## 4.10 PARKLAND AND RECREATIONAL RESOURCES

Following the identification of the parkland and recreational resources, an analysis of potential impacts resulting from the construction of the TSM and Build Alternative Options including the ALC was performed. Resources located within the proposed 600-foot-wide (183 meter) corridor were identified. The boundaries associated with these resources were compared with estimated construction limits using location study orthophoto mapping to determine the amount of property to be used by the proposed project.

### 4.10.1 Methodology and Assumptions

Section 4(f) of the Department of Transportation Act of 1966 makes provisions for the preservation of public parks and recreational lands, wildlife and waterfowl refuges, and historic sites. Under Section 4(f), in order to gain approval for a project which uses the public lands mentioned above, it must be determined that "there is no feasible or prudent alternative to the use of the land," and planning to "minimize harm" to the land must be considered (49 U.S.C. Section 303).

Parklands and recreational resources located within one mile (1.61 kilometers) of the TSM and Build Alternative Options were identified for this analysis. The following general types of parklands and recreational resources were identified:

- Federal and State Parklands
- Regional and Local Parks
- Wildlife Management Areas (where recreational opportunities exist)

Following the identification of the above resource types, an analysis of the resource in relation to alternatives was performed in order to determine the potential impacts resulting from the construction of the I-73 project. Recreational resources located in proximity to the ALC and the Build Alterative Options are listed in Table 4.10-1 and shown on Figures 4.10-1 through 4.10-4. These resources are also described in the Parks and Recreation Areas Technical Memorandum (VDOT, 2000).

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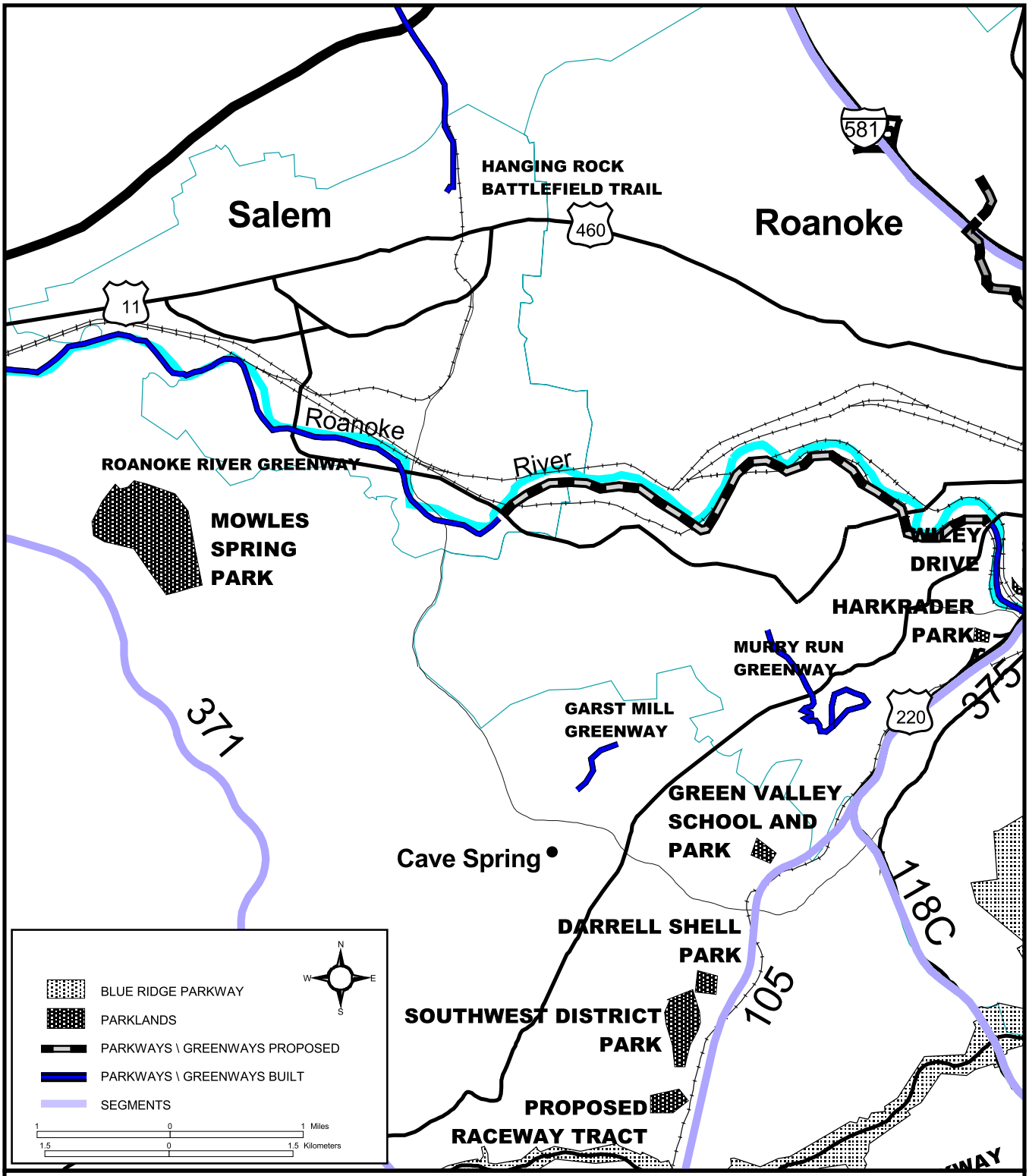
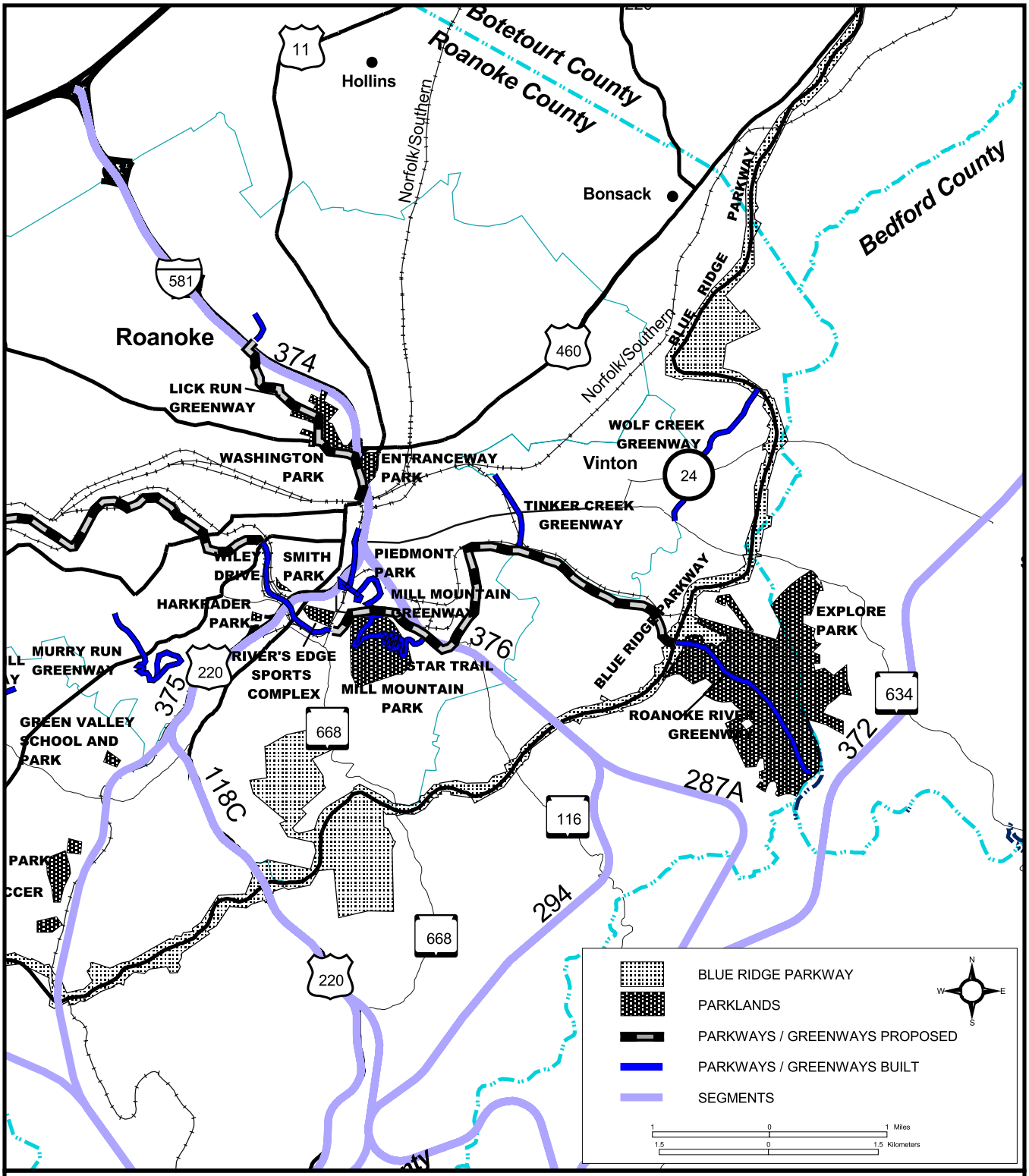
**Table 4.10-1**
**STUDY AREA RECREATIONAL RESOURCES SERVED**
**BY ALTERNATIVE SEGMENTS**

| Alternative Segment | Name of Resource | Location | Built/ Proposed |
|---|---|---|---|
| 372 | Appalachian Trail | Botetourt County | Built |
| 371, 376, 118C, 105, 372 (ALC | Blue Ridge Parkway | Roanoke County / Botetourt County | Built |
| 287A, 372 | Explore Park, Roanoke River Parkway | Roanoke County | Built |
| 376 | Mill Mountain Park | Roanoke City | Built |
| 192A | Waid Recreation Area | Franklin County | Built |
| 153 (ALC) | Franklin County Recreation Park | Franklin County | Built |
| 372 | Blue Ridge Boxley Fields | Botetourt County | Built |
| 374 (ALC) | Washington Park | Roanoke City | Built |
| 374 (ALC) | Entranceway Park | Roanoke City | Built |
| 374, 376 (ALC) | Mill Mountain Greenway | Roanoke City | Built |
| 374 (ALC) | Lick Run Greenway (Phase I) | Roanoke City | Built |
| 374 (ALC) | Lick Run Greenway (Phases II, III) | Roanoke City | Proposed |
| 374 (ALC) | Piedmont Park | Roanoke City | Built |
| 375 (ALC) | Roanoke River (Wiley Drive) Greenway | Roanoke City | Built |
| 374* (ALC) | Roanoke River Greenway (remaining portion) | Roanoke City/ Salem City | Proposed |
| 375 (ALC) | Harkrader Park | Roanoke City | Built |
| 375 (ALC) | Smith Park | Roanoke City | Built |
| 375 (ALC) | River's Edge Sports Complex | Roanoke City | Built |
| 376* | Mill Mountain Star Trail (Greenway) | Roanoke City | Built |
| 376* | Tinker Creek Greenway | Roanoke City/ Vinton City | Built |
| 105 | Darrell Shell Park | Roanoke County | Built |
| 105 | Southwest District Park | Roanoke County | Built |
| 105 | Raceway Tract | Roanoke County | Proposed |
| 105 | Green Valley School and Park | Roanoke County | Built |
| 105* | Murray Run Greenway | Roanoke County | Built |
| 371* | Garst Mill Greenway | Roanoke County | Built |
| 372* | Wolf Creek Greenway | Roanoke County | Built |
| 371 | Mowles Spring Park | Salem City | Built |
| 374* (ALC) | Hanging Rock Greenway | Salem City/ Roanoke County | Built |
| 375 (ALC) | Roanoke River (David Smith Trail) Greenway | Salem City | Built |
| 383 | LARC Ballfield | Franklin County | Built |



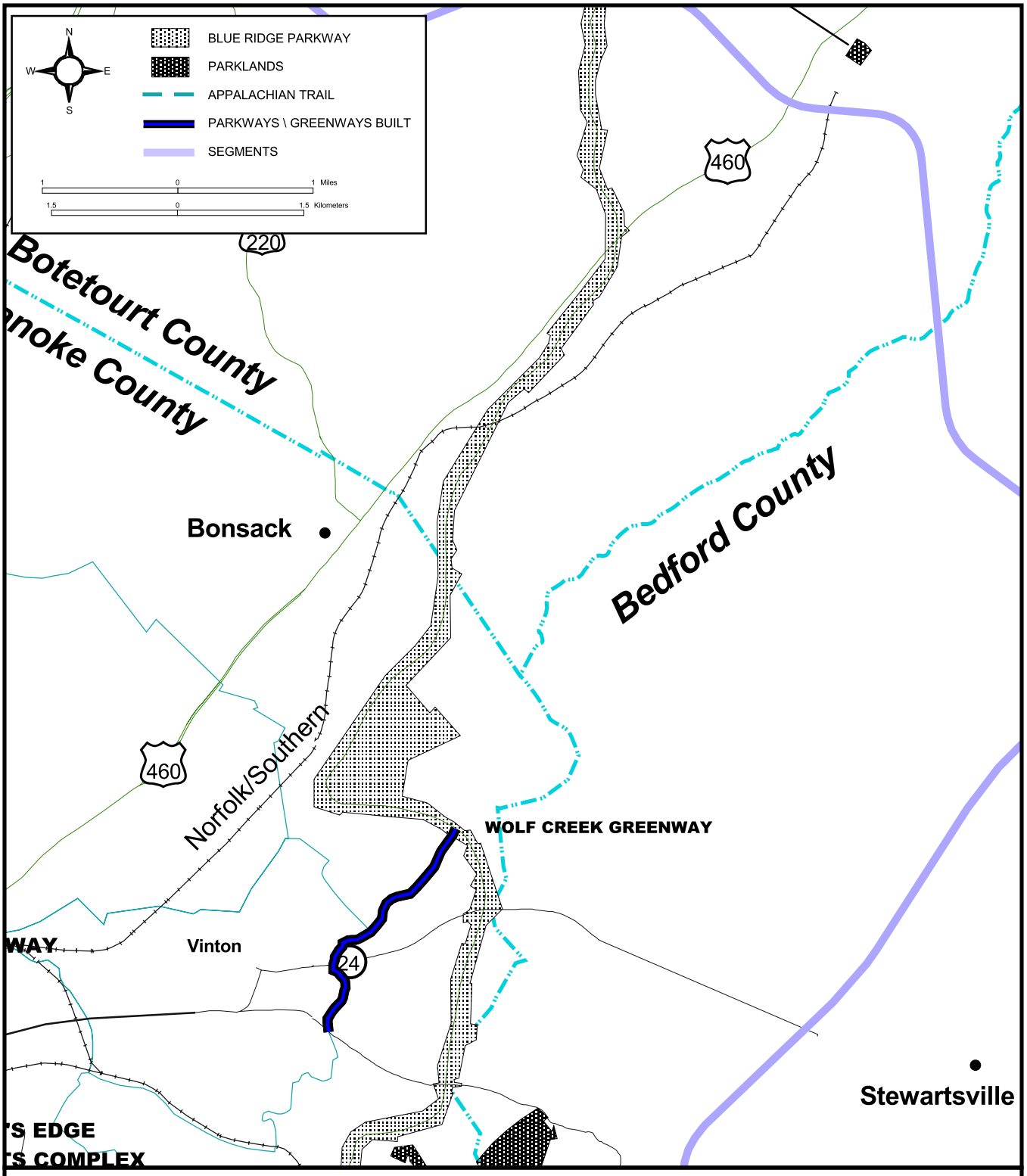

I-73 Location Study

**FIGURE 4.10-1**
**PARKLANDS AND RECREATIONAL RESOURCES**
**(SEGMENTS 105 AND 371)**



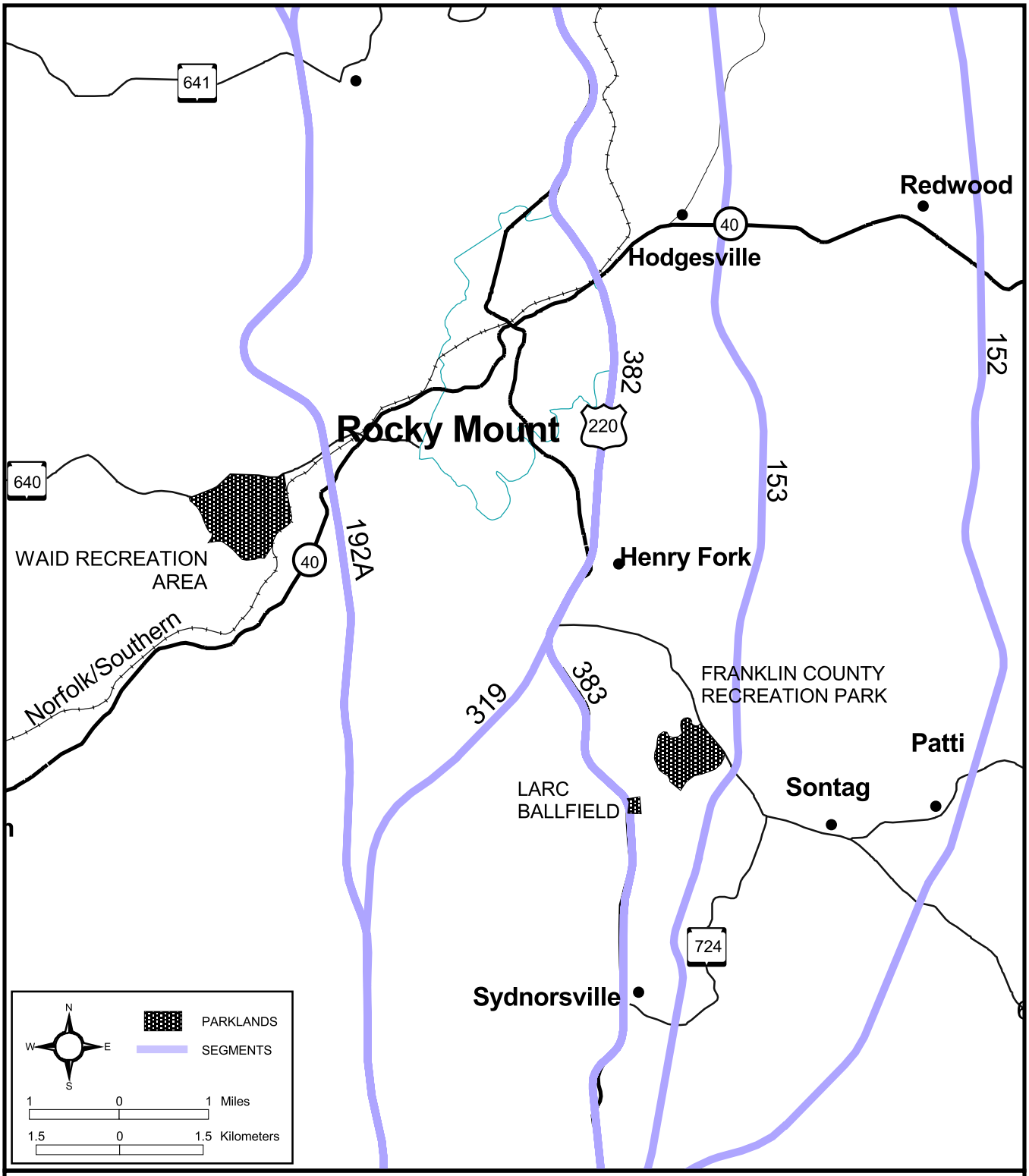

I-73 Location Study

**FIGURE 4.10-2**
**PARKLANDS AND RECREATIONAL RESOURCES**
**(SEGMENTS 118C, 287A, 372, 374, 375, AND 376)**




FUTURE 73 I-73 Location Study

**FIGURE 4.10-3**
**PARKLANDS AND RECREATIONAL RESOURCES**
**(SEGMENT 372)**




I-73 Location Study

**FIGURE 4.10-4**
**PARKLANDS AND RECREATIONAL RESOURCES**
**(SEGMENTS 153, 192A, AND 383)**

### 4.10.2 Environmental Consequences

The implementation of either the No-Build Alternative or the TSM Alternative will not result in the impact of any park or recreation resource located in the study area. Also, none of the Build Alternatives Options, including the ALC, will impact any land associated with existing or proposed Roanoke Valley Greenways as these alternatives utilize existing or proposed structures that pass over the Greenway resource. However, the construction of some of the Build Alternative Options will result in the direct use of property associated with the Blue Ridge Parkway. Build Alternative Options 2b, 3, 3b, and 3c and the ALC will use the existing VDOT right-of-way at the existing Route 220 crossing of the Blue Ridge Parkway and therefore, will not require any land associated with the Blue Ridge Parkway. All other Build Alternatives would cross the Blue Ridge Parkway at new locations and therefore, use land from the parkway. Table 4.10-2 lists those roadway segments associated with each of the Build Alternative Options, including the ALC that will cross Blue Ridge Parkway in the study area.

**Table 4.10-2**
**POTENTIAL CROSSINGS OF THE BLUE RIDGE PARKWAY**
**BY BUILD ALTERNATIVE SEGMENTS**

| Option Number | Segment Number | Parkway Milepost Crossing | Amount of Parkland Used |
|---|---|---|---|
| 1 and 1a | Segment 372 | 103.6 | 3.73 acres (1.5 hectares) |
| 2, 2a and 2c | Segment 376 | 116.9 | 2.24 acres (0.906 hectares) |
| 2b, 3, 3b and 3c | Segment 118C | 121.4 | 0.0 acres (0.0 hectares) |
| 3a | Segment 105 | 124.1 | 3.37 acres (1.36 hectares) |
| 4 | Segment 371 | 126.5 | 4.04 acres (1.63 hectares) |
| ALC | Segment 118C | 121.4 | 0.0 acres (0.0 hectares) |

Options 1 and 1a (Segment 372) would cross the Blue Ridge Parkway in Botetourt County, north of U.S. Route 460 near the end of Parrvish Drive and Leonard Farm Road. The Blue Ridge Parkway crossing in this location is proposed as an under-crossing.

Options 2, 2a and 2c (Segment 376) would cross over the Blue Ridge Parkway in Roanoke County at milepost 116.9, approximately 1.5 miles (2.4 kilometers) west of Explore Park. Options 2b, 3, 3b and 3c (Segment 118C) would use the existing crossing of the Blue Ridge Parkway at U.S. Route 220. The crossing at this location is proposed to pass under the Blue Ridge Parkway as it is currently used today. VDOT owns 160 feet of right-of-way that already bisects the Blue Ridge Parkway at Route 220. The NPS owns the bridge that carries the Blue Ridge Parkway over Route 220, with rights to occupy VDOT right-of-way to maintain the bridge at this location.. In accordance with the NPS' master plan for the parkway, the NPS is proposing to eliminate access to and from the Blue Ridge Parkway at this location. Closure of the access points will be addressed by the NPS under a separate environmental process.

Option 3a (Segment 105) would cross under the Blue Ridge Parkway and would be located west of the Buck Mountain Overlook. Option 4 (Segment 371) would cross the Blue Ridge Parkway in the vicinity of Poages Mill on U.S. Route 221 in the Back Creek community of Roanoke County. ALC (Segment 118C) would cross under the Blue Ridge Parkway in Roanoke County at milepost 121.4. This is similar to Options 2b, 3, 3b and 3c. The crossing at this location is proposed to cross under the Blue Ridge Parkway as it is currently used today. VDOT owns 160 feet of right-of-way that bisects the Blue Ridge Parkway at Route 220. The NPS owns the bridge that carries the Blue Ridge Parkway over Route 220, with rights to occupy VDOT right-of-way to maintain the bridge at this location. In the draft EIS, VDOT had proposed to replace the existing on/off ramps between the BRP and Route 220 with a diamond interchange. However, in accordance with the NPS's policy to not allow a direct connection between the BRP and the Interstate system, the existing access at Route 220 will now be eliminated and the ramps removed. To mitigate the impact associated with the closure of the BRP access point at this location, VDOT is proposing two alternatives in the Clearbrook area that would provide access to the BRP off of Buck Mountain Road and be implemented as part of the I-73 project. These two alternatives have been evaluated from the perspective of archeological and architectural resources,

threatened and endangered species, hazardous materials, water quality, agricultural-forestal districts, prime farmlands, and other resources and no significant impacts are anticipated let alone significant impacts not already considered in the draft EIS. The final decision on a particular alternative will be made after the environmental process is completed for I-73, further coordination with the NPS is carried out, and after the NPS has had the opportunity to comply with any NEPA requirements that their agency must satisfy prior to granting new access.

### 4.10.3 Coordination

The analysis revealed that only one parkland resource, the Blue Ridge Parkway, would be impacted by the proposed project depending upon the alternative selected. Based on coordination with the NPS, the Route 220 crossing of the Blue Ridge Parkway by I-73 is their preferred alternative of the crossing alternatives that were under consideration. Because the ALC will not use property from the Blue Ridge Parkway, avoidance alternatives were not considered for the ALC. Coordination between the NPS, VDOT and FHWA was established following the identification of the ALC in an effort to address design issues and limit the potential effects associated with the proposed crossing of the Blue Ridge Parkway by I-73, and this coordination has been ongoing since. When Segment 376 was part of the ALC, FHWA and VDOT initiated the development of a design Memorandum of Agreement with the NPS to address many of the design issues associated with the crossing. With the elimination of Segment 376 from the ALC for Segment 118C, the design Memorandum of Agreement is no longer being pursued. Notwithstanding, the NPS, FHWA, VDOT, the Virginia Department of Historic Resources, and the Advisory Council on Historic Preservation have executed a Section 106 Memorandum of Agreement that documents the measures that will be implemented to minimize the adverse effect of I-73 on the qualities and features that qualify the Blue Ridge Parkway for the National Register of Historic Places. This coordination is referenced in the Comments and Responses To DEIS section of this document (Appendix C).

### 4.10.4 Section 4(f) and the ALC

Section 4(f) of the Department of Transportation Act of 1966 makes provisions for the preservation of public parks and recreational lands, wildlife and waterfowl refuges, and historic sites. Under Section 4(f), the Federal Highway Administration is unable to approve the location of a project that uses land, either directly or constructively, from a resource protected by Section 4(f) unless there are no prudent and feasible avoidance alternatives and all planning to minimize harm has been considered.

#### 4.10.4.1 Section 4(f) Direct Use

Table 4.10-1 identifies the park and recreational resources that have been identified in the study area and the alternatives that are located in close proximity to or adjacent to those resources. The ALC will not use any land from the park and recreational resources that have been identified. The ALC will cross the BRP at the location of the existing Route 220 crossing, and VDOT owns 160 feet of right of way that bisects the BRP at this location. The NPS owns the bridge that carries the BRP over Route 220, with rights to occupy VDOT right-of-way to maintain their bridge. VDOT intends to use an urban design for I-73 at this location in order to stay within their existing 160 foot right-of-way and avoid any use of parkway property. Accordingly, there will be no Section 4(f) direct use of the BRP resulting from the crossing of I-73 at this location. This conclusion is based on the fact that VDOT would not provide direct access to the BRP from I-73 at this location as proposed in the draft EIS. This is in keeping with a NPS policy not to provide direct access to the BRP from the Interstate system. Instead, VDOT would eliminate the existing ramps that provide access to Route 220 by obliterating the pavement and returning the ground to a natural condition.

Based on coordination with the NPS-BRP and Roanoke County, VDOT is committed to replacing access to the BRP, which will be lost with the closure of the Route 220 access. VDOT is considering a couple of locations in the vicinity of Clearbrook where access to the BRP would be replaced by providing a connection to a secondary road such as Buck Mountain Road. While new access would result in property within the boundaries of the BRP being converted from a natural state to a paved road, the NPS would retain ownership

of the property within its boundaries and be responsible for its maintenance. Therefore, the new access will not represent a Section 4(f) direct use of the BRP.

The areas where the connection is being considered have been evaluated for historic resources. The potential for finding significant archeological resources, let alone archeological resources worthy of preservation in place, is extremely low. This conclusion is based on the steep topography of the area and the results of previous surveys (March of 2004 for this project and September 1998 for a proposed Virginia Gas Company pipeline). Likewise, no significant architectural resources have been identified that would be used by either connection.

Section 4(f) applies to all historic sites that are on or eligible for the National Register of Historic Places. Table 4.9-2 lists the historic resources that have been identified for the study area including the ones associated with the ALC alignment. As a result of design work performed to date, the ALC will not directly use any property associated with a historic site, including the Blue Ridge Parkway, which is addressed above.

Section 4(f) applies to all archeological sites that are on or eligible for the National Register of Historic Places provided they are worthy of preservation in place. The ALC will not directly use property from any archeological sites meeting these criteria. No Civil War battlefields have been identified in the study area.

#### 4.10.4.2 Section 4(f) Constructive Use

A Section 4(f) constructive use occurs when a transportation project does not directly use land from a Section 4(f) resource but the proximity impacts of the project are so severe that the protected activities, features or attributes that qualify a resource for protection under Section 4(f) are substantially impaired. Constructive use was considered for the ALC.

While the NPS will retain ownership of the land within the BRP, which would be used to accommodate the new access, FHWA also reviewed the new access to determine if its proximity to the BRP results in a Section 4(f) constructive use of the BRP. Based on this review and in accordance with 23 CFR Part 771.135(p)(5)(viii), FHWA has determined that this new access would not constitute a Section 4(f) constructive use since the change in access will not substantially diminish the utilization of the Section 4(f) resource. Further, the new access will replace the access that is being lost at the Route 220 crossing with the closure of those access ramps.

A review of Figures 4.10-1 through 4 shows that many of the park and recreational resources in the vicinity of the ALC are located in the City of Roanoke urbanized area adjacent to or among existing development and adjacent to highly traveled roadways (i.e. Interstate 581 and U.S. Route 220) and/or railroad tracks. These parks include Washington Park, Entranceway Park, Rivers Edge Sports Complex, Harkrader Park, Smith Park, and Piedmont Park. Because the ALC will use the existing alignment of Interstate 581 and U.S. Route 220 through the urbanized area, the spatial relationship of the proposed project to these parks and recreational areas will be similar to the relationship that currently exists between these parks and the existing transportation system. In other words, introduction of an Interstate facility along the existing alignment will not introduce any features that are inconsistent with the existing setting. Consequently, the setting of these parks has already been compromised by existing development and the transportation system and the setting is not conducive to quiet. In some cases, the parks themselves are significant for the recreational features or amenities that they provide such as youth and adult sport facilities and as such, the qualities that make the park significant are not adversely affected by surrounding development and do not require a quiet setting. Therefore, the proximity of Interstate 73 to these park and recreational resources will not constructively use these resources for purposes of Section 4(f) by substantially impairing the activities, features or attributes that qualify the resource for protection.

Franklin County Recreation Park is located southeast of Rocky Mount off of Route 619. The ALC would be located approximately a quarter mile from the park. The park has tennis courts, basketball/volleyball court, playgrounds, picnic shelters, soccer fields, baseball/softball fields, an amphitheater, and hiking/mountain bike trails. Given that these activities are not considered noise sensitive requiring a quiet setting, the proximity of

Interstate 73 to the park will not constructively use the park or interfere with the public's use of the park for the recreational purposes intended.

None of the historic resources associated with the ALC that are identified in Table 4.9-2 will experience a constructive use because of I-73. In accordance with 23 CFR § 771.135(p)(5)(i), a constructive use does not occur when compliance with the requirements of Section 106 of the National Historic Preservation Act result in a "no effect" or "no adverse effect" determination for those resources. The BRP, the only historic resource that will be adversely effected by I-73, will not experience a constructive use because of the proximity of I-73 to the parkway. The setting of the BRP at the location where I-73 would cross is already impaired by a four-lane principle arterial facility and adjacent residential and commercial development. As a result, the visual and esthetic qualities of the parkway at this location are already impaired. Consequently, the proximity of I-73 to the BRP will not substantially impair the parkway.

No archeological resources worthy of preservation in place have been identified. Therefore, I-73 will not constructively use any archeological sites protected by Section 4(f).

Recently, the City of Roanoke amended the Code of the City of Roanoke by adding a new definition of "park" that reads: "The term "park" as used in this Article, shall mean any land, water, right-of-way, or way owned or managed by the City that is designated in the City's comprehensive plan as a park, or which is administered by the City as such, including, but not limited to, the Carvins Cove Natural Reserve (as defined in §35-14), and all of the City-owned lands contiguous to and along the Roanoke River, Mill Mountain, and the Fishburn Parkway and Blue Ridge Parkway." FHWA and VDOT have reviewed the study area in light of this definition and determined that it does not create any concerns with respect to Section 4(f). Specifically, the ALC will not use any land associated with the Carvins Cove Natural Reserve or any City-owned lands contiguous to and along the Roanoke River, Mill Mountain, and the Fishburn Parkway and Blue Ridge Parkway. Further, constructive use isn't a concern with these resources being designated as "park" by the City, including City-owned land adjacent to these resources. In accordance with 23 CFR § 771.135(p)(5)(iv), constructive use doesn't apply when an applicant's adoption of a project's location established the location for a proposed transportation project before the designation, establishment or change in the significance of a resource.

## 4.11 INDIRECT EFFECTS AND CUMULATIVE IMPACTS

This section identifies and assesses the indirect (i.e., secondary and tertiary) effects and the cumulative impacts associated with construction and operation of the ALC. This review provides a discussion of the land use, keystone natural resources, and traffic related impacts. The local context evaluation describes the relationship of local short-term uses versus long-term productivity as well as the irreversible and irretrievable commitment of resources.

Indirect effects are those effects that are expected to be "caused" by the proposed action but are later in time or are removed in distance, but are still reasonably foreseeable (40 CFR 1508.8(b)). Cumulative impacts are those which result from the incremental consequences of an action when added to other past, present and reasonably foreseeable future actions (40 CFR 1508.7). FHWA has developed a position paper on this subject (1992) which is the basis for this analysis. According to the guidance provided in this paper, critical decision-making for FHWA projects has been based upon "direct impacts" which are measurable, easy to verify, and depict a direct cause and effect relationship between an action and its consequences. Prior to the completion of the draft Environmental Impact Statement, EPA met with FHWA and VDOT and recommended that indirect impacts be assessed for I-73 using a one-mile radius around interchanges and assuming that the area would develop by the design year of the project. This analysis is based on that recommendation.

In total, the action would entail the construction of 71.71miles of new or improved limited access highway (the proposed Virginia Interstate 73 or "I-73"). The proposed ALC corridor encompasses construction limits that will range from 126 feet out-to-out for a typical six-lane section to 221.3 feet out-to-out for a typical six-lane section with two-lane collector-distributor roads. As discussed in section 2.0 of this document, the ALC would entail modification of eight existing interchanges along I-581and U.S. Route 220 and the construction of 13 new interchanges. The assessment area (or action area) for the proposed ALC encompasses those areas potentially affected by direct effects (i.e., those within proposed limits of construction) and indirect effects (i.e., potential interchange- induced development within a one-mile radius of each proposed interchange). Direct effects (quantified in previous section of this document) are discussed in this section from the perspective of cumulative impacts only.

### 4.11.1 Indirect Effects

Council on the Environment (CEQ) regulations (specifically 40 CFR 1508.8(b)), define indirect effects as:

> Those effects "….which are caused by the action and are later in time or farther removed in distance, but are still reasonably foreseeable."

CEQ regulations (specifically 40 CFR 1508.8(b)), further state that:

> "Indirect effects may include growth inducing effects and other effects related to induced changes in the pattern of land use, population density or growth rate, and related effects on air and water and other natural systems, including ecosystems."

A zone of potential influence having a one-mile radius (or 2,011 acres) was utilized at each of the ALC interchange locations. This zone of influence was developed to estimate reasonably foreseeable indirect effects which could result from induced development in and around proposed ALC interchanges. After deducting the 0.25-mile radius of direct interchange effects and a 300-foot-wide interchange construction footprint, the acreage of indirect effects within each of the one-mile-radius assessment areas totals 1,764 acres.

Primary factors affecting growth and land management practices specific to the proposed action and study area were developed in order to guide an analysis of secondary impacts at proposed interchange locations. Proposed interchange locations were analyzed because they were determined to be the areas most likely to be subjected to secondary impacts resulting from selection of any of the Build Alternative Options considered in the Draft EIS. Spatial data utilized as part of this assessment includes:

- The study area base map of existing land uses, including currently developed areas
- Currently undeveloped lands (including agricultural and forest lands)
- Growth areas (as mapped in future land use map sets of most recently available local land use plans) and accompanying policy statements (as also set forth in most recently available local land use plans)
- Study area wetlands mapping
- Study area prime agriculture mapping

Existing land use maps were reviewed to identify a general inventory of currently developed and undeveloped land within the study area. Existing commercial/industrial, residential, and parkland/public areas are considered developed land. Agricultural and forested areas are considered undeveloped. Prime agricultural and wetland areas, which also are considered undeveloped, are given special consideration under this analysis.

The future land use map (Table 3.2-4) provides a projection of how development may occur in the foreseeable horizon year. This map was developed based on use of most recently available information (primarily comprehensive plans) and coordination with the local governments. Future land use designations are, as expected, more general than what is identified as the existing land use conditions. The actual distribution of land that will be developed as residential and commercial/industrial is not well defined for some jurisdictions. It is more important to view these land uses as a combined resource for determining the total acreage to be considered "developed" land in the future. The generalization of future land uses also makes it unrealistic to predict the impact of future development on parkland, public land, prime agricultural property, and wetlands. For this reason, the acreage designated for these land uses are held constant for the existing and future conditions.

Table 4.11-1 summarizes the existing and future acreages by land use category with the net change. Although several of the comprehensive plans made mention of a proposed I-73, these plans treated I-73 only as a possible long-range project for which no specific alignment had yet been identified. Accordingly, local comprehensive land use plans were developed independent of a proposed I-73 project and, as such, reflect a no-build scenario with respect to I-73. The existing land use data indicate that approximately 99,752 acres (40,000 hectares) or 16.6 percent of the total land within the study area is currently developed as commercial, industrial, park, public or residential land use. The future land use plans suggest that the total amount of acreage planned for conversion from undeveloped to similar developed land use is approximately 138,559 acres (56,000 hectares). This would increase the amount of developed land within the study area to 39.7 percent, leaving approximately 60 percent of the area undeveloped.

**Table 4.11-1**
**STUDY AREA TOTAL LAND USE CONVERSIONS BY CATEGORY (NO-BUILD SCENARIO)**

| | **Commercial and Industrial** | | **Forest** | | **Open Space, Pastureland, Agriculture, and Wetlands** | | **Parks** | | **Public Facilities** | | **Residential** | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Acres | Hectares | Acres | Hectares | Acres | Hectares | Acres | Hectares | Acres | Hectares | Acres | Hectares |
| **Existing** | 21,041 | 8,515 | 371,067 | 150,171 | 130,092 | 52,648 | 6,338 | 2,565 | 1,144 | 463 | 71,229 | 28,826 |
| **Future** | 101,548 | 41,096 | 269,289 | 108,981 | 93,311 | 37,763 | 6,338 | 2,565 | 1,144 | 463 | 129,281 | 52,320 |
| **Change** | 80,507 | 32,581 | -101,778 | -41,190 | -36,781 | -14,885 | 0 | 0 | 0 | 0 | 58,052 | 23,494 |

An analysis was then conducted to determine the amount of land that would be converted from an undeveloped to developed status due to the construction of I-73 Build Alternatives. Table 4.11-2 provides a summary of this analysis. A 600-foot (183-meter) buffer along each alignment plus a ¼ mile buffer for each proposed interchange was used to calculate the amount of undeveloped land that would be developed for highway use that is not accounted for in the local comprehensive plans. These buffers exaggerate the impacts since most of the highway footprint will be well within 600 feet (183 meters); however, for the purpose

of comparison, a maximum buffer was used. Comparison of existing land use effects (Table 4.11-1) and future land use effects (Table 4.11-2) demonstrates (1) that a net loss of forest lands and agricultural lands is projected by localities within the region under current Comprehensive Plans, (2) that this net loss will occur independent of construction of I-73, and (3) that any future Build Alternative would impact a relatively smaller proportion of forest lands and agricultural lands due to this regionally projected and independent shift from undeveloped to developed land coverage.

Options 3, 3a, 3b, and 3c have the lowest amount of undeveloped land being converted for highway use ranging from approximately 1,800 to 2,100 acres (700 to 900 hectares). These options predominantly follow-along the existing U.S. Route 220 corridor where land already is highly developed. Option 4 had just over 3,000 acres (1,200 hectares) of land converted from undeveloped to developed use based on this analysis. Although Option 4 follows a more rural route than most other options, the shorter length of this option and the limited number of proposed interchanges reduced the acreage of land conversion. Although different in character, the amount of land converted from undeveloped to highway for Options 1 and 1a is similar to Options 2, 2a, 2b, and 2c ranging from 4,000 to 4,500 acres (1,600 to 1,800 hectares). Options 1 and 1a are slightly longer in distance and follow a more rural route than Options 2, 2a, 2b, and 2c but have seven to 14 fewer interchanges.

**Table 4.11-2**
**FUTURE UNDEVELOPED LAND CONVERTED TO HIGHWAY USE**

| Build Alternative | Forest | | Open Space, Pastureland, Agriculture, and Wetlands | | Total | |
|---|---|---|---|---|---|---|
| | Acres | Hectares | Acres | Hectares | Acres | Hectares |
| Option 1 | 3,333 | 1,349 | 1,133 | 459 | 4,466 | 1,808 |
| Option 1a | 3,145 | 1,273 | 886 | 359 | 4,031 | 1,632 |
| Option 2 | 2,914 | 1,179 | 1,344 | 544 | 4,258 | 1,723 |
| Option 2a | 2,684 | 1,086 | 1,432 | 580 | 4,116 | 1,666 |
| Option 2b | 2,605 | 1,054 | 1,363 | 552 | 3,968 | 1,606 |
| Option 2c | 2,779 | 1,125 | 1,429 | 578 | 4,208 | 1,703 |
| Option 3 | 1,324 | 536 | 572 | 231 | 1,896 | 767 |
| Option 3a | 1,534 | 621 | 519 | 210 | 2,053 | 831 |
| Option 3b | 1,592 | 644 | 549 | 222 | 2,141 | 866 |
| Option 3c | 1,230 | 498 | 563 | 228 | 1,793 | 726 |
| Option 4 | 2,359 | 955 | 652 | 264 | 3,011 | 1,219 |
| ALC | 3,138 | 1,270 | 1,236 | 500 | 4,374 | 1,770 |

The ALC has a total conversion of land similar to Option 1 with 4,374 undeveloped acres (1,770 hectares) being used for the highway. This amount represents 0.7 percent of the total study area and 0.95 percent of the future undeveloped land within the study area.

Table 4.11-3 provides a summary of the land use acreage associated with the impact areas for each build option. The number of proposed interchanges per option range from 14 (Option 4) to 28 (Option 2b). For each option, between 22,859 acres (9,252 hectares) and 37,598 acres (15,215 hectares) was evaluated for secondary impacts at potential interchange locations.

**Table 4.11-3**
**SUMMARY OF SECONDARY IMPACT AREAS BY OPTION**
**IN ACRES (HECTARES)**

| | | Commercial and Industrial | | Forest | | Open Space, Pastureland, Agriculture, and Wetlands | | Parks | | Public Facilities | | Residential | | Total | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Acres | Hect. | Acres | Hect. | Acres | Hect. | Acres | Hect. | Acres | Hect. | Acres | Hect. | Acres | Hect. |
| Option 1 | Existing | 464 | 188 | 15,472 | 6,261 | 7,600 | 3,076 | 0 | 0 | 7 | 3 | 2,367 | 958 | 25,910 | 10,486 |
| | Future | 7,967 | 3,224 | 8,849 | 3,581 | 5,102 | 2,065 | 0 | 0 | 7 | 3 | 3,985 | 1,613 | 25,910 | 10,486 |
| | Change | 7,503 | 3,036 | -6,623 | -2,680 | -2,498 | -1,011 | 0 | 0 | 0 | 0 | 1,618 | 655 | 0 | 0 |
| Option 1a | Existing | 539 | 218 | 15,973 | 6,464 | 6,839 | 2,768 | 0 | 0 | 7 | 3 | 2,533 | 1,025 | 25,891 | 10,478 |
| | Future | 8,218 | 3,326 | 7,999 | 3,237 | 3,448 | 1,395 | 0 | 0 | 7 | 3 | 6,219 | 2,517 | 25,891 | 10,478 |
| | Change | 7,679 | 3,108 | -7,974 | -3,227 | -3,391 | -1,373 | 0 | 0 | 0 | 0 | 3,686 | 1,492 | 0 | 0 |
| Option 2 | Existing | 3,169 | 1,282 | 15,131 | 6,124 | 6,665 | 2,697 | 234 | 95 | 105 | 42 | 5,675 | 2,297 | 30,979 | 12,537 |
| | Future | 10,739 | 4,346 | 8,734 | 3,535 | 5,028 | 2,035 | 234 | 95 | 105 | 42 | 6,139 | 2,484 | 30,979 | 12,537 |
| | Change | 7,570 | 3,064 | -6,397 | -2,589 | -1,637 | -662 | 0 | 0 | 0 | 0 | 464 | 187 | 0 | 0 |
| Option 2a | Existing | 3,169 | 1,282 | 15,405 | 6,234 | 6,930 | 2,805 | 234 | 95 | 104 | 42 | 5,679 | 2,298 | 31,521 | 12,756 |
| | Future | 10,739 | 4,346 | 9,008 | 3,645 | 5,294 | 2,142 | 234 | 95 | 104 | 42 | 6,142 | 2,486 | 31,521 | 12,756 |
| | Change | 7,570 | 3,064 | -6,397 | -2,589 | -1,636 | -663 | 0 | 0 | 0 | 0 | 463 | 188 | 0 | 0 |
| Option 2b | Existing | 3,772 | 1,527 | 17,977 | 7,274 | 7,000 | 2,833 | 1,034 | 418 | 190 | 77 | 7,625 | 3,086 | 37,598 | 15,215 |
| | Future | 11,683 | 4,728 | 10,495 | 4,247 | 5,362 | 2,170 | 1,034 | 418 | 190 | 77 | 8,834 | 3,575 | 37,598 | 15,215 |
| | Change | 7,911 | 3,201 | -7,482 | -3,027 | -1,638 | -663 | 0 | 0 | 0 | 0 | 1,209 | 489 | 0 | 0 |
| Option 2c | Existing | 3,191 | 1,291 | 15,131 | 6,124 | 6,669 | 2,699 | 234 | 95 | 105 | 42 | 5,647 | 2,285 | 30,977 | 12,536 |
| | Future | 10,762 | 4,355 | 8,732 | 3,534 | 5,033 | 2,037 | 234 | 95 | 105 | 42 | 6,111 | 2,473 | 30,977 | 12,536 |
| | Change | 7,571 | 3,064 | -6,399 | -2,590 | -1,636 | -662 | 0 | 0 | 0 | 0 | 464 | 188 | 0 | 0 |
| Option 3 | Existing | 4,200 | 1,700 | 18,312 | 7,411 | 4,523 | 1,830 | 1,034 | 418 | 308 | 125 | 7,617 | 3,083 | 35,994 | 14,567 |
| | Future | 12,250 | 4,958 | 9,031 | 3,655 | 2,918 | 1,181 | 1,034 | 418 | 308 | 125 | 10,453 | 4,230 | 35,994 | 14,567 |
| | Change | 8,050 | 3,258 | -9,281 | -3,756 | -1,605 | -649 | 0 | 0 | 0 | 0 | 2,836 | 1,147 | 0 | 0 |
| Option 3a | Existing | 4,077 | 1,650 | 16,903 | 6,841 | 4,452 | 1,802 | 469 | 190 | 311 | 126 | 7,262 | 2,939 | 33,474 | 13,548 |
| | Future | 11,954 | 4,838 | 8,178 | 3,310 | 2,849 | 1,153 | 469 | 190 | 311 | 126 | 9,713 | 3,931 | 33,474 | 13,548 |
| | Change | 7,877 | 3,188 | -8,725 | -3,531 | -1,603 | -649 | 0 | 0 | 0 | 0 | 2,451 | 992 | 0 | 0 |
| Option 3b | Existing | 4,200 | 1,700 | 18,294 | 7,404 | 4,540 | 1,837 | 1,034 | 418 | 308 | 125 | 7,624 | 3,085 | 36,000 | 14,569 |
| | Future | 12,250 | 4,958 | 8,989 | 3,638 | 2,936 | 1,188 | 1,034 | 418 | 308 | 125 | 10,483 | 4,242 | 36,000 | 14,569 |
| | Change | 8,050 | 3,258 | -9,305 | -3,766 | -1,604 | -649 | 0 | 0 | 0 | 0 | 2,859 | 1,157 | 0 | 0 |
| Option 3c | Existing | 4,190 | 1,696 | 17,622 | 7,131 | 4,470 | 1,809 | 1,034 | 418 | 303 | 123 | 7,538 | 3,051 | 35,157 | 14,228 |
| | Future | 12,240 | 4,953 | 8,032 | 3,251 | 2,785 | 1,127 | 1,034 | 418 | 303 | 123 | 10,763 | 4,356 | 35,157 | 14,228 |
| | Change | 8,050 | 3,257 | -9,590 | -3,880 | -1,685 | -682 | 0 | 0 | 0 | 0 | 3,225 | 1,305 | 0 | 0 |
| Option 4 | Existing | 793 | 321 | 14,321 | 5,796 | 5,031 | 2,036 | 118 | 48 | 66 | 27 | 2,530 | 1,024 | 22,859 | 9,252 |
| | Future | 8,329 | 3,371 | 6,767 | 2,739 | 3,309 | 1,339 | 118 | 48 | 66 | 27 | 4,270 | 1,728 | 22,859 | 9,252 |
| | Change | 7,536 | 3,050 | -7,554 | -3,057 | -1,722 | -697 | 0 | 0 | 0 | 0 | 1,740 | 704 | 0 | 0 |
| ALC | Existing | 3,419 | 1,384 | 14,577 | 5,899 | 5,954 | 2,410 | 703 | 284 | 146 | 59 | 6,827 | 2,763 | 31,626 | 12,799 |
| | Future | 7,836 | 3,171 | 9,710 | 3,930 | 5,225 | 2,115 | 703 | 284 | 146 | 59 | 8,006 | 3,240 | 31,626 | 12,799 |
| | Change | 4,417 | 1,787 | -4,867 | -1,969 | -729 | -295 | 0 | 0 | 0 | 0 | 1,179 | 477 | 0 | 0 |

The amount of land planned for conversion from undeveloped (forest, open space, pastureland, agriculture, and wetlands) to developed (commercial/industrial or residential) within the secondary impact areas ranges from 5,596 acres (2,264 hectares) for the ALC to 11,365 acres (4,600 hectares) for Option 1a. This indicates that between 17.7 percent (for the ALC) and 43.9 percent (for Option 1a) is already planned for development within the secondary impact buffers around the proposed interchange locations. In fact, for every option other than the ALC, at least 24 percent of the land evaluated for secondary impacts is slated for conversion from undeveloped to developed. This may be an indication that growth in development is already anticipated in these locations with or without the introduction of a new interstate facility. Since growth in development is already planned in these areas, with or without an interstate facility, the secondary impacts from any of the proposed build options would be minimal

The amount of acreage representing wetlands is less than one percent under any of the build options. This suggests that there would be minimal impact on wetlands as a result of any possible secondary impact. Prime agricultural farmland represents from 1.6 percent (Option 2c) to 4.9 percent (Option 4) of the land within the one-mile radius of the interchanges proposed under the build options. Similar to wetlands, it is anticipated that the impact to prime agricultural farmland as a result of possible secondary impacts would be minimal. Protection of such property may depend on the regulatory provisions set forth by the various localities.

These interchange secondary impact areas (as defined above) for the ALC interchanges as a whole encompass significantly less land that is slated for conversion to higher use than any of the other 11 options. As shown in Table 4.11-3 this area for the ALC is 5,596 acres (2,264 hectares). The option that encompasses the next highest amount of land slated for conversion to a higher use is Option 2a with 8,033 acres (3,252 hectares). Option 1a involves the most land, 11,365 acres (4,600 hectares), of this type. The ALC encompasses 42 to 59 percent less land of this type than any of the other options. This can be attributed to the fact that, compared to the interchange locations of each of the other 11 options, the ALC interchange locations are immediately surrounded by areas that, as a whole, contain significantly less land that is slated for conversion to higher use. The following example illustrates the point.

The ALC is comprised of the northern portion of Option 2b and the southern portion of Option 1. The ALC and Option 2b are identical from the north end of the study area southward to the U.S.Route 220 interchange in southern Franklin County. From that point southward, the ALC and Option 1 are identical. Analysis shows that there is a marked difference among the interchange secondary impact areas for the ALC and Option 2b and Option 1 in the amount of land that is slated for conversion to higher use. Option 2b and Option 1 encompass 9,120 acres (3,690 hectares) and 9,121 acres (3,691 hectares), respectively, compared to the 5,596 acres (2,264 hectares) of the ALC. In Roanoke, Bedford, and Botetourt Counties, the ALC and Option 2b encompass approximately 1,600 acres (647 hectares), compared to approximately 5,000 acres (2,023 hectares) for Option 1, of land of this type. The ALC and Option 2b interchanges are located in the urban areas of Roanoke City, areas that are already developed, hence only a small amount of land is available for conversion to higher use. The interchanges of Option 1, however, are located in undeveloped portions of Bedford County and Botetourt County where most of the land is slated for future development. In Franklin County, the interchanges of all three alternatives are located in areas composed mostly of land that is not slated for future development. In Franklin County the three options each encompass slightly less than 350 acres of land to be converted. In Henry County, however, a disparity again is manifested. In this region, the ALC and Option 1 are identical. Each encompasses 3,724 acres (1,507 hectares) of land slated for conversion to higher use. On the other hand, Option 2b encompasses nearly twice that amount, 7,124 acres (2,883 hectares). In southern Henry County, Option 2b interchanges are located in the heart of wide growth corridors, while the ALC and Option 1 interchanges skirt growth corridors or are located in the middle of much narrower growth corridors than the former. The same logic can be applied when comparing the ALC to any of the other options, that is, taking into account the many different interchange locations for each of the options, those of the ALC are buffered by areas that as a whole contain significantly less land that is slated for conversion to a higher use.

With respect to proposed I-73, stormwater runoff associated with potential interchange-induced development would be tertiary in effect, in that, any interchange-induced development would be a secondary effect of

roadway construction and any resulting stormwater runoff would, in turn, be secondary to interchange-induced development. Within zones of potentially induced development surrounding proposed interchanges, the bulk of development is anticipated to occur in upland areas; however, effects to water quality and quantity within headwater streams could be cumulative with respect to downstream segments of perennial streams, particularly the Pigg River, depending upon whether or not developers are required to address stormwater runoff and the amount of overland flow that will occur with runoff before it reaches receiving bodies of water.

Any substantial degree of development induced by new local access at and around proposed interchanges could be expected to contribute to potentially adverse effects to water quality and water quantity within nearby receiving waters. Interchange induced development would cumulatively affect surface water resources and aquatic habitat over a number of years. Specifically, interchange-induced development resulting in the conversion of substantial acreages of forestland to developed properties and even the substantial conversion of forestland to agricultural lands without implementation of appropriate best management practices could lead to changes in surface water drainage patterns, peak rates of runoff, and sediment/pollutant loading.

The Blue Ridge Parkway

The Blue Ridge Parkway also was evaluated for potential indirect effects from the proposed alternative build options. For this analysis, a one-mile buffer on each side of the Blue Ridge Parkway was used to compare the existing development with planned growth. A one-mile buffer for the entire length of the Blue Ridge Parkway within the study area is equivalent to approximately 43,772 acres (17,714 hectares) of land. The sum of the acreage for this buffer on both sides of the Blue Ridge Parkway is considered the impact area for this analysis. Using this approach, acreage of developable and undevelopable land was quantified. Developable land was defined as all agricultural/forest land not considered prime agricultural property or designated as wetlands.

Table 4.11-4 provides a summary of the land use acreage associated with the impact area. The amount of land planned for conversion from undeveloped (agricultural/forest) to developed (residential or commercial/industrial) within the impact area is 12,331 acres (4,990 hectares). This represents a significant amount of land (28 percent) already planned for development within the areas surrounding the Blue Ridge Parkway, which could have an increasing impact on the viewshed of the Parkway. This may be an indication that growth in development is already anticipated in areas adjacent to the Blue Ridge Parkway without the introduction of a new interstate facility since none of the localities immediately adjacent to the Blue Ridge Parkway have included the location of I-73 in their comprehensive plans. With respect to the ALC, since growth in development is already provided in these areas without an interstate facility and because I-73 would follow existing interstate (I-581) and principal arterial (U.S. 220) facilities through the study area in the vicinity of the Blue Ridge Parkway, it is not expected that the ALC would significantly induce development in the vicinity of the parkway. The crossing of the Blue Ridge Parkway by the ALC represents the NPS' preferred crossing because it occurs in a location that is in close proximity to the urbanized area where the surrounding landscape is already developed, developing, or experiencing greater development pressures than other locations and the viewshed is already compromised. In fact, the NPS has proposed to eliminate the existing access to the Blue Ridge Parkway at the Route 220 crossing. By eliminating the access, the NPS would eliminate the primary mechanism by which the ALC could have induced or accelerated development near and adjacent to the Parkway. As for the other build alternatives that were considered, they would have had a greater potential to induce development around proposed interchanges within the viewshed of the Blue Ridge Parkway than the ALC because they would have been located in more rural and undeveloped areas. This is especially true of the eastern and western options (options 1, 1a, and 4). To a lesser degree, option 3a had similar issues. Options 2, 2a, and 2c were the NPS' second choice for a crossing of the Blue Ridge Parkway behind the Route 220 crossing. Although it would have involved a new crossing of the Parkway, it too crossed the Blue Ridge Parkway at a location in close proximity to the urbanized area that is experiencing increasing development pressures

**Table 4.11-4**
**ADJACENT BLUE RIDGE PARKWAY LAND USES**
**EXISTING AND FUTURE IN ACRES (HECTARES)**

| Land Use | Existing | | Future | | Change | |
|---|---|---|---|---|---|---|
| Commercial/Industrial | 925 | (374) | 4,385 | (1,774) | 3,460 | (1,400) |
| Residential | 6,296 | (2,548) | 15,167 | (6,138) | 8,871 | (3,590) |
| Parkland/Public | 5,253 | (2,126) | 5,253 | (2,126) | 0 | (0) |
| Agricultural/Forest | 31,298 | (12,666) | 18,967 | (7,676) | -12,331 | (4,990) |
| Total | 43,772 | (17,714) | 43,772 | (17,714) | 0 | (0) |

Economic Development as an Indirect Effect

A component of the purpose and need for this project is to foster economic development. There are numerous parallel studies which support the relationship between economic development and an improved transportation system. The analysis conducted for the TransAmerica Corridor concluded that there was a magnitude of difference in economic development that would be realized by the corridors under consideration. Partially, the basis for this determination was the impact of travel time savings, operational economies in fuel and maintenance and the economic benefit of reductions in fatalities, personal injury and property damages that accrue to a safer transportation corridor. Secondarily, employers and developers will concentrate their investment around interchanges that link to such facilities all other things being equal such as educational base, quality of life and cultural features of the area. The TransAmerica Corridor Study also concluded that there is a substantive difference in terms of economic development for a roadway conducted to an Interstate design standard versus a roadway conducted to a lesser design standard. While it is not possible to predict the different types of economic development that might occur as a result of the project, it was assumed, like the TranAmerica Corridor Study, that this development would occur around or in close proximity to the interchanges

As referenced in Section 1.4 of this document, two economic impact analyses were conducted on the I-73 corridors initially considered - one by the Virginia Employment Commission (VEC) and one by the Virginia Transportation Research Council (VTRC). The VEC study determined the direct effect that construction of a new interstate would have on highway service sector employment that includes gas stations, restaurants and hotels. Indirect and induced impacts in terms of changes in employment were also calculated for major industry divisions such as agriculture, construction, manufacturing, transportation/communications/utilities, wholesale/retail trade, finance/insurance/real estate, services, and government. The employment compensation resulting from the predicted increase in employment was also calculated. In contrast, the VTRC study did not attempt to identify the specific business sectors in which economic development would occur. Instead, it attempted to capture the sum effect of all types of business activity that included the change in employment, employee compensation, taxable sales, and adjusted gross income. Although both studies differed in magnitude and analytical method, they both found that the U.S. Route 220 corridor provided the greatest economic development potential of the twelve corridors initially under consideration. These studies support the premise regarding the economic development potential of a new interstate facility and the potential number of jobs it might support.

Ultimately, whether or not economic development will come in, will depend upon the ability of the region and localities to attract new or expanding businesses to the area. An improved transportation system and its link to retail markets will improve the attractiveness of the area to businesses, but it is just one factor that influences a business's decision to locate to an area. Other factors include the availability of a skilled and educated work force, the availability of and distance to existing and planned residential development, environmental and quality of life factors, the presence of an infrastructure that is conducive to development (sewer, water, and electrical lines) or the willingness of a locality to provide one, etc. Recognizing that Interstate 73 in Virginia is a component of the longer Interstate 73 high priority corridor designated by Congress, construction phasing and the development of I-73 in other states is another issue that may effect the level and timing of economic development in Virginia. Because of limited funding and the magnitude of

the proposed project, construction would have to occur in stages. At this time, it is too early in project development to predict the phasing of construction. This phasing and the development of the overall corridor in adjoining states are other issues that may affect the ability of the region to attract businesses to the region, the type of businesses willing to locate, and the timing of those relocations.

Recently, FHWA recently completed research on the Economic Development Impacts of Mostly Rural Interstates. The research looked at the impact of several rural interstates on economic development including Interstate 81. While the research seeks to discourage inappropriate extrapolation of the studies, its conclusion regarding the relationship between an improved transportation system and economic development is consistent with the above statements. Specifically, the research concluded “It is difficult to look at the results of this research and agree with those proponents of developing new interstate highways who envision increased employment all along any corridor with an Interstate. Similarly, it is difficult to agree with those opponents of developing new interstate highways who envision increased sprawl and lower income jobs all along any corridor with an Interstate. The results of this research imply that counties with partially successful employment expansion programs will have more successful programs if there is an interstate nearby. For counties where economic development is inhibited by a lack of developable sites or other barriers, the results of this research imply that a new interstate may result in little improvement in the economic development picture. Further, at the direction of Congress, FHWA also recently completed the Economic Development Highways Initiative which reached a similar conclusion. Over 200 state, local, and regional officials, including many elected officials, were consulted by FHWA. The overall results of the initiative support the general linkage between highway improvement and economic development, and validate the contention that highway improvements are a necessary but not sufficient condition for capturing economic growth potential.

In a report titled Economic Impact of I -73 Alignments on the City of Roanoke (February 2000), the City of Roanoke conducted an economic impact analysis of the I-73 alternatives to get a sense of which alternative provided the city with the best economic advantage. The mission of the Roanoke economic impact study was to demonstrate "how any of the alternatives may affect the city's economic base and tax revenues, and whether any of the alternatives may lead to dis-investment in established commercial areas in the City." The Roanoke study did not provide employment, spending or tax revenue forecasts for each of the I-73 alternatives. It did recognize the relationship between transportation and economic activity but the emphasis was comparative in terms of the affect of I-73 directly through town or bypassing the city on the east or west side. Case study reports of bypass facilities in cities equivalent to Roanoke were developed. The Roanoke economic impact study provided an analysis of five factors in which I-73 could influence the city's economic base: expanded access to sites, travel time reduction, shifting of traffic volumes, congestion/delay and business disruptions/relocations.

The No-Build Alternative was felt to have significant economic disadvantages for the city. These disadvantages included increased traffic congestion downtown, degradation of downtown access and downtown attractions, increased travel times from and to Roanoke, to and from other out-of-state destinations, retarded growth in regional distribution facilities, and a reduction in tourist and visitor related activity.

Build Alternative Option 3, or the “Central Alignment” as described in the City’s Economic Impact Report, has the greatest potential benefits to the city but there were risks. The advantages to the city included additional capacity to the I-581/US 220 urban freeway, enhanced access to the downtown area and central city development sites, additional employment and tax base. The risks include inability or reluctance of the city to promote and plan for appropriate urban development and reluctance to provide incentives for economic activity in the central city. Other risks include takings of commercial properties during construction.

Build Alternative Option 4, or the “West Bypass” as described in the City’s Economic Impact Report, has the least opportunity for economic gains but has the least risk to the city. The mountain terrain of the West Bypass limits the amount of developable land in the county and hence would not threaten development patterns in the city. There would be positive travel time savings for long distance travelers to and from the city and impacts upon existing I-581 would be minor.

Build Alternative Option 1, or the "East Bypass" as described in the City's Economic Impact Report, has the greatest risk to the city. The East Bypass opens up new development sites in the eastern counties of Bedford and Botetourt. While this alternative promotes regional growth, it would likely attract commercial investment, trade and tax dollars away from existing businesses in the city. There is also the risk that much of the traffic might use the I-581/U.S. Route 220 corridor to avoid the dog leg in the new I-73 alignment east of the city of Roanoke.

In response to public comment, a Benefit Cost Analysis (BCA) of the ALC was conducted as a Technical Report supplementing the FEIS; however, it was not a factor considered by the decision-makers and for this reason, the cost-benefit analysis did not cover all of the build-alternatives in an effort to try and differentiate between them. As stated in the DEIS, CEQ does not require that a cost-benefit analysis be prepared to comply with NEPA, and their regulations only address circumstances when one is prepared for purposes of making a decision. The BCA evaluated the direct user and non user benefits and compared these benefits to the capital and operating costs of I-73 over the next 30 years. Direct user and non user benefits include travel time savings, reductions in crashes, decline in vehicle operating costs, agency cost reductions and a diminishing of pollution costs. Capital costs include engineering, construction, environmental mitigation and right of way elements. Operating costs include the cost of maintenance and minor repair of the facility over time. The BCA indicates the I-73 project exhibits a positive net present value with benefits exceed cost for all discount rates less than 6.6%. The 30 year Treasury bond yield on bonds sold in November 2004 was 4.84%. A copy of the analysis can be found in Appendix G.

The economic development benefits of long term job growth, economic spending and fiscal revenue enhancement for the I-73 alternatives have not been quantified nor have they been monetized into a dollar figure for comparison to the cost. Other long-term benefits include savings in travel times, reductions in fatalities, injuries and property damage, improved access to undeveloped areas and improved efficiencies in vehicle and roadway operations. These benefits have, to some extent been quantified, but have not been monetized for comparison to project capital costs.

The TransAmerica Corridor Feasibility Study estimated that approximately 69,000 full time equivalent jobs could be added in the Commonwealth through the construction a new freeway type facility paralleling the U.S. Route 460 corridor across the state. Recent research by the U.S. Department of Transportation indicates that for every $1.0 billion invested in the National Highway System approximately 42,100 fulltime equivalent jobs are created. This research supports the TransAmerica study and confirms the economic efficacy of transportation investment. A benefit cost analysis was conducted for the TransAmerica corridor, projecting benefits exceeding costs by a factor of 2.6 to 4.05 times for the build alternatives evaluated. Benefits evaluated in the TransAmerica study were limited to savings in travel time, operating costs and accident/crash reduction.

The formerly referenced U.S. Department of Transportation research conducted by FHWA, provided an analysis of job creation including direct, indirect and induced employment consequences of transportation investment. Using a composite database of 4,532 transportation projects from 1989 to 1993 direct employment impacts were modeled using multiple regression analysis to afford a predictive model of direct job growth resulting from highway investment. Direct employment was defined as full time equivalent, on site, highway construction jobs. Using the FHWA statistical regression model, $1 billion in 1995 highway dollars would support approximately 7,900 direct highway construction jobs.

Indirect employment related to highway transportation construction includes material suppliers (concrete, steel, lumber, aggregates, etc) vendors (equipment, maintenance and suppliers) specialty subcontractors and support services related to inspection, permits and regulation. Induced employment is a measure of job creation in the general economy and includes economic activity associated with general development and the increased commercial activity associated with improved transportation networks. FHWA research using a dynamic econometric input/output model developed estimates of indirect and induced job growth and estimated approximately 19,700 indirect and 14, 500 induced fulltime equivalent jobs as a result of a $1 billon dollars investment in highway construction. Table 4.11-5 illustrates the employment forecast results of the FHWA research. These figures are intended to provide some idea of the economic development potential of an investment in the NHS of over one billion dollars. It should be reiterated that the results are based on

national trend data from 1989 to 1993. Therefore caution should be exercised in translating these numbers in absolute terms to the regional level or even further to the project level because they would adjust based on the total program funds appropriated to the region, the mix of federal-aid improvement projects undertaken in each region, and the mix of urban-rural projects.

The benefits of transportation investment include not only short term construction spending, but rather a long term stimulation of the overall economy and the infrastructure necessary to support a modern society. Clearly this research indicates that highway investment contributes to the broader employment picture. Regional productivity and job growth are an important indirect benefits and impacts of highway infrastructure investment.

**Table 4.11-5**
**FORECAST OF DIRECT, INDIRECT, AND INDUCED EMPLOYMENT IMPACTS RESULTING FROM FEDERAL AID HIGHWAY CONSTRUCTION**

| Type of Employment | Jobs Supported by $1 Billion Federal Spending | Modeling Approach |
|---|---|---|
| Direct | 7,900 | FHWA Highway 1 Model |
| Indirect | 19,700 | Dynamic I/O Model |
| Induced | 14,500 | Dynamic I/O Model |
| Total | 42,100 | ---- |

### 4.11.2 Cumulative Impacts

Cumulative impacts are those which result from the incremental consequences of an action when added to other past and reasonably foreseeable future actions. Council on the Environment (CEQ) regulations (specifically 40 CFR 1508.7), define a cumulative impact as:

> "… the impact on the environmental which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions regardless of what agency (Federal or non-Federal) or person undertakes such other actions."

CEQ regulations (specifically 40 CFR 1508.7), further state that:

> "Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time."

### 4.11.3 Traffic-Related Cumulative Impacts

An investigation into the forecast ADT Build Alternative options on the parallel non-study area roadways of I-77 and U.S. Route 29 was conducted as part of the I-73 Location Study analysis. The forecast –ADT volumes along these roadways are summarized in Table 4.11-6. These data were available to make some comparisons of the cumulative traffic effects on the two roadways requested by EPA.

**Table 4.11-6**
**FORECAST AVERAGE DAILY TRAFFIC VOLUMES**
**FOR PARALLEL NON-STUDY AREA ROADWAYS**

| | 2020 | | | | | | 2025 | |
|---|---|---|---|---|---|---|---|---|
| **Route and Segment** | **No-Build /TSM** | **Option 1** | **Option 2** | **Option 3** | **Option 4** | **ALC** | **No-Build/ TSM** | **ALC** |
| **I-77** | | | | | | | | |
| Route 42 to West Virginia | 30,700 | 27,000 | 27,000 | 27,000 | 27,000 | 27,000 | 32,500 | 28,600 |
| I-81 to Route 42 | 28,900 | 25,100 | 25,100 | 25,100 | 25,200 | 25,100 | 29,900 | 26,000 |
| I -81/I -77 | 63,700 | 59,700 | 59,700 | 59,700 | 59,700 | 59,700 | 65,700 | 61,600 |
| U.S. Route 58 to I-81 | 43,900 | 45,500 | 45,500 | 45,500 | 45,500 | 45,500 | 45,000 | 46,600 |
| North Carolina to U.S. Route 58 | 32,600 | 34,200 | 34,200 | 34,200 | 34,200 | 34,200 | 33,800 | 35,500 |
| **U.S. Route 29** | | | | | | | | |
| U.S. Route 501 to U.S. Route 60 | 47,100 | 46,900 | 46,900 | 47,000 | 47,000 | 47,000 | 51,700 | 51,600 |
| Route 24 to U.S. Route 501 | 56,700 | 58,500 | 58,500 | 56,600 | 56,700 | 56,600 | 63,400 | 63,300 |
| Route 40 to Route 24 | 14,900 | 14,100 | 14,500 | 14,700 | 14,800 | 14,700 | 15,500 | 15,300 |
| Route 57 to Route 40 | 19,900 | 20,900 | 19,100 | 19,800 | 19,900 | 16,500 | 22,700 | 18,800 |
| U.S. Route 58 to Route 57 | 21,300 | 19,700 | 16,500 | 18,700 | 18,000 | 19,100 | 20,700 | 18,600 |
| North Carolina to U.S. Route 58 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 15,000 | 16,300 | 16,300 |

As indicated, year 2025 forecast ADT volumes on I-77 and U.S. Route 29 remain similar between all Build Alternative options. Forecast ADT volumes on I-77 range from 26,000 to 61,600 under the ALC Alternative. These volumes are approximately 4,000 vehicles less than the volumes anticipated under the No-Build Alternative in the year 2025.

Thus, the inclusion of I-73 in the interstate highway network reduces the ADT on I-77 by approximately 7 to 13 percent. The reduction of traffic along I-77 is similar between the four options and the ALC Alternative. Forecast ADT volumes along U.S. Route 29 also indicate a reduction with the inclusion of I-73. The volume reductions are generally 100 to 4,000 vehicles less than the volumes anticipated under the No-Build Alternative, however, forecast ADT volumes are anticipated to be reduced by a maximum of approximately 17 percent in the section between Route 57 and Route 40 for both the Option 2 and ALC Alternative. The inclusion of I-73 into the interstate highway network will not significantly affect the anticipated traffic volumes along I-77 or U.S. Route 29, thereby exacerbating the need to improve those routes.

VDOT's Six-Year Improvement Program identifies other transportation facilities in the study area that are targeted for near term study, design or construction. These improvements along with the proposed I-73 action become part of the cumulative transportation actions that can be readily anticipated. Major capacity improvements include Interstate 81 statewide, U.S. Route 58 statewide and U. S. Route 460 statewide (TransAmerica). More locally focused improvements include U.S. Route 220, U.S. Route 221 and state primary Routes 24 and 40.VDOT's Six Year Improvement Program was also reviewed to identify other projects that involve improvements to, or new crossings of, the Blue Ridge Parkway in Virginia.

All primary crossings of the Blue Ridge Parkway were identified. These include (north to south):

- I-64
- Route 240
- Route 56
- U.S. Route 60
- Route 130
- U.S. Route 501
- Route 43
- U.S. Route 221 / 460
- Route 24
- Route 116
- U.S. Route 220
- Route 8
- U.S. Route 58
- U.S. Route 52
- I-77
- Route 97
- Route 89

One improvement is proposed for the above referenced crossings, U.S. Route 58 in Carroll County from Route 600 to Route 795 (East of Meadows of Dan School). In this location the road is being improved to four lanes, yet no access will be provided to the Blue Ridge Parkway at this location. Accordingly, the incremental impact on the Blue Ridge Parkway from I-73 is not expected to be significant when added to the cumulative impact from past, present, and reasonably foreseeable future actions.

The Six-Year Improvement Program does not list any potential new crossings of the Blue Ridge Parkway other than money allocated for study of I-73. A project recognized by Congress (National Highway System Act of 1995) may involve future improvements to a Blue Ridge Parkway crossing is the TransAmerica project in the vicinity of U.S. Route 460 in Botetourt County. The focus TransAmerica Corridor Feasibility Study was primarily to determine the costs and benefits of improvements to facilities between the cities of Beckley, WV, Roanoke, Lynchburg, Petersburg, and Hampton Roads. Additional planning, NEPA evaluation and detailed design for TransAmerica will not be developed until later project stages.It has not yet been determined if improvements will be necessary in the vicinity of the existing U.S. Route 460 crossing.

A recently announced research and employment center sponsored by the Carilion Health Care organization, the University of Virginia and Virginia Tech in downtown Roanoke will provide not only a high number of professional and scientific employment impacts but will also focus more attention on the transportation network in and around the Roanoke central business district.

Roanoke's Regional Airport is located just off the Hershberger Road interchange with existing I-581. This facility will benefit from any proposed Build Alternative, however, the Option 3 alternatives should create the most effective intermodal linkage.

The National Highway System (NHS) created under the NHS Act of 1995, represents four percent of the country's public roads but it carries more than 40 percent of the nation's highway traffic and 70 percent of the nation's truck freight. I-73 would be an integral component of the NHS. Funds invested to upgrade or maintain the NHS enable firms who operate on the system to ship, deliver and improve goods delivery. Dependable and efficient transportation allows companies to lower costs, thus lowering production costs and enhancing overall productivity and profits. Cumulatively this translates to higher efficiency and productivity for the nation as a whole. Clearly, at a national level the reliable movement of freight on the transportation network assists U.S. business to compete in the international market.

#### 4.11.3.1 Cumulative Impacts Associated with Natural Resources

Reasonably foreseeable projects, which could cumulatively affect the aforementioned direct and indirect action areas include:

- a presently undetermined portion of the residential and commercial development depicted in the Franklin County Comprehensive Plan within one mile of the proposed ALC/Route 40 interchange;

- a presently undetermined portion of the residential development depicted in the Franklin County Comprehensive Plan along the southern banks of the Pigg River;
- as identified in the FEIS, highway project number 32 of the 2002 VDOT Six-Year Improvement Program (construction of a new South Main Street bridge over the Pigg River in Rocky Mount);
- as identified in the FEIS, highway project number 33 of the 2002 VDOT Six-Year Improvement Program (improvements to Route 40 0.1 km east intersection Route 220 and 0.6 km east intersection Route 122);
- a presently undetermined portion of the 300-acre site of the Franklin County Regional Airport to be located near I-73 just southeast of the Town of Rocky Mount which is discussed in greater detail below. (Talbert & Bright, Inc., 2002).
- the approximately 10-mile long U.S. Army Corps of Engineers Roanoke River Flood Damage Reduction Project which is discussed in greater detail below;

The total combined area of the interchanges and roadway that would be constructed within the Upper Roanoke River and Smith-Dan River watersheds is 1,290 acres. This translates to 0.06 percent of the total 2,132,184 acres within the aforementioned watersheds. With respect to direct effects, the ALC would result in the conversion of 1,961 acres of currently developed land, and would convert 5,076 acres of agricultural lands and forestland to roadway, right-of-way, and interchanges. This translates to a two percent increase in developed land surfaces within the study area and a one percent decrease in forest and agricultural lands within the study area. The percent increase in developed land surfaces and the percent decrease in forest and agricultural lands would be considerably less when viewed from the perspective of the two watersheds in their entirety.

Several hundred feet of stream bed would be affected during installation of bridge piers and possible temporary causeways at each major stream crossing. Several hundred feet of stream bed also would be affected during installation of box culverts at each lesser stream crossing. In addition, without implementation of appropriate mitigation measures, water quality and stream bottom quality could be affected by stormwater runoff for a certain distance downstream of each of these stream crossings.

Franklin County Airport

The Franklin County Board of Supervisors selected the Patti or Sontag Site as the preferred location for a general aviation airport in Franklin County. The airport, as proposed, would be located approximately 2 miles east of the proposed interchange of Interstate 73 and Route 619. Based on aerial photographs, the land within and around the site is composed of forested, agricultural, and rural residential land uses. The Federal Aviation Administration is currently preparing an Environmental Assessment for the preferred location. However, prior to selecting a preferred alternative, the County, without the benefit of field work or site visits, conducted a desktop environmental overview based on existing environmental information to identify potential impacts and form a basis for their decision. Based on that overview, the County does not anticipate any significant environmental impacts with the construction of the airport. The construction of the airport will impact approximately 330 acres of forested, agricultural, and rural residential land. No major population shifts or impacts are anticipated. Construction of the airport will likely displace a single occupied residence as well as an abandoned house/structure. Some of the land located within the property lines of the airport is currently being farmed. The airport is not expected to adversely impact air quality in the region or keep Franklin County from maintaining their air quality attainment status. Water quality is not expected to be a problem provided standard erosion and sediment controls are used during construction and appropriate stormwater runoff controls are installed to control the quality of runoff entering local streams and tributaries. No sites that are listed on the National Register of Historic Places will be adversely affected by the construction of the airport. It is not anticipated that the construction of the airport will impact any streams containing known populations of the Federally endangered Roanoke logperch. No wetland areas are located in the proposed property line of the airport. The site is not located near either the 100 or 500 year floodplains in Franklin County.

Roanoke River Upper Basin Flood Damage Reduction Project

The U.S. Army Corps of Engineers (USACOE) Roanoke River Flood Damage Reduction Project has been designed to reduce the potential for flood damage to the heavily developed floodplain of the Roanoke River. The approximately 10-mile project consists of four components, three of which have already been completed in cooperation with the City of Roanoke. Those components are 1) installation of a flood warning system (completed); 2) floodproofing of Roanoke Memorial Hospital (completed); 3) floodproofing of the water pollution control plant at 13th Street (completed); and 4) channel improvements in the Roanoke River consisting of a benched channel and training walls (taking the form of berms and composite walls), which will be completed in two phases: for the first phase, work is expected to begin in 2006 while work under the second phase is in the design phase. Specifically, for the work yet to be completed, the USACOE is proposing to widen the Roanoke River channel by constructing 14,300 linear feet of benched channel about 1 to 2 feet above the elevation of the average streamflow. Approximately 6,400 linear feet of training walls will also be constructed. Manmade debris, fallen trees and limbs, and leaning trees will be removed from the Roanoke River and its banks. Two low-water roadway bridges will be replaced with box culvert bridges and slope protection (i.e. rip rap, trees, shrubs, native grasses) will be provided where potential river floods produce erosive effects. Based on the USACOE's Environmental Assessment (November 2000), this work will result in 37,300 linear feet of riparian clearing and remove 32.5 acres of wooded vegetation. However, approximately 27.5 acres of wooded vegetation will be replanted resulting in a net loss of 5 acres of wooded vegetation. As a result, the USACOE anticipates that the impact to wildlife resources will be minimal. Although there is a potential for adverse impacts to water quality due to an increase in suspended materials from erosion of cut slopes and in-stream construction activities, these impacts are anticipated to be minimal and short term. Likewise, the riparian clearing would only have a minor impact on the water temperature of the Roanoke River because of the existing open tree canopy over the river. Based on consultation with the U.S. Fish and Wildlife Service and in their opinion, the flood damage reduction project is not likely to jeopardize the continued existence of the federally endangered Roanoke logperch. Finally, no significant cultural resources nor wetlands have been identified in the project area by the USACOE.

Neither the Franklin County Airport or the USACOE Roanoke River Upper Basin Flood Damage Reduction Project, either individually or collectively, will significantly contribute to the cumulative impacts experienced by the resources in the Interstate 73 study area as discussed below in Section 4.11.3.2.

### 4.11.3.2 Evaluation of Cumulative Impacts

Section 3.11 quantitatively describes the past and ongoing present actions that have cumulatively impacted the study area as the population in the study area has steadily increased from the 1800s to the present. The following is a discussion of the incremental impact on a variety of resources from I-73 when added to the cumulative impact from past, present, and reasonably foreseeable future actions.

Land Use Impacts

Interstate 73 may influence the location, intensity, and nature of development that could occur near the proposed interchanges; however, based on future land uses projected under local comprehensive plans, the nature of land use would not change substantially because of a Build Alternative Option and the type of projected development would occur with or without the project. Specifically, land use conversions from (undeveloped to developed) is projected to be 138,559 acres by year 2020. Options 3, 3a, 3b, and 3c have the lowest amount of undeveloped land being converted for highway use ranging from approximately 1,800 to 2,100 acres (700 to 900 hectares). This represents 1.2 to 1.5 percent of the land use conversion expected to occur in the future. Option 4 had just over 3,000 acres (1,200 hectares) of land converted from undeveloped to developed use or 2.1 percent of total projected land use conversion. Although different in character, the amount of land converted from undeveloped to highway for Options 1 and 1a is similar to Options 2, 2a, 2b, and 2c ranging from 4,000 to 4,500 acres (1,600 to 1,800 hectares). This represents 2.8 to 3.2 percent of total land use conversions expected by year 2020. The ALC would result land conversion similar to Option 1 with 4,374 acres (1,770 hectares) or 3.1 percent of future land use conversion being directly attributed to highway use. This amount represents 0.7 percent of the total study area.

Socioeconomic Impacts

Minority and low income populations are present in the City of Roanoke with some of them located along the I-581 corridor. According to a story by John Cramer in the Roanoke Times, back in the 1950s, thousands of Roanoke residents worked in the City's prosperous industries. Some of the neighborhoods in the City built up around these industries to provide housing for the workers and the their families. However, in the late 1950s, America's industrial markets were changing prompting layoffs that hurt working class neighborhoods in the city. In 1958, American Viscose Corporation closed leaving over 5,000 people without work. When Norfolk and Western Railway converted to diesel power, 2,000 people were laid off. Other industrial jobs were also lost. With the loss of jobs, the way of life for these neighborhoods began to vanish. Property values dropped and neighborhood unity declined. These neighborhoods began to be characterized by low income and minority populations. During the late 1950's, housing subsidies were provided to numerous single-family homes, duplexes and homes with rental apartments in the Southeast section of the City. In the mid-1960s, Interstate I-581 was constructed, resulting in the loss of several dwellings and further isolating some of the core neighborhoods, like Southeast, from downtown. There is no way to determine if the dwellings in question were low income or minority, but there is evidence to suggest that many were. By the 1970s, many cities including Roanoke turned their attention to the suburbs, neglecting the core neighborhoods in the City and letting them decay. As proposed, the ALC would be located along existing I-581, and every effort was made to accommodate the improvements to I-581 within existing right-of-way. Although a limited amount of right-of-way may be acquired, it is not expected that the construction of the ALC would add to the cumulative relocation impact that minority and/or low-income residents in the City of Roanoke have experienced from past actions like the construction of I-581. Construction of the ALC will not further isolate the neighborhoods in the City from downtown or further contribute to a loss of unity since all existing crossings of I-581 will be maintained with the construction of the ALC. Finally, existing noise levels along I-581, which are a result of past and present actions in the project area, are in the range of 68 to 75 dB(A). A review of future build noise levels to future no-build noise levels reveals that the incremental change to noise levels from the project are barely perceptible (1 to 4 dB(A)). Notwithstanding, the project is an opportunity to mitigate the cumulative impact from noise on the neighborhoods surrounding I-581. Several barriers have been identified, which will receive further consideration during final design, to protect these neighborhoods.".

Energy Impacts

Although energy use for the existing roadway network and the network that can be expected to be in place over the reasonably foreseeable future was not calculated, the energy that is expected to be used to construct and operate the proposed project (Section 4.12) is considered to be a minor contribution to the cumulative energy usage for this roadway network given the number of lanes miles and vehicle miles traveled associated with it.

Farmland Impacts

It is expected that I-73 will influence the location, intensity, and nature of development that could occur near the proposed interchanges but as the distance from the interchange grows, the influence of I-73 on development will decrease as existing roads and access exercise greater influence over developmental location, intensity, and nature. According to one commenter, Virginia has lost nearly 450,000 acres of prime farmland from 1987 to 1997. Based on future land uses projected under local comprehensive plans, the nature of land use would not change substantially because of a Build Alternative Option and the type of projected development would occur with or without the project. Specifically, farmland loss is projected to be 36,781 acres by year 2020. By comparison the amount of land use conversion resulting from implementation of an Option will comprise between 5.7 and 5.9 percent of this total (or 2,106 to 2,177 acres) for the Options 1, 1a, 2, 2a, 2b, and 2c, 3.2 and 4.1 percent of this total (or 1,203 to 1,520 acres) for Options 3, 3a, 3b, 3c, and 4, and 4.6 percent of this total (or 1,707 acres) for the ALC. Table 4.11-3 summarizes the amount of open space, pastureland, agriculture, and wetlands that could be lost if secondary development occurs around the interchanges of the project. This table shows that that the conversion of open space, pastureland, agriculture, and wetlands will range from 729 acres for the ALC to 3,391 acres for Option 1a.

Air Quality Impacts

Tables 4.3-3 and 4.3-5 show the predicted concentrations of carbon monoxide that can be expected from the project in the design year. It is important to point out that the predicted concentrations take into account background levels, which are representative of the cumulative impact from past and present actions on the receptors adjacent to the project. A review of these table shows that the incremental impact of the project on carbon monoxide levels at the receptors modeled will be limited. Of the 12 sites modeled for the 1-hour carbon monoxide standard, the ALC will reduce existing carbon monoxide levels at 5 of the sites and increase carbon monoxide by 0.2 to 1.4 ppm at the remaining sites. Likewise, of the 12 sites modeled for the 8-hour carbon monoxide standard, the ALC will reduce existing carbon monoxide levels at 5 of the sites and increase carbon monoxide by 0.1 to 1.1 ppm at the remaining sites. It is not possible to determine the incremental impact of the project on regional emissions like ozone or particulate matter since the region is not subject to the conformity requirements of the Clean Air Act and an inventory of regional emissions has not been prepared by VDEQ.

Noise Impacts

Existing noise levels at noise-sensitive sites adjacent to each corridor were calculated as part of the noise analysis up to 1,000 feet from the proposed location of each Build Alternative Option. These noise levels essentially represent the cumulative localized impact on noise levels from past and present transportation-related actions and local land use decisions. The proposed project would add to these existing noise levels and in some instances, create localized noise impacts. In some rare instances, the project may even reduce noise levels at some noise receptors by moving traffic further away from it. Whether or not the incremental contribution that I-73 will have on localized noise levels is an issue depends upon these existing noise conditions. For example, generally speaking, the incremental increase from the construction of the project on localized noise levels will likely not be significant for those receptors that are located adjacent to or in close proximity to existing and high-volume roadways and/or areas characterized by commercial development. In contrast, incremental noise increases from the project will have a greater impact on those receptors that are not located near high volume roads or existing commercial development where existing noise levels approach ambient noise levels. See Sections 3.4 and 4.4 of this EIS for more-specific details for localized noise impacts that can be expected as a result of the project. Major contributors to existing noise levels in the study area include the Interstate and primary highway systems - consisting of I-81, I-581, Route 220, Route 40, and Route 58. Interstate 73 would become part of the primary system; however, its contribution to cumulative noise levels will be minor on a regional basis given the number of lane miles that it would add to the highway network compared to the number currently available. The contribution of I-73 could be substantial enough on a local basis to produce impacts (as defined by FHWA) requiring consideration of noise abatement.

Water Quality Impacts

Tables 3.6-2, 3.6-3 and 3.6-4 summarize the state priority list of impaired waters in the study area, waters requiring water quality-based effluent limits, and recent water quality trends of monitored streams within the I-73 study corridors, respectively. These tables essentially represent the cumulative impact on water quality from past and present actions in the study area. Although agriculture is a valuable resource in the study area, it is also a cause of water quality impairment in many waters in the study area as borne out by Table 3.6-2. Further, as documented in the biological assessment, “The average depth of soil erosion resulting from two centuries of agricultural practices in the portion of Virginia’s Piedmont containing the Pigg River is reported to be between 7.1 and 9.6 inches (Trimble, 1974). The redeposition of these massive volumes of soil lead to wholesale sedimentation of floodplains and siltation to streams and water bodies, which, until the implementation of more effective soil conservation practices starting around the 1920s, resulted in progressive water quality degradation and loss of incremental flood storage and loss of aquatic habitat.” Finally, agricultural practices are cited as the leading contributor of water quality degradation in the Pigg River watershed causing the decline of the Roanoke logperch; it is estimated that approximately 37% of the total land surface in the Pigg River watershed is occupied by agricultural lands. Based on future land uses projected under local comprehensive plans, the nature of land use would not change substantially because of a Build Alternative Option and the type of projected development would occur with or without the project, albeit, probably at a different pace. Specifically, land use conversions (from undeveloped parcels to

developed parcels contributing to net increase in impervious surfaces) is projected to be 138,559 acres by year 2020. By comparing the amount of new impervious surface Options 3, 3a, 3b, and 3c will have the lowest amount of undeveloped land being converted for highway use ranging from approximately 1,800 to 2,100 acres (700 to 900 hectares). This represents 1.2 to 1.5 percent of the land use conversion expected to occur in the future. Option 4 had just over 3,000 acres (1,200 hectares) of land converted from undeveloped to developed use or 2.1 percent of total projected land use conversion. Although different in character, the amount of land converted from undeveloped to highway for Options 1 and 1a is similar to Options 2, 2a, 2b, and 2c ranging from 4,000 to 4,500 acres (1,600 to 1,800 hectares). This represents 2.8 to 3.2 percent of total land use conversions expected by year 2020. The ALC would result land conversion similar to Option 1 with 4,374 acres (1,770 hectares) or 3.1 percent of future land use conversion being directly attributed to highway use. Table 4.6-4 summarizes the pollutant loadings that can be expected from the project by the design year. It is important to point out that this is not the pollutant loading that would reach receiving bodies of water. Due to overland flow and the use of stormwater management measures, the contribution of the project to the cumulative degradation of water quality is expected to be minimal when one takes into account the fact that many of the past actions, as well as some of the present actions (i.e. agricultural), occurred at a time when no consideration was given to stormwater runoff and water quality impacts or allowances made for them. Further, secondary development around interchanges will lead to the conversion of agricultural and forested land to land with impervious surfaces. Of the build alternatives under consideration, the ALC will lead to the conversion of the least amount of agriculture and forested land due to secondary development around interchanges. It is expected that the stormwater management measures employed for this project will capture some of the runoff from the secondary development, but much of it would reach receiving bodies of water if they are located in close proximity to the development and if the localities don't require the developers to address stormwater runoff from their property.

Wildlife Habitat

Past and present actions in the study area that have led to the loss of wildlife habitat include the urbanization and suburbanization of Roanoke, agricultural practices, roadway construction, industrial development, etc. Based on future land uses projected under local comprehensive plans, the nature of land use would not change substantially because of a Build Alternative Option and the type of projected development would occur with or without the project. Using forest lands as the single-most important component of regional wildlife habitat, forest loss within the study area is projected to be 101,778 acres by year 2020. By comparison the amount of forest loss Options 3, 3a, 3b, and 3c have the lowest amount of forest land being converted for highway use ranging from 2,014 to 2,241 acres (815 to 907 hectares). This represents 1.9 to 2.2 percent of the land use conversion expected to occur in the future. Option 4 had 3,412 acres (1,380 hectares) of land converted from forest land to highway use or 3.3 percent of total projected land use conversion. Although different in character, the amount of land converted from forest land to highway for Options 1 and 1a is similar to Options 2, 2a, 2b, and 2c ranging from 3,177 to 4,390 acres (1,285 to 1,776 hectares). This represents 3.1 to 4.3 percent of total land use conversions expected by year 2020. The ALC would result in land conversion similar to Option 4 with 3,369 acres (1,363 hectares) or 3.3 percent of forest land being converted to highway use. Secondary development could add to this total on the magnitude of 4,500 acres for the ALC to 9,500 acres for Option 3c, increasing the percent of forest land in the study area converted (as documented in Section 4.11 of this EIS). These direct and secondary impacts to forestland could interfere with the movement of wildlife, increase wildlife mortality due to an increase in vehicle-wildlife collisions, put stress on the wildlife as relocated wildlife must be absorbed into remaining wildlife populations in a smaller area. Accordingly, the incremental impact on wildlife from the construction of the road and secondary development can be substantial, especially in rural areas where development has been limited, when compared to the cumulative impact on wildlife from past, present, and other reasonably foreseeable future actions.

Endangered Species

This section summarizes the results of the biological assessment, which should be referenced for additional information. The Roanoke logperch is the only endangered or threatened species in the study area that the USFWS is requiring formal consultation for. The Roanoke logperch occurs in the Pigg River near the proposed Pigg River crossing of the ALC. Past and present actions that have led to the decline of the

Roanoke logperch include habitat loss and alteration due urbanization in the form of residential and commercial development, to turbidity and siltation resulting from erosion, chemical spills and pollution such as the 1975 discharge of copper sulfate and silver nitrate into Furnace Creek (a tributary to the Pigg River) which caused a severe fish kill for 23 miles, channelization, and impoundments and cold water releases such as those associated with the Philpott Reservoir. The major concern for the well-being of the Pigg River population of the Roanoke logperch is siltation from agricultural sources, specifically cattle farms. Urbanization is often blamed for widespread environmental degradation, but urbanization in the Pigg River watershed is limited. It is estimated that approximately 37 percent of the total land surface in the Pigg River watershed is occupied by agricultural lands while 61 percent is occupied by forestlands. Based on the foregoing, it is believed that the long term viability of the Roanoke logperch in the Pigg River is tenuous whether or not I-73 is constructed due to these other factors. As documented in the biological assessment, the construction of I-73 is expected to have minimal incremental impact on the Pigg River population of the Roanoke logperch when that incremental impact is considered in the context of the cumulative impact on the Roanoke logperch from past and present actions. This conclusion also recognizes that I-73 will be constructed as a fully controlled access facility with the closest access in the vicinity of the Pigg River provided at Route 40 (approximately 1.7 miles north of the Pigg River). The next closest access would be provided 3.3 miles south of the river. Even if we assume a one-mile area of development around interchanges, the closest that development would get to the Pigg River is 0.7 miles. None of the potential development around the interchanges would encroach on any perennial streams reported to contain the Roanoke Logperch.

Wetland Impacts

Wetlands losses for each Build Alternative Option have been estimated within the study area. These would impact between 11.84 and 35.61 acres of wetlands. The ALC would impact 21.3 acres and will require 5.45 acres of wetland compensation. Under the No-Build Alternative (which assumes that all roadway and transit projects programmed for construction in the regions CLRP will be implemented except I-73), it is expected that there will be wetland impacts in the study area; however, an exact number cannot be determined because all of those projects have not yet gone forward for development. Additionally, wetland impacts can be expected to occur from the residential, commercial, and retail development that is planned for the study area. Construction of I-73 would result in additional impacts to wetlands, but this incremental impact is minor when taken in context with the cumulative wetland impacts that can be expected to occur from these reasonably foreseeable future actions. This contribution is even less when one takes into account the cumulative wetland impacts that have resulted from past and present actions. The loss of wetlands on a national scale (as well as a statewide scale) has been well documented, although the rate of loss has slowed considerably the past fifteen years. Prior studies by the U.S. Fish and Wildlife Service and others indicate that the contiguous United States has lost over 50 percent of its wetlands since the 1780's. These studies indicate that Virginia has lost approximately 42 percent of its wetlands over that same time period. Wetland impacts associated with I-73 are inconsequential when compared to the magnitude of cumulative wetland impacts that have occurred on a national, statewide, or regional level.

Floodplain Impacts

Historically, people have congregated around water because it provided a convenient means of transportation and became a source of commerce. Naturally, development occurred around water and spread out from there and, with this development, came impacts to floodplains and wetlands. Because wetlands are often associated with floodplains, the trend in floodplain impacts has followed the trend in wetland impacts. Because the project will be designed so that all encroachments on floodplains will not result in an increase in the 100 year floodplain of a foot or more, it is not expected that the incremental impact on floodplains from the project will be significant and will not increase the potential of downstream flooding created by past and present development.

Park, Recreation, & Open Space Impacts

The implementation Build Alternatives Options, including the ALC, will not impact any land associated with existing or proposed Roanoke Valley Greenways as these alternatives utilize existing or proposed structures

that pass over the Greenway resource. However, the construction of some of the Build Alternative Options will result in the direct use of property associated with the Blue Ridge Parkway. Build Alternative Options 2b, 3, 3b, and 3c and the ALC will use the existing VDOT right-of-way at these proposed crossings and therefore, will not require any land associated with the Blue Ridge Parkway. Historically, there have been few direct impacts to established parks in the study area as a result of past and present actions, therefore, this discussion focuses on the Blue Ridge Parkway as a recreational resource. When it comes to the Blue Ridge Parkway, Interstate 73 would represent just one of many primary and secondary route crossings of the Parkway along its 469-mile length (Section 4.11.3 lists the primary crossings in Virginia). Many of these primary and secondary routes existed when the Parkway was developed and constructed and as such, the crossings were accommodated by the Parkway. Historically, when improvements have been made at these crossings, they have had minor impacts on the Parkway because the improvements themselves have been minor. Because the crossing of Interstate 73 at the Route 220 crossing will occur within the existing right-of-way of Route 220, the incremental impact of the Interstate 73 crossing on the Parkway is considered insignificant when compared to the cumulative impact that improvements to primary and secondary crossings up and down the Parkway have had. As discussed in Section 4.11.1, an analysis was conducted along the Parkway in the study area to determine how much of the undeveloped land adjacent to the Parkway could be developed under existing comprehensive plans. The results of that analysis shows that approximately 28% of undeveloped land could be developed under existing land use scenarios whether or not Interstate 73 is constructed. This development would parallel the Parkway and if it were to take place, would represent a cumulative impact on the viewshed of the Parkway. The existing development located adjacent and parallel to the Parkway also represents a cumulative impact on the viewshed of the Parkway. Section 4.5 addresses the visual impact of Interstate 73 on the surrounding environment including specific resources like the Blue Ridge Parkway. Recognizing that Interstate 73 would cross the Blue Ridge Parkway perpendicular to it and would be located along an alignment that has already been disturbed, the incremental impact of Interstate 73on the viewshed of the Parkway is expected to be minor when compared to the cumulative impacts that development parallel to the Parkway has had.

Cultural Resource Impacts

Construction of I-73 has the potential to impact architectural and archaeological sites located within the study area. Several archeological sites deemed important primarily for the information that can be gathered from them also have the potential of being impacted by each Build Alternative Option. Past and present actions in the form of roadway projects and residential, commercial, and industrial development have eliminated many architectural and archeological resources in the study area. Reasonably foreseeable future actions will place additional pressure on those resources that remain as development occurs around them - compromising their setting. As the study area continues to evolve from one characterized by rural development, agriculture, and forested lands to one characterized by residential, commercial, and industrial development, the area will continue to lose its sense of history, which will be increasingly confined to isolated locations. Based on coordination with the Virginia SHPO, the construction of the ALC will have an adverse effect on the setting of the Blue Ridge Parkway even though the alignment follows existing U.S. Route 220 and the setting is already compromised by modern development. Therefore, this cumulative impact discussion only focuses on the Blue Ridge Parkway and not the other historic resources that the ALC of Interstate 73 will neither effect nor adversely effect. As discussed above, the development that has occurred along the Parkway in the study area and the development that could occur under existing comprehensive plans represented the cumulative impacts of past, present, and reasonably foreseeable future actions on the viewshed of the Parkway. In the same way, these actions represent the cumulative impact on the setting of the Blue Ridge Parkway. Given that the Blue Ridge Parkway is 469 miles long, the contribution of Interstate 73 to the diminishment of the setting of the Parkway is considered minor when compared to the diminishment, cumulatively, that development adjacent to the Parkway has had and future development could have.

Conclusion

Given the history of the area (as presented in Section 3.11 of this EIS), it is clear that much of the natural environment in the study area, especially at the northern end, has changed over time and been gradually degraded as a result of past and present actions. With the projected increases in employment, resource use, and population within the I-73 study area, there is significant pressure to continue the existing trend for

additional commercial, industrial, and residential development. In order to meet the increasing need for services such as transportation, water, sewer, utilities, housing, etc., a number of public and private projects are currently planned or underway within the study area. Given that access is already provided to undeveloped lands, most of this development has already been planned and will occur regardless of whether or not the proposed action is implemented. There is little known development that will occur solely as a result of the project. Although the proposed project may accelerate planned development within the study area, should it be implemented, this development would still be expected to occur within the analysis years of this EIS. Because much of the natural environment has been changed and continues to exist in a degraded state as a result of past and present actions, it can reasonably be assumed that this trend will continue as reasonably foreseeable future actions are implemented, although at a slower pace given the level of environmental controls and oversight that exist today that did not exist when many of the past actions occurred. Therefore, the incremental (cumulative) effects associated with the proposed action, when taken into consideration with the cumulative effects from other past, present, and reasonably foreseeable future actions, are not considered significant. The overall general socioeconomic benefit of improving the regional transportation system is critical for satisfying the purpose and need of the proposed action, while meeting the projected traffic demands wrought by other projects currently underway or planned by VDOT and others.

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# 4.12 ENERGY

This energy analysis is a comparison of the energy requirements of the estimated daily and annual energy consumption between the No-Build Alternative, the TSM Alternative, and the Build Alternative Options, including the ALC. Two categories of energy consumption are analyzed: construction and operational. Total energy consumption is also provided to compare among the Build Alternative Options and the ALC.

## 4.12.1 Methodology

Construction-related energy consumption is based on the construction cost of the Build Alternative Options and the ALC. The California Transportation (CALTRANS) Laboratory, Energy and Transportation Systems developed the method used by FHWA, in July 1983. This method determines the total amount of joules (the metric equivalent) of British Thermal Units (BTUs) required for the production and placement of materials (e.g. asphalt, structures, cut, and fill) based on the I-73 Location Study's estimated construction cost. Approximately 131,850,000 joules (125,000 BTUs) equals 3.785 liters (1 U.S. gallon) of fuel.

Operational energy consumption is calculated using the Energy Requirements for Transportation Systems, USDOT, 1977. This type of energy consumption is influenced by vehicle size, vehicle weight, traffic conditions, engine size, vehicle accessories, roadway design, and driving mode (highway vs. city). VMT was developed for the Build Alternative Options, including the ALC, for the proposed design year 2020. The 2020 VMT estimates were combined with vehicle fuel consumption tables to develop total vehicle fuel consumption for each of the alternatives and the options. Total vehicle fuel consumption was also calculated based on 2025 VMT estimates for the ALC. The VMT for the TSM Alternative is expected to be similar to that of the No-Build Alternative for purposes of this analysis.

Total energy requirements are the sum of the energy required for construction and operation of each alternative option.

## 4.12.2 Environmental Consequences

Table 4.12-1 indicates the construction costs and predicted energy consumption for each of the Build Alternatives Options, including the ALC. Due to the absence of identified funding and the variations in any potential construction scenarios, no annualized construction energy has been estimated. All of the Build Alternative Options, including the ALC, exceed the energy consumption (either construction or operations) of the No-Build or TSM Alternatives. Build Alternative Option 2b, due to its higher construction costs, would consume the greatest amount of energy during construction. Build Alternative Option 4 followed by the ALC would consume the least energy for construction.

Table 4.12-2 presents the estimated operational energy consumed under the No-Build Alternative, the TSM Alternative, the Build Alternative Options, and the ALC. The TSM Alternative would result in the same operational energy consumption that is predicted under the No-Build Alternative due to the similarity of traffic volumes and traffic characteristics (speeds, congestion, interrupted flow). Build Alternative Options 1 and 1a consume less operational energy than the TSM and No-Build Alternatives due to lower traffic volumes. All of the other Build Alternative Options would consume higher amounts of energy than the TSM and No-Build Alternatives Table 4.12-3 provides the sum of these tables as a total energy requirement for the No-Build Alternative, the TSM Alternative, the Build Alternative Options, and the ALC.

**Table 4.12-1**
**CONSTRUCTION ENERGY CONSUMPTION**

| Alternative/ Option | Preliminary Construction Cost Estimate [1] (in $ millions) | Total Construction Energy Consumption *BTUs* (Trillions) | Total Construction Energy Consumption *Joules* (Trillions) |
|---|---|---|---|
| No-Build | $0 | 0 | 0 |
| TSM | $146 | 1.37 | 1,441 |
| Build Alternative | | | |
| Option 1 | $1,263 | 11.81 | 12,464 |
| Option 1a | $1,346 | 12.59 | 13,283 |
| Option 2 | $1,320 | 12.35 | 13,027 |
| Option 2a | $1,295 | 12.11 | 12,780 |
| Option 2b | $1,357 | 12.69 | 13,392 |
| Option 2c | $1,285 | 12.02 | 12,681 |
| Option 3 | $1,243 | 11.63 | 12,267 |
| Option 3a | $1,279 | 11.96 | 12,622 |
| Option 3b | $1,247 | 11.66 | 12,306 |
| Option 3c | $1,242 | 11.62 | 12,257 |
| Option 4 | $1,107 | 10.35 | 10,925 |
| ALC | $1,207 | 11.29 | 11,912 |

Source: Parsons, Brinckerhoff, Quade, and Douglas, Inc., 2002

Note: 1. Capital Cost Report, October 2000.

**Table 4.12-2**
**DIRECT INTERSTATE OPERATING ENERGY CONSUMPTION**

| Alternative | Year | Daily VMT | Daily VKT | Daily Fuel Consumption | | Total Annual Energy Consumption (trillions) | |
|---|---|---|---|---|---|---|---|
| | | | | Gallons | Litres | BTU's | Joules |
| No-Build | 2020 | 1,643,404 | 2,644,237 | 72,546 | 274,586 | 3.83 | 4,036 |
| TSM | 2020 | 1,643,404 | 2,644,237 | 72,546 | 274,586 | 3.83 | 4,036 |
| Build Alternative | | | | | | | |
| Option 1 | 2020 | 1,321,000 | 2,125,489 | 58,314 | 220,717 | 3.08 | 3,244 |
| Option 1a | 2020 | 1,311,000 | 2,109,399 | 57,872 | 219,047 | 3.05 | 3,220 |
| Option 2 | 2020 | 2,612,000 | 4,202,708 | 115,303 | 436,422 | 6.08 | 6,415 |
| Option 2a | 2020 | 2,539,000 | 4,085,251 | 112,081 | 424,225 | 5.91 | 6,236 |
| Option 2b | 2020 | 2,796,000 | 4,498,764 | 123,426 | 467,166 | 6.51 | 6,867 |
| Option 2c | 2020 | 2,596,000 | 4,176,964 | 114,597 | 433,749 | 6.04 | 6,376 |
| Option 3 | 2020 | 2,731,000 | 4,394,179 | 120,556 | 456,305 | 6.36 | 6,707 |
| Option 3a | 2020 | 2,668,000 | 4,292,812 | 117,775 | 445,779 | 6.21 | 6,553 |
| Option 3b | 2020 | 2,758,000 | 4,437,622 | 121,748 | 460,817 | 6.42 | 6,774 |
| Option 3c | 2020 | 2,699,000 | 4,342,691 | 119,144 | 450,959 | 6.28 | 6,629 |
| Option 4 | 2020 | 1,793,000 | 2,884,937 | 79,150 | 299,581 | 4.17 | 4,404 |
| ALC | 2020 | 2,728,000 | 4,389,352 | 120,424 | 455,804 | 6.35 | 6,700 |
| ALC | 2025 | 2,864,000 | 4,608,176 | 126,427 | 478,527 | 6.67 | 7,034 |

Source: Parsons, Brinckerhoff, Quade, and Douglas, Inc., 2002

**Table 4.12-3**
**TOTAL ENERGY CONSUMPTION BY ALTERNATIVE**

| Alternative/ Option | Year | Total Estimated Energy Consumption *BTUs* (Trillions) | Total Estimated Energy Consumption *Joules* (Trillions) |
|---|---|---|---|
| No-Build | 2020 | 3.83 | 4,036 |
| TSM | 2020 | 5.19 | 5,477 |
| Build Alternative | | | |
| Option 1 | 2020 | 14.89 | 15,709 |
| Option 1a | 2020 | 15.64 | 16,503 |
| Option 2 | 2020 | 18.43 | 19,442 |
| Option 2a | 2020 | 18.02 | 19,016 |
| Option 2b | 2020 | 19.20 | 20,259 |
| Option 2c | 2020 | 18.06 | 19,057 |
| Option 3 | 2020 | 17.98 | 18,974 |
| Option 3a | 2020 | 18.17 | 19,175 |
| Option 3b | 2020 | 18.08 | 19,080 |
| Option 3c | 2020 | 17.90 | 18,886 |
| Option 4 | 2020 | 14.53 | 15,328 |
| ALC | 2020 | 17.64 | 18,611 |
| ALC | 2025 | 17.96 | 18,945 |

Source: Parsons, Brinckerhoff, Quade, and Douglas, Inc., 2004

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## 4.13 TEMPORARY EFFECTS ASSOCIATED WITH CONSTRUCTION ACTIVITIES

Temporary effects from construction are those impacts that occur during the actual construction of the project but are not permanent or long-term in nature. Once construction is completed, temporary effects subside.

### 4.13.1 Community Impacts

The effects of construction activities include the creation of temporary easements on private property which would be needed to access the project right of way, the relocation of private access drives, parking lots, encroachment on farm operations, and temporary closure of roadways within the study area. Traffic management within the construction area would be implemented to assure smooth traffic flow by providing signage, detours and alternate routes as per the Virginia Work Area Protection Manual Standards and Guidelines (VDOT, January 1, 1996).

Construction activities may require a temporary disruption in the delivery of utility services while transmission lines and conveyance pipes are relocated, adjusted or modified. This disruption in utility service would be minimized by phased adjustments to the utility in conjunction with roadway construction operations or by establishing new utility service before the old service is cut off. In addition, detours and traffic delays caused by construction activities may temporarily delay emergency service response times. Careful coordination and communication with service providers, as well as project construction phasing, would alleviate the severity of any disruptions. Due to unknown factors such as funding and the staging of construction projects, procurement of contractors and scheduling of contract activities will be determined during the design phase of project development.

### 4.13.2 Transportation Effects During Construction

Construction of the ALC would affect existing traffic patterns, resulting in localized delays and detours. However, since the ALC would be a controlled-access facility and primarily on new location, impacts should be isolated to locations of interchange, intersection and crossroad bridge construction, and areas where the alignment of the project coincides with existing roadways.

The implementation of a traffic maintenance and safety plan, as required by the Virginia Work Area Protection Manual Standards and Guidelines (VDOT, January 1, 1996), as well as the establishment of a public information program will help to minimize the impacts associated with construction activities and increased construction-related truck traffic in the more populated areas. The traffic maintenance and safety plan would reduce disruption to existing traffic patterns, develop lane closure scenarios which are sensitive to peak hour traffic needs, and provide for traffic control devices and signage at construction sites to improve safety. In addition, a public information program will educate drivers on the location of construction activities and could provide them with alternative routes.

### 4.13.3 Construction-period Visual Changes

The impact of construction activity associated with the ALC will temporarily impact the visual environment. The severity of the visual impact would be contingent on the type, location, and intensity of the construction activity. In general, the construction impacts would include the movement of machinery, the placement of construction trailers, the construction of temporary roads and access ways, stockpiling of construction materials and the placement of temporary fences and screens.

### 4.13.4 Construction-period Air Quality

The construction activities may result in the generation of fugitive dust/particulate pollution, emissions from construction equipment and emissions from additional and detouring vehicles due to localized traffic re-routing.

As per the VDOT Road and Bridge Specifications, contractors to the Department would be required to minimize air quality impact by reducing fugitive dust and other emissions generated during construction. Measures to reduce fugitive dust transmission include watering of exposed soils, covering of open body trucks which transport materials to and from the construction sites, covering stockpiled materials, and repaving/revegetating exposed areas within prescribed time frames.

### 4.13.5 Construction-period Noise

The construction process for the ALC involves the use of excavation and construction equipment resulting in temporary increases in noise along the corridor. In addition, increases in traffic due to construction-related detours would add to increase noise for some receptors.

The contractors' operations would be performed to minimize the impact of construction-generated noises on the surrounding area and noise would be controlled during construction in accordance with VDOT's Road and Bridge Specifications. Construction noise impacts are generally controlled by equipping machinery with noise abatement devices, limiting construction activities during noise sensitive times of the day, and locating staging areas away from noise sensitive areas.

### 4.13.6 Hazardous Wastes

Construction equipment and materials utilized during construction of the ALC may result in hazardous waste production and may also provide the potential for a hazardous materials release. The types of hazardous materials associated with construction activities include, but are not limited to gasoline, diesel fuel, kerosene, oil, pesticides, fertilizers, herbicides, cleaning solvents, coolants, paints and sealants.

In accordance with the requirements of the VDOT Road and Bridge Specifications, the contractor shall protect the public and the environment from hazardous materials associated with construction activities. Any hazardous waste generated during construction activities must be registered, manifested and disposed of at a permitted treatment, storage and disposal facility (TSDF). Additionally, the construction materials used on-site that are defined as hazardous substances should be stored, handled and disposed of in accordance with state and federal regulations to prevent the pollution of air, soil, or surrounding bodies of water. All construction equipment on-site shall be monitored for leaks and shall receive regular preventive maintenance to reduce the chance of leakage. In the event that any hazardous material is released during construction activities the contractor shall immediately notify all appropriate jurisdictional state and federal agencies in accordance with the VDOT Road and Bridge Specifications and shall take immediate actions to contain, remove, and properly dispose of the hazardous material.

In the event that any hazardous material is released during construction activities the contractor shall immediately notify all appropriate jurisdictional state and federal agencies in accordance with VDOT and shall take immediate actions to contain, remove, and properly dispose of the hazardous material.

### 4.13.7 Water Resources and Water Quality

Construction of the ALC could potentially result in temporary effects on the water quality and aquatic biota of adjacent waterways through an increase in turbidity. Although fish and benthic macroinvertebrate communities are known to recover quickly once construction activities have ceased, siltation and sedimentation during the construction phase may lead to a temporary displacement of aquatic fauna. Implementation of erosion and sedimentation control devices, as well as other mitigation measures required by the Virginia Erosion and Sediment Control Handbook, Third Edition (DCR, Division of Soil and Water Conservation 1992), will address potential impacts to the baseline water quality and ecology of the water systems. In addition to control measures, scheduling construction activities during dry seasons and after fish spawning will further reduce construction-related impacts to adjacent waters and their aquatic species, including the Roanoke logperch. With implementation of appropriate mitigation measures and best management practices, construction of the ALC would not result in a permanent degradation of water quality.

### 4.13.8 Natural Resources

Temporary impacts to natural resources include the disruption of wildlife and wildlife corridors due to noise from construction equipment and the disturbance of vegetative communities during the construction of access roads, staging areas, and storage yards. Mobile wildlife species inhabiting affected areas are expected to be absorbed into adjoining forest communities with no long-term adverse effects. Some species whose populations are already limited by existing environmental conditions may experience an increase in mortality rates, not only during construction but in the long-term, as forested land is cleared for the construction of the roadway. Temporary effects to navigable waters could include construction of temporary causeways and cofferdams to accommodate bridge construction, which would be addressed during the permitting process.

Construction of bridges will employ methods designed to avoid or minimize impacts to aquatic habitat and riparian corridors and will be phased to minimize effects to recreational boating interests. Stream channels will be restored to preconstruction configuration following removal of temporary causeways, coffer dams, and other construction materials. Traffic maintenance plans will be developed during project design stages to minimize the temporary effects of construction on mineral resource operations. Once construction activities are completed, measures will be employed to restore any disturbed natural communities not incorporated into the roadway footprint to pre-construction conditions.

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## 4.14 RELATIONSHIP BETWEEN LOCAL SHORT-TERM USES OF THE ENVIRONMENT AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

Designated by Congress as a "high priority" corridor in it's NHS, transportation improvements afforded by the Build Alternative Options are based on state and local comprehensive planning which consider the need for present and future traffic requirements within the context of present and future land use development. The relationship between short-term uses of the environment and long term productivity enabled by the construction of the ALC is discussed in this section. Short-term impacts and uses of the environment are generally associated with the construction phase of the project. The impacts during the construction phase, listed below, would be offset by anticipated benefits that I-73 will provide once it is completed.

### 4.14.1 Localized Delays and Detours

Construction activities would result in temporary and localized detours, modifications to access and increases in construction related truck traffic and associated congestion. These short-term impacts would be offset by the increased long term mobility, decreased travel times and reduced local street congestion.

### 4.14.2 Natural Resources

As discussed in the purpose and need section of this document, local short-term impacts and use of natural resources are consistent with the maintenance and enhancement of long-term productivity for the region and, as a component of the longer I-73 corridor, for interstate commerce.

On a short-term basis, provision of right-of-way for construction of a new interstate would convert a portion of forest lands and agricultural lands to successional herbaceous and shrub communities. On a long-term basis, these vegetated right-of-way areas would inherently provide edge habitat and a limited amount of wildlife habitat values (particularly for bird species). All practicable measures to reduce the probability of wildlife-vehicle collisions would be addressed during the design phase and during development of landscape management plan. Tree stands would be preserved within the right-of-way to the fullest extent practicable for the long term. With respect to mineral resources, short-term benefits of the ALC would include increased use of regional mineral resources (such as crushed stone, sand and gravel) during project construction and associated contributions to the regional economy. Long-term benefits would include enhanced interstate commerce and associated benefits to the regional economy. In a similar manner, short-term commitments of timber resources and prime farmland soils would translate to long-term benefits through enhanced agricultural/silvicultural interstate commerce and associated benefits to the regional economy. Utilization of I-73 for long-haul agricultural and silvicultural freight movements to, from and through the study area will accrue long term benefits in travels safety and travel time.

### 4.14.3 Air Quality

Emissions from reduced traffic speeds through construction zones and construction equipment, combined with fugitive dust from construction activities and smoke produced during open burning, would result in a temporary degradation in local air quality. However, once construction of the ALC is completed, increased travel speeds throughout the corridor and reduced congestion would help to improve air quality.

### 4.14.4 Water Resources

As discussed in the purpose and need section of this document, local short-term impacts and use of water resources are consistent with the maintenance and enhancement of long-term productivity for the region and, as a component of the longer I-73 corridor, for interstate commerce.

A short-term commitment of local raw water resources will be required during construction (for mixing of aggregates, road wetting operations, landscape establishment, etc.). Through provision of stormwater management facilities, adherence to the guidelines established in the Virginia Erosion and Sediment Control

Handbook (DCR, Division of Soil and Water Conservation, 1992), the established spill prevention and counter measure control (SPCC) plan and other pertinent resource management plans, the ALC is not expected to adversely impact the long-term productivity of regional water resources.

### 4.14.5 Noise

Noise impacts are expected adjacent to the right-of-way in developed areas as construction machinery is operating and traffic is detoured during construction. Because of the existing built environment in areas like the City of Roanoke, existing noise levels are already at elevated levels and the addition of construction-related noise would not substantially increase those levels. In rural areas where existing noise levels approach ambient levels, construction-related noise would be more noticeable. At the same time, however, because of the low population density in those areas, not as many people would be impacted by construction-related noise, In the long-term, noise impacts will be addressed through the erection of noise barriers adjacent to the roadway where determined reasonable and feasible. Some areas that are currently experiencing noise impacts (along I-581) but are not currently protected would likely receive protection once I-73 is constructed.

### 4.14.6 Aesthetics

Construction activities will create new cut and fill slopes, some of them substantial, especially in the mountainous and hilly areas of the study area that will be visible from a distance. Exposed slopes would be revegetated so that in the long-term, the visual impact created by new cut and fill slopes would be lessened as vegetation matured.

### 4.14.7 Economic

A short-term reduction in business activities and employment due to reduced accessibility and displacement of businesses is anticipated. In addition, there would be lost tax revenue from businesses that elect not to relocate. Relocated businesses would be reestablished at their new location before the old location was acquired and cleared for the project. Therefore, assuming that relocated businesses located in close proximity to their original location, localities would not experience a substantial reduction in the tax base from local business relocations. There would, however, be a loss of tax revenue as land is converted to highway right-of-way and taken off of the tax rolls. In the long-term, I-73 would be used by the localities to attract new economic development to their areas which would offset losses associated with near-term construction of I-73.

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## 4.15 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Construction of the ALC would involve a commitment of land, construction materials, natural resources, capital resources, and labor that would be irreversible and irretrievable.

The commitment of land for the construction of the ALC right-of-way would render the land unusable for any other use. Although the existing land uses within the right-of-way could be relocated to an alternate location, in many cases this land would be dedicated to VDOT in perpetuity. This commitment of land would include existing rights-of-way, natural landscapes, and lands currently developed or planned for a variety of land use development.

The raw materials and energy used to construct the ALC would constitute an irretrievable commitment of resources. The raw materials (including aggregates, sand and gravel, and cement) would be dedicated to the construction of the ALC and would not be available for other uses. Resources like steel and asphalt are the byproducts of raw materials and can be recycled for other uses when they outlive their usefulness. Similarly, fuels and electricity used in the construction process would be dedicated to the project. None of the natural resources associated with lands that would be committed to the project or natural resources that would be used in preparation/fabrication of construction materials is in short supply and their use will not have an adverse effect on the continued availability of the resources.

Commitment of human and fiscal resources would also be required. During construction, members of the labor force (including construction crews, government staff, consultants and engineers) would be dedicated to the project. Fiscal resources used to purchase construction materials and pay the labor force would also constitute an irretrievable commitment of resources at the governmental level. However, these fiscal resources would be recycled in the local and regional economies as the recipients use them to purchase goods and services, and so on.

The irreversible and irretrievable commitment of resources would be offset by short-term and long-term improvements to the regional economic base and achievement of goals to improve mobility options and overall transportation services in the local area, region, and state. Additionally, gains in long-term economic productivity translate to increased tax revenues for local and state jurisdictions.

Under the Endangered Species Act, the FHWA is prohibited from making any irreversible and irretrievable commitments that would foreclose the consideration of reasonable and prudent alternative measures that may aid in not jeopardizing a listed species or destroying critical habitat. Given this, FHWA and VDOT will not commit any resources to the development of Segment 153, other than the necessary resources needed to carry out final design activities and develop information needed by the USFWS to carry out formal consultation and issue a biological opinion. Should information developed in conjunction with final design activities carried out on Segment 153 lead the USFWS to issue a jeopardy opinion, then FHWA and VDOT would have the ability to pursue other segments that would avoid crossing the Pigg River at the proposed crossing of the ALC while committing only a limited amount of irreversible and irretrievable resources to the development of Segment 153

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