



U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL HIGHWAY ADMINISTRATION
and
VIRGINIA DEPARTMENT OF TRANSPORTATION

ENVIRONMENTAL ASSESSMENT

US 460 BYPASS INTERCHANGE AND SOUTHGATE DRIVE RELOCATION

Town of Blacksburg
State Project No.: 0460-150-204, P101, R201, C501, B601
UPC 99425



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Date

Mark E. [Signature]

for

Division Administrator
Federal Highway Administration

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1.1 STUDY AREA

The Virginia Department of Transportation (VDOT), in cooperation with the Federal Highway Administration (FHWA), is studying the environmental consequences of improvements along the existing signalized at-grade intersection of Southgate Drive on the US 460 Bypass. The US 460 Bypass, a four-lane divided limited access highway, provides a north-south connection between and around the Towns of Christiansburg and Blacksburg. It has a posted speed limit of 65 miles per hour (mph). Southgate Drive (Route 314), a two-lane road, provides access to Virginia Polytechnic Institute and State University (Virginia Tech), downtown Blacksburg, the Virginia Tech-Montgomery Executive Airport, and the Virginia Tech Corporate Research Center. Southgate Drive has a posted speed limit of 35 mph.

Figure 1-1 shows the traffic analysis area, which encompasses one existing grade-separated interchange to the north and one grade-separated interchange to the south along the US 460 Bypass, as well as areas to the east associated with connections to the existing Southgate Drive roadway network (Duck Pond Drive and Research Center Drive). This area is located entirely within the Town of Blacksburg in Montgomery County.

Figure 1-2 shows the study corridor for the proposed project. This area encompasses approximately 0.85 miles along US 460 Bypass and approximately 0.8 miles along Southgate Drive, as well as areas on new location for the relocation of Southgate Drive and the potential interchange area.

1.2 HISTORY

Improvements along the existing at-grade intersection of Southgate Drive and the US 460 Bypass have long been a regional priority as it has consistently been ranked as

a congestion and safety-deficient location in need of improvements by previous studies.

- The Blacksburg-Christiansburg-Montgomery Area Metropolitan Planning Organization (MPO) completed a study entitled *Analysis for a New Interchange on the US 460 Bypass in the Vicinity of Southgate Drive* (June 2011), which was adopted by the MPO Policy Board on June 2, 2011.
- Planning and construction funding for improvements at the intersection of Southgate Drive and the US 460 Bypass is included in the MPO's financially constrained *Year 2035 Long Range Transportation Plan (LRTP)*.
- An interchange in the vicinity of Southgate Drive, along with connections from the interchange to local roadways, is included in the Town of Blacksburg's *2006-2046 Comprehensive Plan*.

1.3 NEEDS – EXISTING CONDITIONS

Traffic Congestion. The existing at-grade intersection of Southgate Drive and US 460 Bypass serves approximately 35,000 vehicles on an average weekday (2010 traffic)¹. The intersection also serves special events at Virginia Tech, including football games (Lane Stadium holds more than 66,000 spectators), basketball games (Cassell Coliseum seats almost 10,000), and other campus events.

Existing levels of service (LOS)² and associated delay times at intersections along Southgate Drive are presented in **Table 1-1**.

¹ http://virginiadot.org/info/resources/2010/AADT_150_Blacksburg_2010.pdf

² Level of service (LOS) provides a comparative measure of the traffic performance of roads through a grading from A (best) to F (worst).

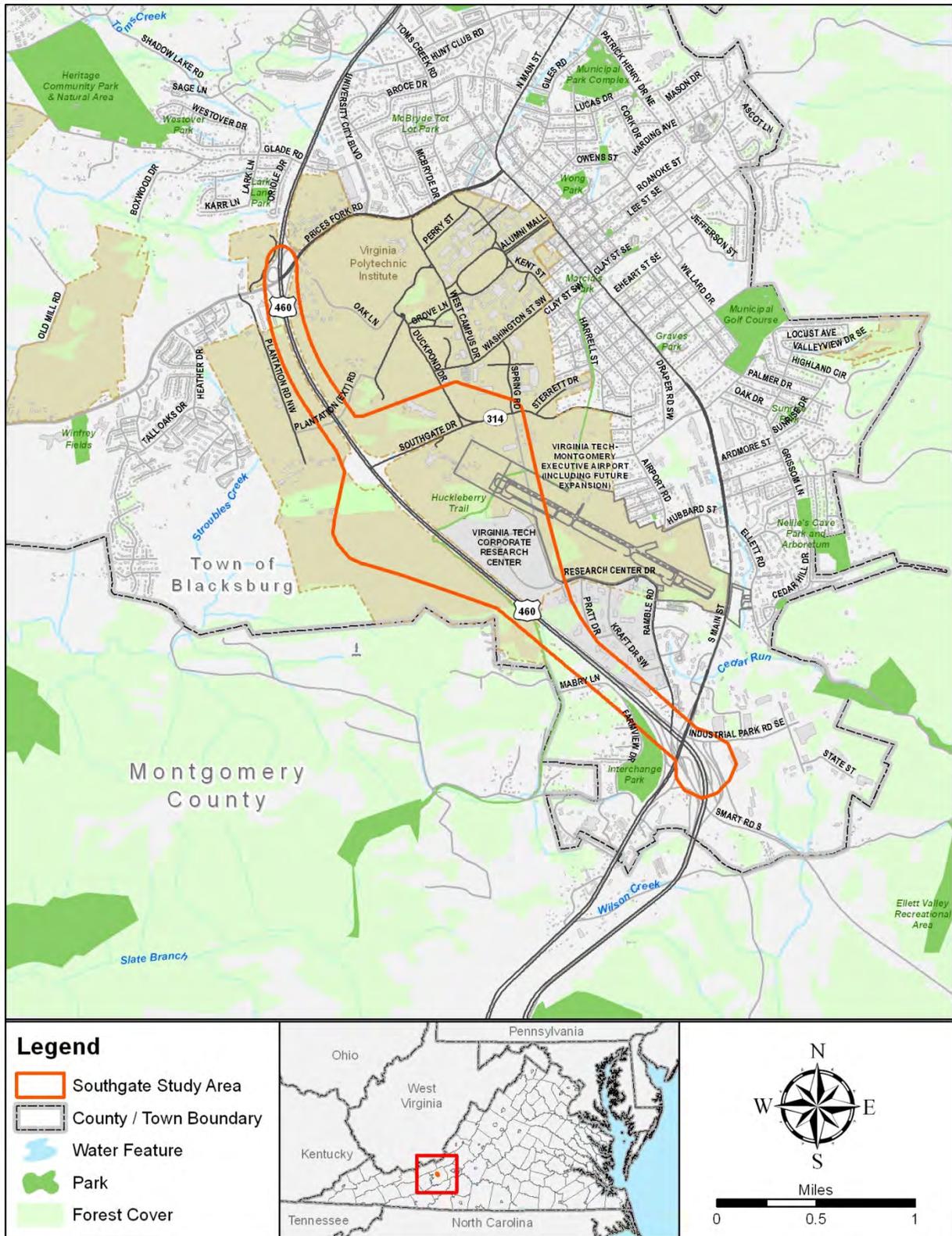


Figure 1-1. Traffic Analysis Area



Figure 1-2. Study Corridor

Table 1-1. Overall Intersection Operations – Existing and 2040 No-Build Conditions

Intersection		2010 Existing		2040 No-Build	
		AM	PM	AM	PM
Southgate Drive at US 460 Bypass	LOS	B	D	D	F
	Delay (sec)	11.9	35.9	42.2	139.3
Southgate Drive at Duck Pond Drive	LOS	A	B	E	B
	Delay (sec)	6.6	16.4	59.8	15.9
Southgate Drive at Spring Road	LOS	B	F	E	F
	Delay (sec)	16	262.4	70.7	300.6

Source: Traffic and Transportation Memorandum, prepared in support of this EA. Available for review on project website: http://www.virginiadot.org/projects/salem/southgate_connector_blackburg.asp.

At the intersection with US 460 Bypass, the LOS is B in the AM and D in the PM. FHWA design criteria require LOS C on this section of US 460 Bypass, which is on the National Highway System.

Safety. Over most of its 11-mile length from Interstate 81 to its terminus located north of the Town of Blacksburg, the US 460 Bypass is a four-lane, limited-access facility. Its intersection at Southgate Drive is one of only two at-grade intersections along the entirety of the bypass. The at-grade intersection at Southgate Drive along a predominantly limited-access roadway adversely affects safety due to:

- Variations of travel speeds. Over most of its length in the region, US 460 Bypass has a posted speed limit of 65 mph. The at-grade signalized intersection at Southgate Drive presents a safety concern as it creates turbulence and speed variability within the traffic stream resulting from through vehicles shifting lanes to avoid slowing or stopped vehicles. A number of studies have examined the relationship between speed variance in the traffic stream and crash rates. For example, in 1988, the University of Virginia conducted a study for the AAA Foundation for Traffic Safety entitled *Speed Variance and its Influence on Accidents*. The study analyzed the relationship between vehicular speed and the geometric characteristics of highways in traffic

streams and concluded that crash rates increase with increased speed variance.

- Queue lengths. Turning vehicle queues on US 460 Bypass extend into through lanes, obstructing through traffic and increasing crash potential (queue lengths are included in Section 1.4 below).
- Driver expectation. Because the majority of the US 460 Bypass operates as a limited access facility, an isolated at-grade intersection is not expected, particularly for motorists from outside of the region.

These existing safety issues are supported by the fact that this intersection ranks sixth in the MPO region in terms of number of crashes³.

Accessibility and Mobility. Southgate Drive provides access to some of the region's key activity centers, including the campus of Virginia Tech (over 28,000 students); the Virginia Tech Corporate Research Center (which currently houses 2,200 employees in one million square feet); the Virginia Tech-Montgomery Executive Airport; and the Town of Blacksburg (over 42,000 residents). Continued accessibility and mobility among these activity and employment centers is a critical need in terms of supporting the region's economy. Congestion at the US 460 Bypass/Southgate Drive intersection limits access to and egress

³ Blacksburg/Christiansburg/Montgomery Area 2035 Transportation Plan. Blacksburg-Christiansburg-Montgomery Area MPO. June 2, 2011.

from these areas, as evidenced by existing LOS and queuing data.

1.4 NEEDS – FUTURE CONDITIONS

Traffic Congestion. By 2040, traffic forecasts show increases in travel demand of almost 84% (to 64,300 vehicles) in weekday traffic that would pass through the intersection at Southgate Drive and US 460 Bypass. The increased volume would result in worse LOS (D in the AM peak hour and F in the PM peak hour) and more than tripling of delay at the intersection in both peak hours. Refer to Table 1-1 above for LOS and associated delays. More details on traffic analyses are provided in the *Traffic and Transportation Memorandum*.

Safety. Existing safety issues are anticipated to worsen as higher traffic volumes pass through the at-grade intersection along the mainly limited-access bypass. The increase in travel delays and congestion also would result in longer queues, as shown in **Table 1-2**.

The movement of most concern with respect to safety is the left-turn traffic from eastbound US 460 Bypass onto Southgate Drive, in which case the stopped traffic in turning queues would spill back into the through lanes carrying higher-speed traffic. Queue lengths on eastbound US 460 Bypass are projected to increase more than 200% in both the AM and PM peak hours.

Queue lengths on Southgate Drive in the PM peak are estimated to lengthen by 188% for right turns and 220% for left turns.

Accessibility and Mobility. As traffic demand increases, continued accessibility to regional activity and employment centers will be needed to support the region's economy. These centers include the Town of Blacksburg, the expanded Virginia Tech-Montgomery Executive Airport, the campus of Virginia Tech, and the expanded Corporate Research Center, which is anticipated to double in size to house an additional 3,000 employees. For the region as a whole, the MPO estimates more than 30% increase in population and 45% increase in employment by 2035.

1.5 PURPOSE SUMMARY

Based on these existing and future needs, the purpose of the proposed project is to:

- Reduce congestion and thereby improve LOS at the intersection of Southgate Drive and US 460 Bypass.
- Improve safety on US 460 Bypass by improving the existing at-grade signalized intersection that is located between adjacent grade-separated interchanges along a limited-access highway.
- Improve accessibility and mobility to and within the surrounding activity and employment centers within the region.

Table 1-2. Queue Lengths – Existing and 2040 No-Build Conditions

Movement	AM (feet)			PM (feet)		
	2010 Existing	2040 No-Build	% Increase	2010 Existing	2040 No-Build	% Increase
US 460 Bypass						
Eastbound Left Turn to Southgate Drive	210	725	245%	160	345	115%
Eastbound Through	125	385	208%	565	1,730	206%
Westbound Through	345	490	42%	890	2,370	166%
Southgate Drive						
Westbound Left Turn to EB 460	35	60	71%	280	895	220%
Westbound Right Turn to WB 460	60	60	-	320	920	188%

Source: Traffic and Transportation Memorandum, prepared in support of this EA.

2.1 INTRODUCTION

This section describes the process that was used to develop and screen alternatives. With the exception of the No-Build Alternative, alternatives that would not meet the stated purpose and need are not considered reasonable and were not carried forward for detailed evaluation. As a result of the screening process, one Build Alternative is carried forward for detailed evaluation. This alternative represents a set of improvements that form a stand-alone solution to the identified needs within the study corridor. The Build Alternative is presented, not as a specific engineering design, but, rather, as a study corridor that encompasses sufficient area to accommodate a variety of specific designs with respect to the US 460 Bypass / Southgate Drive interchange, the alignment for relocated Southgate Drive, removal of existing Southgate Drive, connections to existing roads, and other appurtenances, such as stormwater management facilities.

2.2 ALTERNATIVES DEVELOPMENT AND SCREENING PROCESS

An earlier planning study prepared by the Blacksburg-Christiansburg MPO formed the basis for the alternatives development and screening process. Adopted by the MPO's Policy Board in June 2011, the *Analysis for a New Interchange on the US Route 460 Bypass in the Vicinity of Southgate Drive*¹ evaluated conceptual locations and configurations for an interchange of a relocated Southgate Drive with US 460 Bypass. That report is incorporated by reference in this EA as it reflects the considerations by the MPO regarding how best to meet the identified transportation needs that this project would be addressing.

¹ Available for review on VDOT's project website: http://www.virginiadot.org/projects/salem/southgate_cnnector_-_blacksburg.asp.

The MPO's financially constrained *Blacksburg/Christiansburg/Montgomery Area Year 2035 Long Range Transportation Plan (LRTP)*, available on the MPO's website), as amended June 2, 2011, identifies improvements at the at-grade intersection of US 460 Bypass and Southgate Drive to "Relocate Southgate Drive to intersect with the US 460 Bypass by constructing a new interchange approximately 2,200 feet south of the current intersection." The proposed Build Alternative as presented in this EA is consistent with the MPO's official policy decisions regarding the Southgate Drive improvements, as well as the Virginia Tech Master Plan and planned improvements to the Virginia Tech-Montgomery County Executive Airport (described in Section 2.3).

The planning study and the MPO's inclusion of the project in the regional transportation plan, referenced above, have framed the consideration of alternatives. Furthermore, additional study has been conducted for purposes of this EA to ensure that the latest available information has been taken into account. Accordingly, the *Alternatives Technical Memorandum* not only summarizes findings of the planning study, but also incorporates traffic forecast data using the MPO's most recent regional traffic forecasting model and the most recent estimates of population and employment projections across the region.

Figure 2-1 illustrates the step-by-step process used to identify and screen alternatives. This process considers a full range of alternatives, including those considered in previous studies, that could potentially meet the identified transportation needs (as defined in Section 1) and narrows the options to one Build Alternative for further consideration in this EA. The screening of potential alternatives is shown in **Table 2-1**, and further described in Section 2.3.

Figure 2-1. Alternatives Screening Process

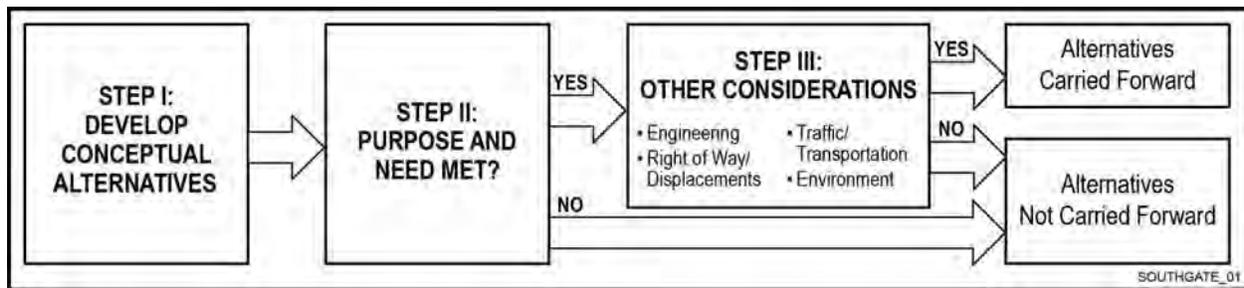


Table 2-1. Screening of Potential Alternatives

Potential Alternative:	Would Purpose and Need Be Met?		
	Traffic Congestion	Safety	Accessibility & Mobility
Mass Transit Alternative	No	No	No
Transportation System Management Alternative	No	No	No
Upgrade Existing At-grade Intersection	No	No	No
Interchange at Existing Intersection Location	Yes	Yes	Yes
Interchange at Relocated Intersection Location	Yes	Yes	Yes

2.3 ALTERNATIVES NOT CARRIED FORWARD FOR DETAILED STUDY

Through the alternatives screening process, several concepts were not carried forward for detailed consideration and not carried forward in this EA for detailed evaluation. Three potential alternatives were not carried forward due to their inability to address the project purpose and need:

- *Mass Transit Alternative.* This alternative would have limited ability as a stand-alone solution to reduce congestion, improve safety, and improve access and mobility because it would not address the primary basis for these needs, which is the at-grade intersection.
- *Transportation System Management (TSM) Alternative.* TSM seeks to reduce roadway congestion and improve traffic safety by way of technology, reducing demand, increasing vehicle occupancy, and/or providing alternate modes of travel. This alternative would have limited ability as a stand-alone solution to reduce congestion, improve safety, and improve access and mobility because it would not address the primary basis for

these needs, which is the at-grade intersection.

- *Upgrade existing at-grade intersection.* As noted in Section 1 Purpose and Need, many of the transportation needs in the project area relate to the at-grade aspect of this junction (including safety, access, and mobility). This alternative would maintain an at-grade intersection on the primarily grade-separated US 460 Bypass and would therefore not meet the project needs.

The alternative consisting of an interchange at the existing at-grade intersection location was not carried forward for further evaluation for the following reasons:

- In order to construct an interchange at the existing location, Southgate Drive would have to be closed to traffic during construction, or a temporary access road would have to be constructed and maintained for the duration of interchange construction. Closing the intersection during construction would eliminate the access provided by the existing road to Virginia Tech, downtown Blacksburg, the Virginia Tech-Montgomery Executive Airport, and the Virginia Tech Corporate

Research Center. Constructing temporary access would not be cost-effective when compared to constructing an interchange at a new location, allowing the existing intersection to remain open during construction. The construction of an interchange at a new location affords maintenance of traffic through the existing intersection and facilitates construction relatively free of traffic conflicts.

- The existing intersection location conflicts with Virginia Tech's campus access plans, as outlined in the 2009 Master Plan Amendment². These plans include a "new interchange/flyover south of Southgate Drive on the Route 460 Bypass" as part of a roadway concept to replace existing Southgate Drive to accommodate the airport runway expansion, which also necessitates the relocation of their Dairy Science Complex facilities.
- As described in Section 2.2, the location of a new interchange to the south of the existing intersection location is consistent with the MPO's planning and programming in their long range transportation plan; an interchange at the existing intersection is not.

2.4 ALTERNATIVES CARRIED FORWARD

2.4.1 No-Build Alternative

The no-action or No-Build Alternative serves as a baseline for comparing build alternatives. The elements of the No-Build Alternative include the following:

- Southgate Drive would remain on its existing alignment (*would not be relocated*).
- The intersection of Southgate Drive and US 460 Bypass would remain a signalized at-grade intersection (*a grade-separated interchange on US 460 Bypass to connect with a relocated*

Southgate Drive would not be constructed).

It is assumed that all transportation improvements (with the exception of the Southgate improvements) that are funded for construction in the MPO's financially constrained long range transportation plan (*Year 2035 LRTP* adopted November 4, 2010 and amended June 2, 2011) would be implemented by the design year 2040.

These projects are described in the Blacksburg/Christiansburg/Montgomery Area 2035 Transportation Plan³ and listed in the *Alternatives Technical Memorandum*. In the vicinity of the Southgate Drive project, they include extension of the runway at the Virginia Tech-Montgomery Executive Airport and relocations of portions of Research Center Drive and the Huckleberry Trail to accommodate the runway extension.

As previously discussed, the No-Build Alternative is not consistent with local land use plans, including the MPO's official policy decisions regarding the Southgate Drive improvements, the Virginia Tech Master Plan, and the planned expansion of the Virginia Tech-Montgomery County Executive Airport. Furthermore, the No-Build Alternative would not meet the identified project needs, as described below.

ABILITY TO MEET NEEDS.

Traffic Congestion. As shown in **Table 2-2**, the LOS at the intersection of Southgate Drive and US 460 Bypass would deteriorate from existing LOS B and D to 2040 No-Build LOS D and F in the AM and PM peak hours, respectively. As previously stated, FHWA design criteria require LOS C on this section of US 460 Bypass. The associated

³ Blacksburg/Christiansburg/Montgomery Area 2035 Transportation Plan. Blacksburg-Christiansburg-Montgomery Area MPO. June 2, 2011. http://www.montgomerycountyvva.gov/filestorage/1146/98/157/658/2035_BCM-MPO_Transportation_Plan_Approved_November_4%2C_2010%2C_Amended_June_2%2C_2011_.pdf

² The Virginia Tech Master Plan Amendment 2009, Land Use.

delays at this intersection would approximately triple in both peak hours. The intersections of Southgate Drive with Duck Pond Drive and Spring Road would deteriorate in the AM peak hour from existing LOS A and B, respectively, to 2040 No-Build LOS E.

Safety. As discussed in Section 1.4 Needs – Future Conditions, existing safety issues associated with variations of travel speeds, queue lengths, and driver expectations are anticipated to worsen as higher traffic volumes (almost 84% increase in weekday traffic through the intersection of Southgate Drive and US 460 Bypass) would pass through the at-grade intersection along the mainly limited-access bypass. The increased queue lengths, which are of main concern on eastbound US 460 Bypass as left-turning traffic spills back onto the through lanes carrying higher-speed traffic, are shown in Table 1-2.

Accessibility and Mobility. As discussed in Section 1.4 Needs – Future Conditions, continued accessibility to regional activity and employment centers will be needed to support the region’s economy as traffic demand increases.

2.4.2 Build Alternative

The screening process resulted in one Build Alternative being carried forward for detailed evaluation: a grade-separated

interchange on new location south of existing Southgate Drive, relocation of Southgate Drive to connect to the new interchange, and closure and demolition of existing Southgate Drive and its intersection with US 460 Bypass. Although several preliminary designs were tested for purposes of the previously published *Analysis for a New Interchange on the US Route 460 Bypass in the Vicinity of Southgate Drive*, those designs were not based on engineering surveys and do not represent actual final designs for elements of the project. As noted in Section 2.1, the Build Alternative is represented as a study corridor (see Figure 1-2 in Section 1) that encompasses sufficient area to accommodate several design variations. This approach provides a worst-case assessment of the potential impacts while providing flexibility during final design with respect to specific alignment and design features.

ELEMENTS OF THE BUILD ALTERNATIVE.

As shown in **Figure 2-2**, the elements of the Build Alternative include the following:

1. Construction of a new interchange, located between approximately 0.3 and 0.4 miles south of the existing at-grade intersection of Southgate Drive and US 460 Bypass.

Table 2-2. Intersection LOS – Existing, 2040 No-Build, and 2040 Build Conditions

Intersection		2010 Existing		2040 No-Build		2040 Build	
		AM	PM	AM	PM	AM	PM
Southgate Drive at US 460 Bypass	LOS	B	D	D	F	A	B
	Delay (sec)	11.9	35.9	42.2	139.3	9.8	12.5
Southgate Drive at Duck Pond Drive	LOS	A	B	E	B	A	B
	Delay (sec)	6.6	16.4	59.8	15.9	3.4	13.1
Southgate Drive at Spring Road	LOS	B	F	E	F	D	D
	Delay (sec)	16	262.4	70.7	300.6	36.8	46.0

Source: Traffic and Transportation Memorandum, prepared in support of this EA. Available for review on project website: http://www.virginiadot.org/projects/salem/southgate_connector_blacksborg.asp.

2. Relocation of Southgate Drive to connect with the new interchange on the west end and with existing Southgate Drive on the east end in the vicinity of Duck Pond Drive.
3. Removal of the existing Southgate Drive and US 460 Bypass intersection and existing Southgate Drive between US 460 Bypass and Duck Pond Drive.

Construction of the Build Alternative would also include geometric improvements to the existing Huckleberry Trail underpass of US 460 Bypass to eliminate sharp curves and poor sight distance as well as reduce the approach grades to the underpass. Other ancillary improvements would include drainage, stormwater management facilities, and connections to existing Duck Pond Drive and Spring Road. All elements of the Build Alternative would accommodate connection with the relocated Research Center Drive and relocated crossings with the Huckleberry Trail that are associated with the airport expansion.

COST. The estimated cost for the new interchange and associated roadway improvements is \$46.7 million (*Year 2035 LRTP, Amendment 1*).

ABILITY TO MEET NEEDS.

Traffic Congestion. The Build Alternative would relieve congestion on both US 460 Bypass and Southgate Drive, as shown in **Table 2-2**. Additionally, all new ramp merge and diverge connections (shown in **Table 2-3**) with relocated Southgate Drive

would operate at reasonable LOS (LOS C at all locations in both the AM and PM peak hours). Refer to the *Traffic and Transportation Memorandum* for details on all traffic operations.

Safety. The Build Alternative would improve safety by providing a grade separation that will remove much of the traffic conflict that occurs today with the at-grade intersection. The new grade-separated interchange would be located between adjacent interchanges that are also grade-separated, which would reduce unexpected conditions for drivers and unsafe variation of driving speeds by maintaining the grade-separated operational characteristics along the US 460 Bypass. The potential safety hazard of turning queues spilling back into the through lanes carrying higher-speed traffic on US 460 Bypass would be eliminated as analysis shows that queues at the intersection of the ramps with relocated Southgate Drive would be less than 50 feet (refer to the *Traffic and Transportation Memorandum* for details).

Accessibility and Mobility. By reducing congestion and providing a more efficient connection between US 460 Bypass and Southgate Drive, the Build Alternative would enhance accessibility to and mobility between the area’s activity centers, including Virginia Tech, downtown Blacksburg, the Virginia Tech Corporate Research Center, and the Virginia Tech-Montgomery Executive Airport.

Table 2-3. 2040 Build Alternative – Ramp Merges and Diverges Measures of Effectiveness

Direction and Ramp		AM		PM	
		Speed (mph)	LOS	Speed (mph)	LOS
EB US 460 Bypass	Off-ramp to Southgate Drive	53.3	C	54.5	C
	On-ramp from Southgate Drive	56.0	C	57.0	C
WB US 460 Bypass	Off-ramp to Southgate Drive	52.7	C	54.8	C
	On-ramp from Southgate Drive	56.0	C	56.0	C

Source: *Traffic and Transportation Memorandum*, prepared in support of this EA.

ENVIRONMENTAL CONSEQUENCES**3.1 INTRODUCTION & OVERVIEW**

This section describes the environmental consequences of the Build Alternative, which are reported based on the generalized study corridor for the project, as shown in Figure 1-2 and Figure 2-2. The study corridor represents an exaggerated “footprint” of the project in order to provide an assessment of worst-case impacts and to provide flexibility during final design to consider multiple variations of specific alignments and design features.

Accordingly, the impacts of the actual construction and right-of-way footprint would be expected to be less than the

impacts reported herein. **Table 3-1** summarizes environmental issues and their relevance to the project. **Table 3-2** quantifies and compares the impacts between the No-Build and Build Alternatives. Resources requiring further discussion are addressed in the sections following the tables. The environmental data and findings presented herein are based on information from federal, state, and local agencies; previous studies; existing literature and websites; aerial photography; geographic information system (GIS) databases; and site visits to the project area.

Table 3-1. Summary of Environmental Issues

Resource	Comment
Land Use/Land Cover	Land cover within the study corridor consists largely of pasture and cropland on property owned by Virginia Tech. Virginia Tech’s Dairy Science Complex currently occupies portions of that land east of US 460 Bypass and south of Southgate Drive. However, Virginia Tech plans to relocate those facilities onto land supporting the dairy operation under its 2009 Master Plan Amendment to accommodate the airport expansion, the MPO-approved Southgate improvements, and the planned expansion of the Virginia Tech Corporate Research Center. Right-of-way acquisition would occur before construction of the Build Alternative. Adjoining the Dairy Science Complex land and to the south along the east side of US 460 Bypass is the 210-acre Virginia Tech Corporate Research Center, which is owned and operated by the Virginia Tech Foundation (a 501(c)(3) nonprofit nonstock corporation that provides private financial support to Virginia Tech). To the east of the Corporate Research Center is the Virginia Tech-Montgomery Executive Airport, for which extension of the runway and other improvements are undergoing planning and design by the Airport Authority. Two small wooded areas also are present in the project area. One is located on the Dairy Science Complex; the other, referred to as “Center Woods,” is located on the west side of the intersection of US 460 Bypass and Southgate Drive.
Agriculture and Prime Farmland	Approximately 118 acres of prime or unique farmland or farmland of statewide or local importance (based on soil types, see Appendix A for NRCS-CPA-106 Form), approximately 18 acres of cultivated land, and approximately 38 acres of pastureland exist within the study corridor. Agricultural activities include production of silage to support the dairy cattle operation at Virginia Tech’s Dairy Science Complex. As noted above, the Dairy Science Complex is slated to be relocated and portions of the land upon which it sits are to be retasked to academic activities. See Section 3.2 .
Agricultural and Forestal Districts	No agricultural or forestal districts (as established by localities under the Virginia Agricultural and Forestal Districts Act) are located within or near the study corridor.

Table 3-1. Summary of Environmental Issues

Resource	Comment
Relocations	No homes, businesses, farms, or nonprofit organizations would be displaced by the project. Currently, Virginia Tech's Dairy Science Complex is located in the study corridor. However, as previously mentioned, Virginia Tech is relocating those facilities away from the project area as part of its 2009 Master Plan.
Right-of-Way Acquisition	Land needed for proposed project right-of-way consists entirely of land owned by Virginia Tech and the Virginia Tech Foundation. Although a detailed design has not yet been developed sufficient for calculating a true quantity of actual new right-of-way required for the project, a rough estimate of 25 acres is provided for illustrative purposes. The actual quantity of right of way needed to implement the project will be identified during final design. Land needed for right-of-way would be acquired in accordance with the federal <i>Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970</i> , as amended.
Environmental Justice	There are no minority or low-income populations within or near the study corridor. Accordingly, there would be no disproportionately high and adverse environmental effects on such populations due to the project.
Community Facilities and Services	There are no community facilities or services (churches, schools, civic organizations, law enforcement, or emergency services) located within or near the study corridor. One cemetery, the Preston Family Cemetery, is located along the north side of Southgate Drive outside the study corridor. It would not be affected by the project.
Parks and Recreational Resources and Section 4(f)	The Build Alternative would include improvements to the horizontal and vertical alignment of the Huckleberry Trail at its crossing of US 460 Bypass. This may involve reconstruction of approximately 300 to 400 linear feet of the Huckleberry Trail (the exact limits would be determined as detailed design is developed). Approximately six miles long, the trail stretches from downtown Blacksburg to the New River Valley Mall in Christiansburg. The trail is used for walking, running, and bicycling and connects several parks along its length. See Section 3.3 .
Historic Properties	<p>There are two architectural historic properties within the area of potential effects (APE):</p> <ul style="list-style-type: none"> • Smithfield (VDHR #150-5017), a late 18th century dwelling listed 11/12/69 on the National Register of Historic Places (NRHP). The proposed interchange and relocated Southgate Drive would be visible from the property; however, this property is located approximately 3,000 feet from the proposed grade-separated interchange at US 460 Bypass. Existing Southgate Drive, US 460 Bypass, the Virginia Tech Dairy Complex, and modern developments associated with Virginia Tech are currently visible from the property. • The Preston Family Cemetery (VDHR #150-5070) is potentially eligible for the NRHP; however, additional data would be needed to make a definitive determination. For purposes of this EA, the cemetery is assumed to be eligible. The cemetery is approximately 230 feet north of existing Southgate Drive. <p>The Virginia Department of Historic Resources (VDHR) concurred on March 27, 2013 that the project as currently proposed will have no effect on the two properties listed above. Upon completion of archaeological surveys, additional coordination with VDHR will be undertaken and a formal Section 106 effect determination for the project as a whole will be sought from VDHR.</p>

Table 3-1. Summary of Environmental Issues

Resource	Comment
Mines, Minerals, and Geology	There are mineral resources in the vicinity of Blacksburg; however, the study corridor is located in a suburban area and there are no active mines or quarries that would be affected by the Build Alternative.
Karst	Karst is soluble carbonate bedrock that can contain sinkholes, caves, and underground streams, which can pose hazards for development due to ground stability problems. Although the study corridor is located in a region with karst formations, there are no such formations in the study corridor.
Acid Drainage	Acidic soils throughout the state have contributed to road degradation and destruction of vegetation and can severely disrupt ecosystems if unchecked into waterways. The Virginia Tech Department of Crop & Soil Environmental Sciences, with support from VDOT, has developed a GIS map of areas that are likely to produce problematic roadside management conditions that require intense reclamation efforts. According to that mapping, no known soils of risk are located in the study corridor.
Wild / Scenic Rivers	No federally listed Wild and Scenic Rivers are located in Virginia. No National Rivers Inventory or state-listed Scenic Rivers are located within or near the study corridor.
Waters of the US, including Wetlands	The study corridor encompasses approximately 2,104 linear feet of intermittent streams and approximately one acre of wetlands. See Section 3.4 .
Water Quality	Stroubles Creek, to which the study corridor drains, is listed on the Virginia Department of Environmental Quality (DEQ) 2012 List of Impaired Waters. Stormwater management facilities would be incorporated into the project to minimize long-term effects of the project on water quality. See Section 3.4 .
Public Water Supplies	No Sole Source Aquifers or Source Protection Areas are located within or near the study corridor. The nearest public surface water source is more than five miles away from the study corridor. Accordingly, no impacts to public water supplies are anticipated.
Floodplains	No 100-year floodplains designated by the Federal Emergency Management Agency are within or near the study corridor; therefore, the project would have no floodplain impacts.
Forest	An isolated seven-acre patch of forest is located adjacent to the east side of the study corridor within the Virginia Tech Dairy Science Complex. The project would be designed to avoid this area. Another forested area of approximately 43 acres (known locally as “Center Woods”) is located west of the existing intersection of US 460 Bypass and Southgate Drive. A three-acre portion of this area is within the study corridor. According to a letter from the Virginia Department of Forestry (VDOP), the forestland located in the project area has low to medium conservation value. VDOP encourages the voluntary mitigation of forestland acres lost to conversion to more intensive land uses.
Terrestrial and Aquatic Habitat and Wildlife	Impacts to terrestrial and aquatic wildlife would include the displacement of habitat within the study corridor. See Section 3.5 .
Threatened or Endangered Species	Information regarding federally listed threatened or endangered species that may potentially occur in the vicinity of the study corridor was requested from the US Fish and Wildlife Service (USFWS) through its Information, Planning, and Conservation

Table 3-1. Summary of Environmental Issues

Resource	Comment
	System (IPaC) website. The official species list provided by USFWS identified four listed species: Indiana bat, Virginia big-eared bat, smooth coneflower, and Mitchell's satyr butterfly. See Section 3.6 .
Anadromous Fish, Trout Waters, and Shellfish	No anadromous fish, trout, or shellfish waters are located within or near the study corridor.
Wildlife and Waterfowl Refuges	No wildlife or waterfowl refuges are located within or near the study corridor.
Invasive Species	In accordance with Executive Order 13112 <i>Invasive Species</i> , the potential for the establishment of invasive terrestrial or aquatic animal or plant species during construction of the project would be minimized by following provisions in VDOT's <i>Road and Bridge Specifications</i> . These provisions require prompt seeding of disturbed areas with mixes that are tested in accordance with the Virginia Seed Law and VDOT's standards and specifications to ensure that seed mixes are free of noxious species. While the proposed right-of-way would be vulnerable to the colonization of invasive plant species from adjacent properties, implementation of the stated provisions would reduce the potential for the establishment and proliferation of invasive species.
Hazardous Materials Sites	The preliminary environmental review of federal and state government databases revealed one petroleum release site (a fuel spill) located within the study corridor. Corrective action was taken and the record has been closed. Any discoveries of hazardous materials during construction would be resolved in accordance with applicable state and federal laws.
Air Quality	An analysis of potential air quality impacts indicates that the project would result in no violations of the National Ambient Air Quality Standards (NAAQS), nor worsen any existing violations or interfere with the attainment of any applicable NAAQS. In accordance with FHWA guidance, the project has a low potential for mobile source air toxics (MSAT) effects. See <i>Air Quality Technical Report</i> .
Noise	A noise analysis indicates that noise levels are anticipated to approach or exceed the FHWA Noise Abatement Criteria along two proposed trails – one proposed by Virginia Tech along Duck Pond Drive and the other the proposed route for the section of the Huckleberry Trail to be relocated as a result of the airport runway extension. See Section 3.7 and the <i>Preliminary Noise Analysis Technical Report</i> .
Visual	The Build Alternative and associated views are located: <ul style="list-style-type: none"> • Along the existing US 460 Bypass, which is characterized by views of suburban development and farmland in and around Blacksburg and Montgomery County, the Virginia Tech Corporate Research Center, and the Virginia Tech campus. Views of the interchange would be similar in character to views of the existing highway. • On new location across land and barns and structures that currently are part of the Virginia Tech Dairy Science Complex. Views from the road would be of open land, the expanded airport runway, the expanded Virginia Tech Corporate Research Center, and athletic facilities and buildings associated with Virginia Tech. Views of the road would be of a four-lane curvilinear roadway.

Table 3-2. Summary of Potential Impacts

Category	Impacts	
	No-Build	Build Alternative
Total Area within study corridor (acres)	0	150
Preliminary Estimate of Approximate New Right-of-Way Needed for the Project, for Illustrative Purposes Only (acres)	0	25
Homes, Businesses, Schools, Churches, Community Facilities within study corridor	0	0
Section 4(f) Property within study corridor (acres)	0	3.8
Historic Properties Adversely Affected	0	0
Agricultural and Forestal District Land Used (acres)	0	0
Prime and Unique Farmland within study corridor (acres)	0	53
Statewide and Local Important Farmland within study corridor (acres)	0	65
Total Prime/Unique/Statewide/Local Important Farmland within study corridor (acres)	0	118
Acidic Rock/Soil Area within study corridor (acres)	0	0
Number of Streams within study corridor	0	3
Length of Streams within study corridor (linear feet)	0	2,104
Wetlands within study corridor (acres)	0	1
Floodplains within study corridor (acres)	0	0
Forest Area within study corridor (acres)	0	3
Federally Listed Threatened or Endangered Species Identified by USFWS that may Occur in the Vicinity of the Study Corridor	0	4
Federally Listed Threatened or Endangered Species that would be Adversely Affected by construction of the project within the Study Corridor	0	0
Hazardous Material Sites within study corridor	0	1
Violations of National Ambient Air Quality Standards	0	0
Noise Impacts	0	2 future trails

3.2 FARMLAND

Under the federal Farmland Protection Policy Act (FPPA), the U.S. Department of Agriculture defines “farmland” as:

- Prime farmland – land that has the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, and oilseed crops and is available for these uses.
- Unique farmland – land other than prime farmland that is used for production of specific high-value food and fiber crops.
- Farmland other than prime or unique farmland that is of statewide or local

importance for the production of food, feed, fiber, forage, or oilseed crops.

The land may be in cultivation, forest, pasture, or other uses except for urban or built-up land or water uses.

Figure 3-1 shows the extent of soils within and near the study corridor classified as prime/unique and statewide/local important farmland, but excludes areas that no longer are available for producing crops or for other agricultural activities. As required by FPPA, Form CPA-106, *Farmland Conversion Impact Rating for Corridor Type Projects* (see **Appendix A**), was submitted to the Natural Resources Conservation Service (NRCS) for assistance

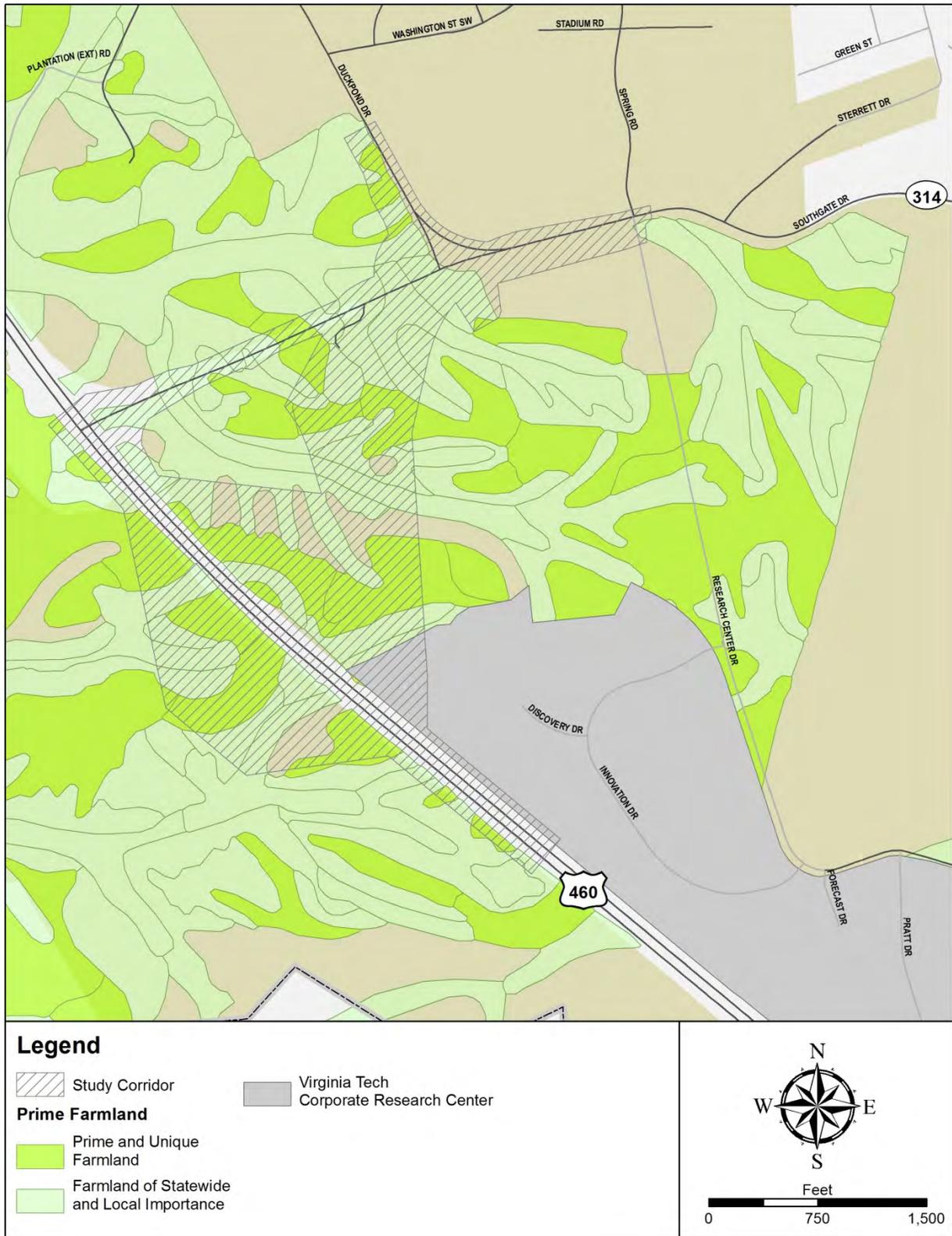


Figure 3-1. Farmland

in evaluating farmland impacts. According to NRCS, there are approximately 53 acres of prime/unique farmland and approximately 65 acres of farmland of statewide/local importance within the study corridor. As reported by NRCS, there are approximately 89,411 acres of farmable land in Montgomery County, approximately 20 percent of which (17,882 acres) meet the definition of farmland under the FPPA.

NRCS provided in Part V of the form the relative value of land within the study corridor as farmland, which was 63 on a scale of 0 to 100. The relative value score is based on information from several sources including soil surveys, NRCS field office technical guides, soil potential ratings or soil productivity ratings, land capability classifications, and important farmland determinations. The score represents the relative value, for agricultural production, of the farmland to be potentially converted by the project compared to other farmland in the county.

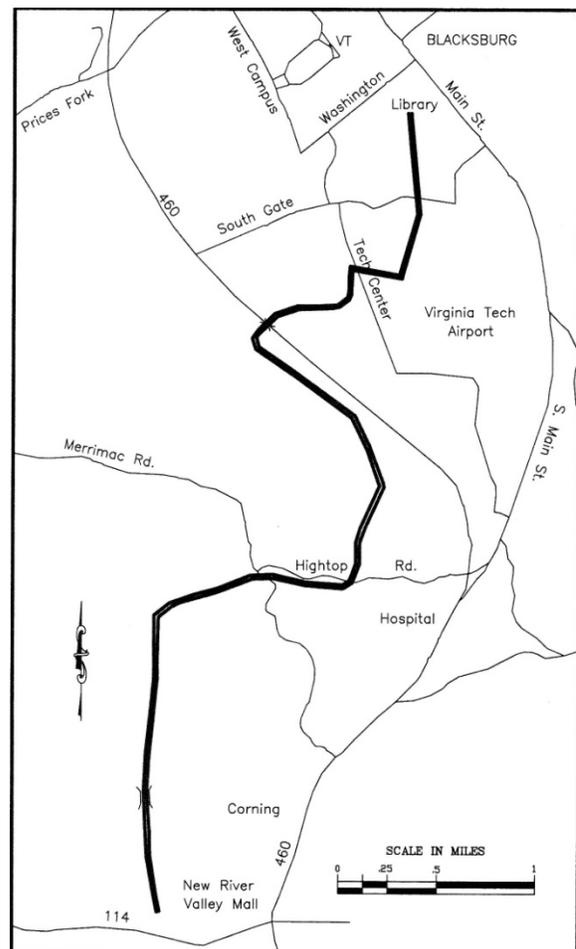
Part VI, Corridor Assessment, of the form then was completed. This section of the form contains assessment criteria from 7 CFR 658.5(c), for which scores are assigned based on factors such as proximity of the farmland to urbanized areas; percentage of adjacent lands in farm use; history of farming on the land; whether the land is subject to government policies or programs to protect farmland; proximity to water, sewer, and other facilities and services whose capacities and design would promote nonagricultural use; relative size compared to the average for the county; availability of nearby farm support services; level of on-farm investments (e.g., barns, drainage, infrastructure for livestock); and the extent to which farm support services would be reduced so as to jeopardize the continued existence of farm support services and the viability of the farms remaining in the area. Out of a possible total combined score of

160 for these criteria, a score of 64 was calculated.

In accordance with NRCS guidelines, the relative value score provided by the NRCS and the score for the corridor assessment were then added together. The total combined score for the farmland conversion impact rating was less than 160. Therefore, no further consideration is required for farmland protection measures or other alternatives that might reduce farmland conversion (7CFR658.4(c)(2)).

3.3 PARKS AND RECREATIONAL RESOURCES AND SECTION 4(F)

The Huckleberry Trail stretches approximately six miles from the public library in downtown Blacksburg to the New River Valley Mall in Christiansburg, as shown in **Figure 3-2**.



Source: Friends of the Huckleberry website.

Figure 3-2. Huckleberry Trail

The original Huckleberry Trail was located along a former coal rail line (referred to locally as “the Huckleberry”) in Blacksburg and has been expanded as an 8-foot-wide paved multi-use pedestrian and bicycle trail.

The facility is on land owned by the Town of Blacksburg, Virginia Tech, Montgomery County, the Town of Christiansburg, Corning Corporation, and the New River Mall. The Friends of the Huckleberry, Inc. is a non-profit corporation that was formed in 1991 as a committee of representatives of the towns of Blacksburg and Christiansburg, and Montgomery County. The parks and recreation departments of the three jurisdictions maintain the portions of the trail that lie within their respective boundaries. The trail connects with multiple recreational and cultural facilities within the jurisdictions (though none of them are within the study corridor). Approximately 2,750 linear feet of the trail are within the study corridor, approximately two thirds of which parallels the west side of US 460 Bypass (1,833 linear feet). Within the study corridor, the trail is located on easements through land that is owned by Virginia Tech and the Virginia Department of Transportation. The trail is maintained by the Town of Blacksburg. The trail shares an underpass

of US 460 Bypass with a farm road (see **Figure 3-3**).

The Build Alternative would include improvements to the horizontal alignment at the approaches to the underpass (to eliminate the sharp curves and poor sight distance) and reduction of the grades on the trail’s approaches to the underpass.

Section 4(f) of the US Department of Transportation Act of 1966, as amended, pertains to uses of land from public parks and recreation areas, including recreational trails. Approximately 3.8 acres of Section 4(f) property are located within the study corridor; however, the proposed project would temporarily impact only approximately 0.5 acres of that land. Under regulations implementing the Act (23 CFR 774), the public is hereby notified that FHWA intends to make a *de minimis* finding with respect to the project’s Section 4(f) involvement with the Huckleberry Trail. The basis for this finding includes the following:

- The project would not permanently interrupt the continuity of the trail.
- Temporary suspensions of pedestrian and bicycle traffic on the trail would last no longer than necessary to complete the construction.



Figure 3-3. Huckleberry Trail Northbound (Left) and Southbound (Right) Approaches to US 460 Bypass Underpass

- Improvements to the trail would be implemented as part of the project, namely, improvements to horizontal curvature and grades on the trail approaches to the underpass that would improve safety and comfort for users of the trail.
- The land disturbed by construction would be fully restored.
- Officials with jurisdiction over the trail will be asked to concur in the *de minimis* determination following an opportunity for public comment.
- The public will be given opportunity at the public hearing to review and comment on the proposed project and the proposed *de minimis* impact finding.

3.4 WATERS OF THE US

The proposed project is located in the Stroubles Creek watershed in the New River basin. Two ponds, an emergent wetland (~1 acre), and a scrub-shrub wetland (~0.02 acres) are located within the study corridor, as shown in **Figure 3-4**. Approximately 2,104 linear feet of three unnamed tributaries to Stroubles Creek are located within the study corridor.

The two ponds are each part of the unnamed tributaries to Stroubles Creek. The first is an artificial pond that was built as part of the dairy facility, which appears to have been used as water storage or water treatment. The second pond is the result of damming a portion of the stream that flows under Duck Pond Drive on the north side of Southgate Drive.

Upper Stroubles Creek, from Walls Branch to the Duck Pond on the Virginia Tech campus (approximately 4.98 miles), is listed on the Virginia Department of Environmental Quality's (VDEQ) 2012 List of Impaired Waters. The impairment pertains to benthic macroinvertebrate habitat, which exhibits decreased numbers and diversity of organisms in the benthic

macro-invertebrate populations that live in and around the stream bottom. VDEQ identified nonpoint source agricultural and urban pollution as the probable causes of the impairment. A Total Maximum Daily Load (TMDL) Implementation Plan¹ has been developed for the Upper Stroubles Creek watershed (encompassing approximately 6,119 acres). According to the Implementation Plan, the following watershed conditions were identified as issues during the stressor analysis in the TMDL study:

- Lack of streamside forest.
- Livestock access to streams.
- Agricultural runoff.
- Increasing development and peak flows from stormwater runoff.
- Stream channel modifications.
- Sewer overflows.
- Downtown business wastewater disposal.
- Pollutant buildup on impervious surfaces.
- Enforcement of Erosion & Sediment regulations at construction sites.
- Improper disposal of grass clippings and trash.

The Implementation Plan identifies best management practices (BMPs) to be utilized within the watershed to offset adverse water quality impacts and to achieve a target reduction in sediment loads of approximately 59 percent. The BMPs include:

- Exclusion of livestock from riparian corridors.
- Establishment of riparian buffers.

¹ *Upper Stroubles Creek Watershed TMDL Implementation Plan, Montgomery County, Virginia.* Stroubles Creek IP Steering Committee, Virginia Tech Department of Biological Systems Engineering, and Virginia Water Resources Research Center; in cooperation with: Virginia Department of Environmental Quality and Virginia Department of Conservation and Recreation. Revised: May 24, 2006.

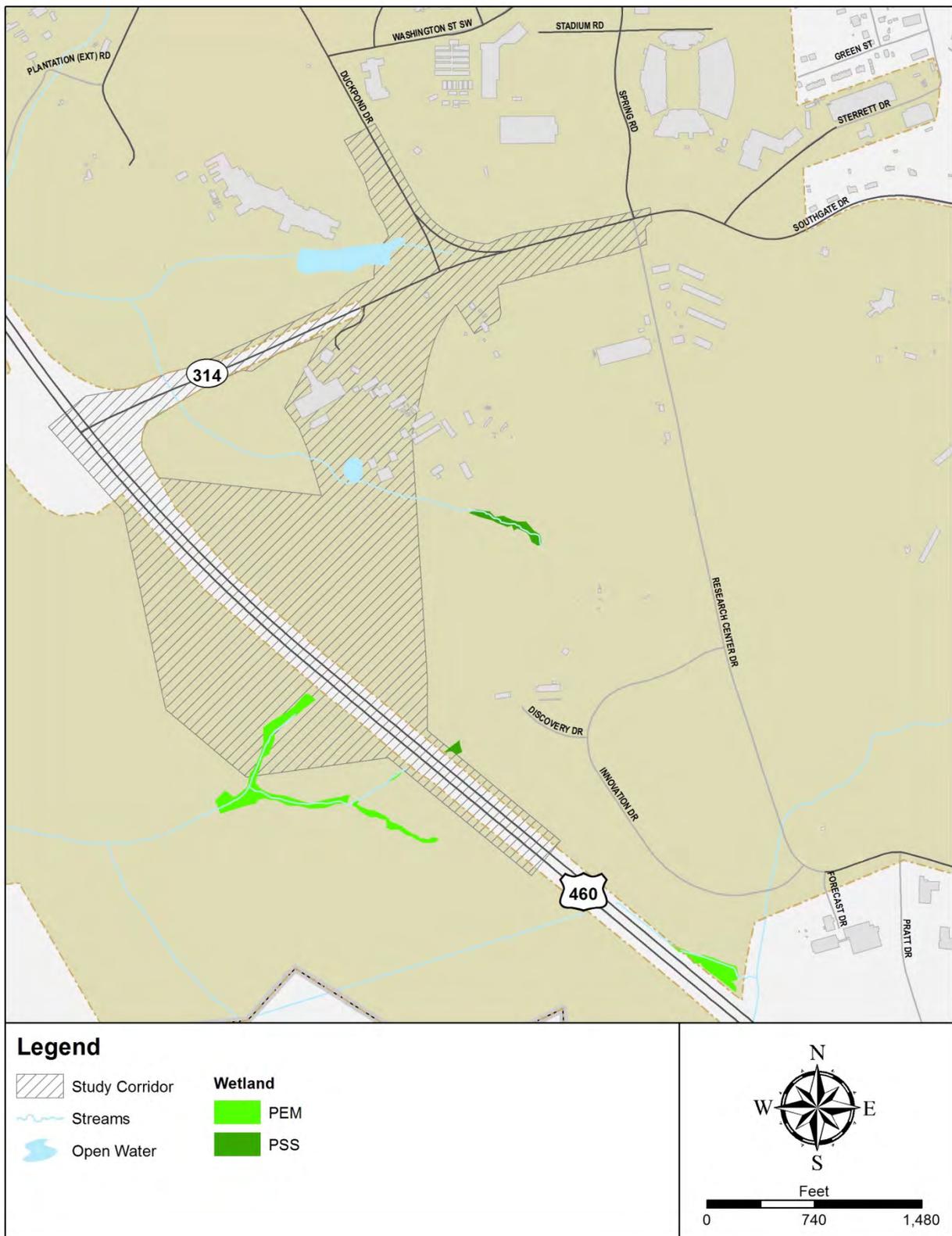


Figure 3-4. Waters of the US

- Restoration of stream channels.
- Implementation of stormwater management measures and bioretention areas.
- Sanitary sewer system improvements.

3.5 WILDLIFE AND HABITAT

Wildlife within and near the study corridor includes species adapted to urban/suburban conditions and highway corridors, such as rabbits, raccoons, opossum, whitetail deer, eastern grey squirrels, red fox, and a number of common bird species. All vegetation within the construction limits would be cleared. Upon completion of the necessary earthwork, all disturbed areas that are not paved would be revegetated using appropriate grass seed mixes.

Impacts to terrestrial wildlife would include the elimination of habitat within the construction limits. The habitat types within the study corridor are not unique to the region. Moreover, terrestrial habitat in areas surrounding the project has already been fragmented by agricultural activities, residential and commercial development, powerlines, and roadways. The losses of these areas to highway construction would not constitute significant losses of available habitat or wildlife populations.

Impacts to aquatic wildlife would include the elimination of stream habitat within the construction limits and potential impacts from sediment deposition due to stormwater runoff from construction. Stream impacts would be compensated through mitigation measures to be developed in consultation with the permitting agencies. Additionally, temporary and permanent stormwater management and erosion and sediment controls would be implemented as part of the project. These controls would minimize damages to aquatic habitats in both the short and long term.

3.6 THREATENED OR ENDANGERED SPECIES

According to the official species list provided by USFWS, the following federally listed threatened or endangered species may potentially occur in the vicinity of the study corridor:

- Indiana bat (*Myotis sodalis*), endangered.
- Virginia Big-Eared bat (*Corynorhinus townsendii virginianus*), endangered.
- Smooth coneflower (*Echinacea laevigata*), endangered.
- Mitchell's satyr butterfly (*Neonympha mitchellii mitchellii*), endangered.

The **Indiana bat** hibernates in the winter, usually in caves found in karst regions of the east-central United States, but can also be found in other cave-like locations. During the summer, females form maternity roosts generally in wooded areas under large peeling pieces of bark on dead standing trees found in gaps in the canopy that receive sun for a good portion of the day. Roosts generally occur in riparian zones, bottomland and floodplain habitats, wooded wetlands, and upland communities with open understories or along habitat edges. Males and nonreproductive females typically do not roost in colonies. According to the USFWS Draft Recovery Plan, Montgomery County has known winter records of the Indiana bat, but it is not known as a summer location. According to VDGIF, there are two likely occurrences in Montgomery County and the watershed (Stroubles Creek) containing the study corridor is listed as an occurrence watershed. Although there is a patch of forest in the project area containing dead trees with peeling bark that would be a suitable roosting place for bats, construction is not planned to occur in this area, and the trees would remain unaffected. Accordingly, the project would have no effect on the Indiana bat. This determination will be

coordinated with USFWS. All areas designated by USFWS as critical habitat for the Indiana bat are outside Virginia.

The **Virginia big-eared bat** is not known to occur in Montgomery County, but it is known or believed to occur in adjacent Pulaski County and five other counties in Virginia. This nonmigratory bat resides in caves year round. Females gather during April and May to form maternity colonies in warm caves. They are found exclusively in limestone caves. There are no limestone caves within or near the study corridor. Suitable habitat for Virginia big-eared bat does not exist within or near the study corridor. Due to the absence of habitat, there will be no effect on this species or its habitat. This determination will be coordinated with USFWS. USFWS has not designated critical habitat for the Virginia big-eared bat.

Smooth coneflower is a sun-loving herbaceous plant associated with roadsides, power line rights-of-way, clearcuts, open woods, cedar barrens, and dry limestone bluffs, usually associated with amphibolite, dolomite, or limestone substrate magnesium- and calcium-rich soils. This species is known to four states and 10 counties, including Montgomery County, Virginia in the Upper New River Watershed. A 2009 survey of the airport expansion site found that the airport site generally lacks suitable habitat for smooth coneflower and no smooth coneflower individuals were found. Although no formal survey of the Southgate study corridor has been conducted for smooth coneflower, habitat conditions are similar to those found at the airport site. Land within the study corridor consists of paved roads and trail, mowed highway right-of-way, cultivated fields, pasture for cattle, buildings associated with the Virginia Tech Dairy Science Complex, and athletic fields associated with Virginia Tech, none of which comprise suitable habitat for smooth coneflower. Due to the absence of habitat,

there will be no effect on this species or its habitat. This determination will be coordinated with USFWS. USFWS has not designated critical habitat for the smooth coneflower.

The **Mitchell's satyr butterfly** is not known to occur in Montgomery County, but it is known or believed to occur in Floyd and Patrick Counties to the south. The Mitchell's satyr habitat is restricted to rare wetlands called fens which are low nutrient systems that receive carbonate-rich ground water from seeps and springs. No such habitat is present within or near the study corridor. Due to the absence of habitat, there would be no effect on this species or its habitat. This determination will be coordinated with USFWS. USFWS has not designated critical habitat for Mitchell's satyr butterfly.

3.7 NOISE

A noise analysis was conducted in accordance with FHWA's *Procedures for Abatement of Highway Traffic Noise and Construction Noise* (23 CFR 772) and VDOT's *Highway Traffic Noise Impact Analysis Guidance Manual*. The FHWA regulations established noise abatement criteria (NAC) for various land use categories. The NAC are noise levels (measured in decibels, denoted as dBA) for each land use category that represent the threshold at which noise impact is considered to occur. If predicted noise levels for a build alternative in the design year (2040 for this study) approach or exceed the NAC, then noise abatement measures must be considered. A noise impact also is deemed to occur if the design year build noise levels are substantially higher than existing levels and abatement measures must be considered, even though the levels may not reach the NAC. For purposes of analysis, areas along the study corridor were divided into six Common Noise Environments (CNEs). A CNE is a group of receptors within the same activity

category that are exposed to similar noise sources and levels; traffic volumes, traffic mix, and speed; and topographic features. One of the CNEs was determined to consist of agricultural and undeveloped lands with no noise-sensitive characteristics. The other five CNEs are considered Category C, which includes active sport areas, parks, picnic areas, playgrounds, recreation areas, trails, and trail crossings. The applicable NAC is 67 decibels (dBA) for Category C CNEs.

Predicted noise levels under the design year (2040) build conditions would exceed the NAC at a portion of a trail proposed by Virginia Tech along Duck Pond Drive and would approach or exceed the NAC or substantially increase (10 dBA or more) over existing noise levels at various points along the proposed location of a section of the Huckleberry Trail that would be relocated as part of the airport runway extension planned by the Virginia Tech-Montgomery Regional Airport Authority. (The relocated trail would be within or near the study corridor.)

A noise barrier is not feasible and reasonable at the Duck Pond Drive proposed trail location because a 5-dBA or greater reduction in noise level cannot be achieved at that location. One noise barrier is considered feasible and reasonable at a location along the proposed route for relocated Huckleberry Trail, which, as currently proposed by the Virginia Tech-Montgomery Regional Airport Authority, would be within or near the study corridor.

Although noise barriers were evaluated in this study in an attempt to reduce design year build noise levels below the NAC, earth berms are still a viable abatement option for this project and may be considered during the final design process. Additionally, design variations of the Southgate roadway and the proposed trails may help achieve reduced noise levels at the trail locations and will be considered during final design.

With respect to construction noise, Section 107.16(b)3 of VDOT's *Road and Bridge Specifications* prescribes contractor requirements for noise control during construction.

Details on the noise analysis can be found in the *Preliminary Noise Analysis Technical Report*, which is available for public review on VDOT's project website. This noise evaluation is preliminary and a more detailed review will be completed during the final design stage. As such, noise barriers that are found to be feasible and reasonable during the preliminary noise analysis may not be found to be feasible and reasonable during the final design noise analysis. Conversely, noise barriers that were not considered feasible and reasonable may be found to meet established criteria and be recommended for construction. The final design noise analysis will use specific, detailed design information and decisions on noise abatement to be provided will be made at that time.

3.8 INDIRECT EFFECTS

Indirect effects are defined as those effects "which are caused by an action and are later in time or farther removed in distance [than direct effects], but are still reasonably foreseeable" (40 CFR 1508.8(b)). These effects may include growth inducing effects or other effects on the natural, social, or physical environments due to changes in land use or population growth. The most common indirect effects associated with roadway projects have to do with induced development, that is, development and the impacts of such development that would not otherwise occur if the project were not constructed.

This project is not expected to result in inducement of development within or near the study corridor for the following reasons:

- Access to adjoining lands on which development may occur already is

available via the existing Southgate Drive and connecting roads.

- Development in the surrounding area already is occurring in the absence of the proposed project (e.g., Virginia Tech Corporate Research Center, ongoing expansion of university facilities at Virginia Tech).
- Virginia Tech has specific short-term and long-term plans regarding the shifting of agricultural operations within its properties, as well as student accommodations, recreational facilities, and campus roadway networks.
- Regional and local plans already include provisions for development in the surrounding area.

3.9 CUMULATIVE IMPACTS

Cumulative impacts are defined as “the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future actions....” (40 CFR 1508.7). The understanding of what are past, present, and reasonably foreseeable future actions is key to the assessment of these impacts. The affected environment or existing conditions in the project area represents the collected impacts of all past actions, e.g., the buildings and other facilities of Virginia Tech, nearby residential and commercial development, existing roads, the existing airport, and agricultural activities. Reasonably foreseeable future actions are other planned and programmed transportation projects and other planned development that is likely to occur in the immediate area. The impacts of these actions are relevant to this assessment if they involve the same resources as those affected by this project.

The cumulative effects associated with this project include the impacts on the social, natural, and physical environments as defined previously in this document,

particularly farmlands, the Huckleberry Trail, streams, wetlands, and noise.

Resources that would experience little or no direct or indirect impact from the project (e.g., air quality, homes, and businesses) also would not experience any cumulative impact attributable to the project. The geographic scope for the analysis includes the study corridor, areas within the viewshed of the study corridor, and stream segments upstream and downstream of the study corridor. The time horizon for the analysis is the design year, 2040.

Other future actions within or near the study corridor that affect these same resources include Virginia Tech operations on the Virginia Tech campus near the study corridor², the Virginia Tech-Montgomery Executive Airport expansion and runway extension to the east and southeast of the study corridor³, and the second phase of the Virginia Tech Corporate Research Center to the south of the study corridor.

Transportation projects that are contained in the region’s fiscally-constrained long range plan also are included (detailed list provided in the *Alternatives Technical Memorandum*). In this case, there are only two relevant projects: upgrading the bridges on Duck Pond Drive over Stroubles Creek (two locations), as identified in the CLRP and located approximately 2,000 to 3,000 feet north of the study corridor.

The Airport work would include increasing the runway length to better accommodate corporate air-traffic, expansion of the runway protection zone (an area off the runway end to enhance the protection of people and property on the ground and to maintain an area clear of incompatible

² The Virginia Tech Master Plan Amendment 2009, Land Use.

³ The Virginia Tech Montgomery Executive Airport Master Plan Update, May 2008, and unapproved draft of EA for the planned airport expansion and runway extension.

objects and activities), expansion of the runway safety area, terminal area improvements, maintenance facility improvements, and hangar and apron improvements. The runway extension would require the relocation of portions of Research Center Drive and the Huckleberry Trail. The trail would be rerouted around the northwest end of the extended runway. Several alternative alignments are being considered for the relocation of Research Center Drive, as illustrated on **Figure 3-5**. Alternative 1 passes through a wooded area that Virginia Tech representatives have indicated should remain intact. Alternative 2 would run along an existing farm road within the southwestern edge of the wooded area. Alternative 3 would avoid the wooded area entirely by running through an open field.

The Virginia Tech Corporate Research Center currently has 27 completed buildings totaling 956,000 square feet on 210 acres of land. Planned additions include another 18 buildings (870,000 square feet) to house a total of 5,000 employees.

Table 3-3 summarizes environmental resources within or near the study corridor that would be impacted by the proposed project, the impact that these resources have experienced from past and present actions, the incremental impact expected from the proposed project, identification of potential reasonably foreseeable future actions, and the potential impact that may occur from other reasonably foreseeable future actions within or near the study corridor.

Despite the dramatic changes in the landscape that have occurred over time due to human settlement in the surrounding area, the intensity of the incremental impacts of this project are considered small when viewed in the context of impacts from other past, present, and reasonably foreseeable future actions and would not rise to a level that would cause significant cumulative impacts.

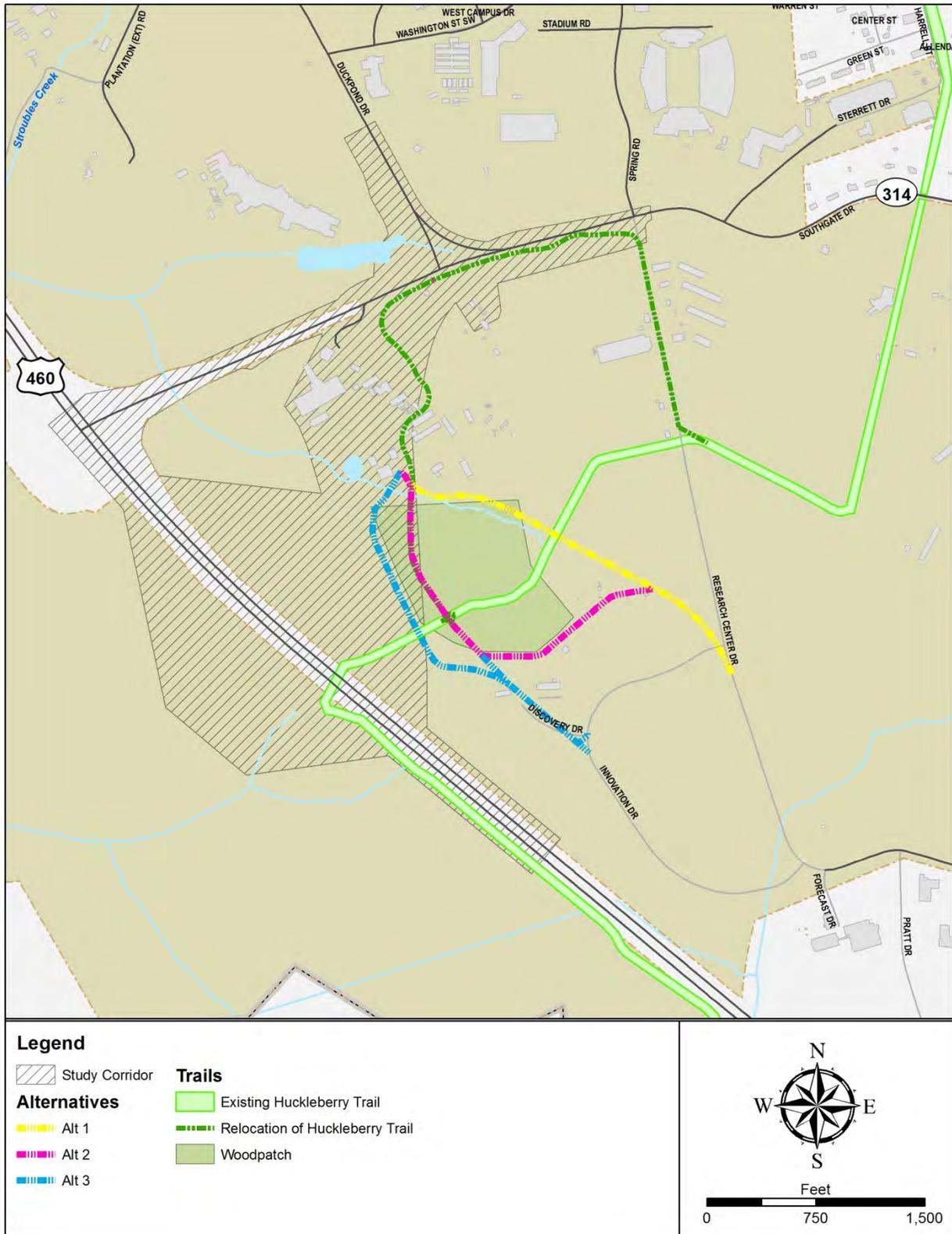


Figure 3-5. Research Center Drive Alternatives

Table 3-3. Summary of Cumulative Impacts

Resource	Impacts from Past and Present Actions	Impacts from Proposed Project	Impacts from Reasonably Foreseeable Future Actions	Cumulative Impacts
Historic Properties	None.	No effect.	Adverse effect on the airport historic property due to airport expansion project. Mitigation would be in accordance with a Section 106 Memorandum of Agreement to be executed among the Virginia Department of Historic Resources, the Virginia Tech-Montgomery Regional Airport Authority, and the Federal Aviation Administration.	No cumulative impacts attributable to proposed project.
Parks and Recreation	None.	Temporary closures of Huckleberry Trail during construction. Improve horizontal and vertical alignments of Huckleberry Trail at approaches to underpass at US 460 Bypass.	Relocation of portion of Huckleberry Trail to accommodate extension of runway at Virginia Tech-Montgomery Executive Airport.	No permanent losses of continuity of the Huckleberry Trail; improvements to trail alignment at US 460 Bypass crossing would improve safety and comfort of trail users.
Noise	It is assumed that increases in noise levels have occurred over the years as the Town of Blacksburg and Virginia Tech have expanded and associated traffic volumes have increased.	Noise impacts on sections of two new or relocated sections of trails (by others): a new section of trail along Duck Pond Drive proposed by Virginia Tech and a relocated section of Huckleberry Trail due to extension of the airport runway.	Analysis by others of noise impacts of the runway extension and other improvements at the airport concluded there would be no adverse noise impacts. (Acreage within the 65 _{DNL} dB contour is expected to increase from approximately 43 acres to approximately 78 acres; however, it would remain entirely contained within the airport property.	Cumulative effects not substantial.
Waters of the US, including Wetlands	Development of Virginia Tech, Town of Blacksburg, and the airport resulted in stream and wetland conversions. Prevalent agricultural operations and increased impervious surfaces have increased stormwater runoff	Potential impacts to approximately 2,104 linear feet of streams and approximately one acre of wetlands. Potential temporary impacts during construction and permanent impacts of stormwater runoff from increased impervious surface. Mitigation of stream and wetland impacts to be developed during water quality	Virginia Tech has recognized the importance of Stroubles Creek watershed in its most recent Master Plan and plans to embody sustainable land use practices and development patterns to preserve and improve the functions of key drainage ways within the watershed. Ongoing implementation of the TMDL Plan is anticipated to achieve a reduction in overall sediment load of approximately 59 percent. Potential temporary impacts during construction of	Cumulative impacts on streams and water quality are being offset by ongoing implementation of the TMDL plan, as well as project-specific stormwater management and erosion and sediment controls. Mitigation to be implemented as part of this project and the airport

Table 3-3. Summary of Cumulative Impacts

Resource	Impacts from Past and Present Actions	Impacts from Proposed Project	Impacts from Reasonably Foreseeable Future Actions	Cumulative Impacts
	<p>and decreased local water quality. Stroubles Creek, into which drainage from the study corridor flows, has been designated an “impaired water” under Section 303(d) of the federal Clean Water Act. The Upper Stroubles Creek watershed is urban/residential, comprising approximately 46 percent of the total watershed area.</p>	<p>permitting. Temporary and permanent stormwater and water quality impacts to be offset by stormwater management, erosion and sediment control measures, and removal of existing pavement on existing Southgate Drive and restoration of area currently occupied by pavement.</p>	<p>other transportation projects, including the airport expansion project, can be minimized through stormwater management and temporary and permanent erosion and sediment control practices.</p> <p>The preliminary jurisdictional determination identified 1.29 acres of emergent wetlands on the runway extension site.</p>	<p>project would further offset adverse impacts.</p>
<p>Farmlands</p>	<p>Between 1969 and 2007, 36,436 acres of farmland in Montgomery County were taken out of production. The number of farms decreased by 71, and the average farm size decreased by 38 acres.</p>	<p>Approximately 102 acres of soils located within the study corridor have been mapped as prime farmland and/or farmland of statewide importance.</p>	<p>Virginia Tech plans to continue to use much of the land surrounding the study corridor for agricultural research and operations. The Virginia Tech-Montgomery Executive Airport would convert approximately 37 acres of prime farmland soils within the runway extension boundaries.</p>	<p>Long-term losses of farmland to development of the project and other nearby development are not expected to compromise the continued viability of agriculture in Montgomery County. The County’s Comprehensive Plan indicates that more than 90,000 acres of land in the county is being farmed. The combined acreage of farmland impacted by the Southgate project and the airport project represent less than 0.2 percent of the county-wide actively farmed land.</p>

Section 4

COORDINATION AND COMMENTS

VDOT, in cooperation with FHWA, has coordinated with local, regional, state, and federal agencies throughout the NEPA process on the Route 460 Interchange and Southgate Drive Relocation. Local, state, and federal agencies were contacted early in the study process and asked to identify issues of concern and to provide information about environmental resources within the study area. The comments received in response to these coordination efforts were instrumental in defining the scope of the EA. In addition, during a previous study of Route 460 in the vicinity of Southgate Drive by the New River Valley Area MPO, public meetings were held to solicit input from the public on proposed improvement concepts.

4.1 AGENCY COORDINATION

4.1.1 Federal and State Agency Coordination

The following agencies were contacted:

- Federal Aviation Administration
- U.S. Army Corps of Engineers
- U.S. Department of the Interior, Fish and Wildlife Service, Virginia Field Office
- U.S. Environmental Protection Agency, Region III Environmental Programs Branch
- Virginia Department of Agriculture and Consumer Services
- Virginia Department of Aviation
- Virginia Department of Conservation and Recreation, Environmental Review Coordinator
- Virginia Department of Environmental Quality – Director
- Virginia Department of Forestry

- Virginia Department of Game and Inland Fisheries
- Virginia Department of Health –New River Health District
- Virginia Department of Health –Office of Drinking Water
- Virginia Department of Historic Resources – Office of Review and Compliance
- Virginia Outdoors Foundation

The following comments were included in the responses from the agencies:

- The studies of the runway extension at the Virginia Tech-Montgomery Executive Airport should be considered.
- Presence of forest land within the study area should be considered.

4.1.2 Regional and Local Agencies and Organizations

The following agencies, organizations, and officials were contacted:

- Blacksburg Town Manager
- Montgomery County Administrator
- New River Valley Area Metropolitan Planning Organization
- New River Valley Planning District Commission
- Virginia Polytechnic Institute, Office of the President
- Virginia Polytechnic Institute, Transportation and Campus Services
- Virginia Tech/Montgomery Regional Airport Authority
- Friends of the Huckleberry, Inc.

The following comments were included in the responses from the agencies:

- Coordination with local and regional transit services should continue through the project process, particularly during construction.
- The Huckleberry Trail is a regional asset and safety of users should be maximized during and after construction.
- Stroubles Creek should be considered during the environmental assessment.
- Coordination with Virginia Tech should continue, particularly regarding right-of-way, natural resources, the Huckleberry Trail, stormwater management, and university design principles.

4.2 PUBLIC INVOLVEMENT

VDOT will hold a public hearing for this project in Spring 2013. The purpose of the hearing will be to present information about the proposed project, present the findings of this EA, provide a discussion forum between the public and project team, and obtain input and comments from the community. All comments received during the public hearing and public comment period will be considered prior to reaching a decision on the project.

**APPENDIX A
FARMLAND CONVERSION IMPACT RATING FORM**

**FARMLAND CONVERSION IMPACT RATING
FOR CORRIDOR TYPE PROJECTS**

PART I (To be completed by Federal Agency)		3. Date of Land Evaluation Request 2/7/13	4. Sheet 1 of <u>1</u>
1. Name of Project Rte 460 Interchange/Southgate Dr Relocation		5. Federal Agency Involved Federal Highway Administration	
2. Type of Project Transportation - Road/Highway		6. County and State Montgomery County, Virginia (Blacksburg)	
PART II (To be completed by NRCS)		1. Date Request Received by NRCS 2/7/13	2. Person Completing Form J. C. Freyman, SRS
3. Does the corridor contain prime, unique statewide or local important farmland? (If no, the FPPA does not apply - Do not complete additional parts of this form). YES <input checked="" type="checkbox"/> NO <input type="checkbox"/>		4. Acres Irrigated Average Farm Size 142 acres	
5. Major Crop(s) Pasture	6. Farmable Land in Government Jurisdiction Acres: 89,411 %	7. Amount of Farmland As Defined in FPPA Acres: estimated % 20	
8. Name Of Land Evaluation System Used	9. Name of Local Site Assessment System	10. Date Land Evaluation Returned by NRCS 2/27/13	

PART III (To be completed by Federal Agency)	Alternative Corridor For Segment			
	Corridor A	Corridor B	Corridor C	Corridor D
A. Total Acres To Be Converted Directly	150			
B. Total Acres To Be Converted Indirectly, Or To Receive Services	0			
C. Total Acres In Corridor	150			

PART IV (To be completed by NRCS) Land Evaluation Information	
A. Total Acres Prime And Unique Farmland	52.9
B. Total Acres Statewide And Local Important Farmland	65.1
C. Percentage Of Farmland in County Or Local Govt. Unit To Be Converted	< 1%
D. Percentage Of Farmland in Govt. Jurisdiction With Same Or Higher Relative Value	10

PART V (To be completed by NRCS) Land Evaluation Information Criterion Relative value of Farmland to Be Serviced or Converted (Scale of 0 - 100 Points)	
	63

PART VI (To be completed by Federal Agency) Corridor Assessment Criteria (These criteria are explained in 7 CFR 658.5(c))	Maximum Points				
1. Area in Nonurban Use	15	9			
2. Perimeter in Nonurban Use	10	8			
3. Percent Of Corridor Being Farmed	20	12			
4. Protection Provided By State And Local Government	20	0			
5. Size of Present Farm Unit Compared To Average	10	10			
6. Creation Of Nonfarmable Farmland	25	0			
7. Availability Of Farm Support Services	5	5			
8. On-Farm Investments	20	20			
9. Effects Of Conversion On Farm Support Services	25	0			
10. Compatibility With Existing Agricultural Use	10	0			
TOTAL CORRIDOR ASSESSMENT POINTS	160	64	0	0	0

PART VII (To be completed by Federal Agency)					
Relative Value Of Farmland (From Part V)	100	63	0	0	0
Total Corridor Assessment (From Part VI above or a local site assessment)	160	64	0	0	0
TOTAL POINTS (Total of above 2 lines)	260	127	0	0	0

1. Corridor Selected:	2. Total Acres of Farmlands to be Converted by Project:	3. Date Of Selection:	4. Was A Local Site Assessment Used? YES <input type="checkbox"/> NO <input checked="" type="checkbox"/>
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5. Reason For Selection:

Signature of Person Completing this Part: _____ DATE _____

NOTE: Complete a form for each segment with more than one Alternate Corridor

CORRIDOR - TYPE SITE ASSESSMENT CRITERIA

The following criteria are to be used for projects that have a linear or corridor - type site configuration connecting two distant points, and crossing several different tracts of land. These include utility lines, highways, railroads, stream improvements, and flood control systems. Federal agencies are to assess the suitability of each corridor - type site or design alternative for protection as farmland along with the land evaluation information.

(1) How much land is in nonurban use within a radius of 1.0 mile from where the project is intended?

- More than 90 percent - 15 points
- 90 to 20 percent - 14 to 1 point(s)
- Less than 20 percent - 0 points

(2) How much of the perimeter of the site borders on land in nonurban use?

- More than 90 percent - 10 points
- 90 to 20 percent - 9 to 1 point(s)
- Less than 20 percent - 0 points

(3) How much of the site has been farmed (managed for a scheduled harvest or timber activity) more than five of the last 10 years?

- More than 90 percent - 20 points
- 90 to 20 percent - 19 to 1 point(s)
- Less than 20 percent - 0 points

(4) Is the site subject to state or unit of local government policies or programs to protect farmland or covered by private programs to protect farmland?

- Site is protected - 20 points
- Site is not protected - 0 points

(5) Is the farm unit(s) containing the site (before the project) as large as the average - size farming unit in the County ?

(Average farm sizes in each county are available from the NRCS field offices in each state. Data are from the latest available Census of Agriculture, Acreage or Farm Units in Operation with \$1,000 or more in sales.)

- As large or larger - 10 points
- Below average - deduct 1 point for each 5 percent below the average, down to 0 points if 50 percent or more below average - 9 to 0 points

(6) If the site is chosen for the project, how much of the remaining land on the farm will become non-farmable because of interference with land patterns?

- Acreage equal to more than 25 percent of acres directly converted by the project - 25 points
- Acreage equal to between 25 and 5 percent of the acres directly converted by the project - 1 to 24 point(s)
- Acreage equal to less than 5 percent of the acres directly converted by the project - 0 points

(7) Does the site have available adequate supply of farm support services and markets, i.e., farm suppliers, equipment dealers, processing and storage facilities and farmer's markets?

- All required services are available - 5 points
- Some required services are available - 4 to 1 point(s)
- No required services are available - 0 points

(8) Does the site have substantial and well-maintained on-farm investments such as barns, other storage building, fruit trees and vines, field terraces, drainage, irrigation, waterways, or other soil and water conservation measures?

- High amount of on-farm investment - 20 points
- Moderate amount of on-farm investment - 19 to 1 point(s)
- No on-farm investment - 0 points

(9) Would the project at this site, by converting farmland to nonagricultural use, reduce the demand for farm support services so as to jeopardize the continued existence of these support services and thus, the viability of the farms remaining in the area?

- Substantial reduction in demand for support services if the site is converted - 25 points
- Some reduction in demand for support services if the site is converted - 1 to 24 point(s)
- No significant reduction in demand for support services if the site is converted - 0 points

(10) Is the kind and intensity of the proposed use of the site sufficiently incompatible with agriculture that it is likely to contribute to the eventual conversion of surrounding farmland to nonagricultural use?

- Proposed project is incompatible to existing agricultural use of surrounding farmland - 10 points
 - Proposed project is tolerable to existing agricultural use of surrounding farmland - 9 to 1 point(s)
 - Proposed project is fully compatible with existing agricultural use of surrounding farmland - 0 points
-

