

6. SENSITIVITY ANALYSIS

6.1 Chapter Overview

This chapter analyzes the validity of the unconstrained development needs that shaped the various alternative analysis scenarios and system development costs identified in Chapters 4 and 5 respectively. These results are intended to provide guidance in the formulation of the recommended plan.

Chapter 4 – Alternatives Analysis, provided information on maximum accessibility that could be achieved with full implementation of all projects identified for study airports. The additional accessibility to certain types of airports or airport facilities could change if projects are not implemented. Potential scenarios and their implications are analyzed in this chapter. Chapter 5 estimated unconstrained development costs; in some instances, these costs could change if the system is not fully optimized as discussed in Chapter 4. The cost implications of various project implementation scenarios are also discussed in this chapter.

6.2 Sensitivity to Accessibility and Costs for Airports with Business Class Characteristics

According to the FAA, a primary objective in airport system planning is to develop a system of airports that is both balanced and viable. For a system to be balanced, airports with different characteristics should be geographically distributed throughout the Commonwealth, assuming there is sufficient demand. For a system to be viable, airports should provide the facilities and services that attract demand sufficient enough to achieve financial sustainability for the airport. DOAV's system planning objectives call for an airport system that is safe and secure. One major additional focus of the VATSP Update has been to identify a system of airports to support not only the air transportation needs of the Commonwealth, but also a system that will help support Virginia's economic development objectives.

To encourage balance and viability as well as economic opportunities within the Virginia aviation system, a key focus of the VATSP is identifying airports in Virginia that should be developed to meet all characteristics of a business class airport. Many general aviation aircraft used to support business travel can operate on a runway length of less than 5,500 feet. Despite the fact that smaller business jets being manufactured today have become less demanding in terms of required runway length, to stay competitive in the long-range domestic and the international market, the VATSP Update set an objective for a runway length of 5,500 feet. At this runway length, business class airports can support most all general aviation aircraft being flown and support these aircraft on longer haul stage lengths.

The alternatives analysis (Chapter 4) revealed that if no actions are taken to improve the Virginia Airport System in terms of the current number of business class airports, the estimated accessibility rating factor will only be 74 percent in 2020. This is the lowest accessibility rating among all factors considered in the alternatives analysis. This review was accomplished using GIS analysis. Once these "unserved" areas were identified, population and employment characteristics of each area were reviewed. The focus of this review was to determine if the unserved areas need access to an airport with business class characteristics, now or in the future. The final analysis resulted in the identification of existing and new airports that should be

developed to meet the characteristics of a business class airport. It is expected that additional business class airports will enhance economic stimulus opportunities to the Commonwealth and many of the surrounding airport communities.

Actions to improve accessibility to business class airports are divided into two categories:

- Upgrading existing system airports and the costs associated with these upgrades.
- New and replacement airports and the costs associated with this development.

6.2.1 Business Class Airport Accessibility Created by Development on Existing Airports and Associated Costs

As part of the review of system alternatives in Chapter 4, analysis was undertaken to show how system performance could be improved with the development of existing airports to meet all criteria associated with a business class airport. Recommendations for these improvements were based on: 1) improving airports to meet the facility objectives identified in the VATSP Update for the airport's associated system role or, 2) changing an airport's current role in the system and its associated facilities to address identified gaps in the system. VATSP FS&E Objectives call for airports in Commercial Service, Reliever, and General Aviation Regional airport roles to have facilities and services that are generally consistent with serving the business jet fleet.

Existing airports identified for runway extensions to 5,500 feet include a combination of airports that can better fulfill their current system role, or that are identified for a role change in Virginia's Airport System. In each instance, the proposed airport role has an objective for a runway length of 5,500 feet.

As part of the alternative analysis, Chapter 4, runway extensions to 5,500 feet were initially identified for eight existing airports to meet the FS&E Objectives for their current system role. The gap analysis completed as part of the alternative analysis helped to confirm the need for 5,500-foot runways to meet FS&E Objectives at these airports.

The gap analysis also revealed areas of the Commonwealth that could benefit from other airports with a primary runway length of 5,500 feet or greater. To address system gaps, role changes were initially identified for two airports. Both the Louisa County and the Virginia Tech-Montgomery Executive airports were recommended to move from the General Aviation Community airport role to the General Aviation Regional airport role. As a result, these two additional airports should ideally have extensions to their runways that would take the length of their primary runway to 5,500 feet.

The gap analysis discussed in Chapter 4 also identified areas in northern and southern Virginia that could benefit from an airport with a 5,500-foot runway to support economic growth and business centers. Existing airports in northern Virginia near the I-81 and I-64 junction appear to be too constrained to accommodate major runway extensions. Initially, for southern Virginia along the I-81 corridor, Mountain Empire was reviewed for its expansion potential. The review concluded that this existing airport is too constrained to accommodate a 5,500-foot runway. As a result, this part of the Commonwealth could remain unserved by a business class airport.

As part of this sensitivity analysis, further review of the I-81 corridor was undertaken. This review showed that this part of the Commonwealth now relies on coverage by Tri-Cities Regional, an out-of-state commercial service airport, to meet the full range of business class aircraft needs. Only a minimal portion of this corridor is covered on the Commonwealth side. Consequently, it was determined that Virginia Highlands Airport’s primary runway should be extended to 5,500 feet to meet business class objectives. In total, 11 airports shown below have recommendations for runway extensions that would take the length of their primary runway to 5,500 feet:

- Blue Ridge Regional
- Culpeper Regional
- Farmville Municipal
- Hampton Roads Executive
- Hanover County Municipal
- Lonesome Pine
- Louisa County
- Stafford Regional
- Virginia Highlands
- Virginia Tech-Montgomery Executive
- Warrenton-Fauquier

As part of the sensitivity analysis, additional review was undertaken to determine, on a very general basis, the feasibility of implementing runway extensions for each of the airports noted above. That review considered each airport’s existing property limits along with factors such as manmade, natural, and environmental constraints. Based on that review, the airports were sorted into three groups. For airports in Group 1, the review showed that a runway extension to 5,500 feet would be very challenging. For airports in Group 2, runway extensions to 5,500 feet would be less challenging than those at airports included in Group 1. The Group 3 airports would be the least challenging.

Additional sensitivity review was undertaken to determine implications to business class airport accessibility if runway extensions cannot be implemented. The estimated costs for runway extensions for airports included in Group 1 (most challenging runway extensions), Group 2 (moderately challenging runway extensions), and Group 3 (least challenging runway extensions) follow in **Table 6-1**.

Table 6 - 1: Runway Extensions Summary

Runway Extension Level of Difficulty	Cost to Extend Runways
Group 1 – Very Challenging	\$34.1 Million
Group 2 – Moderately Challenging	37.7 Million
Group 3 – Least Challenging	28.6 Million
Total	\$100.4 Million

Table 6-2 shows specific costs associated with the 11 runway extensions needed to improve accessibility to business class airports. The estimated cost for extending airports in Group 1 is \$34.1 million; the cost for Group 2 is estimated at \$37.7 million; and the cost for Group 3 runway extensions is estimated at \$28.6

million. The total costs for runway extensions at all nine existing general aviation airports are estimated at \$100.4 million.

Table 6 - 2: Costs of Runway Extensions at Existing Airports to a 5,500-foot Runway Length (in thousands of dollars)

Group 1 –Most challenging	Total Cost 100%	Federal Contribution 90%	State Contribution 8%	Local Contribution 2%
Hampton Roads Executive	\$727	\$654	\$58	\$15
Culpeper Regional	2,447	2,202	196	49
Virginia Highlands	30,984	27,886	2,479	620
Total Cost Group 1	\$34,158	\$30,742	\$2,733	\$684
Group 2 – Moderately Challenging				
Blue Ridge Regional	\$9,418	\$8,476	\$753	\$188
Virginia Tech-Montgomery Executive	22,164	19,948	1,773	443
Louisa County	6,107	5,496	489	122
Total Cost Group 2	\$37,689	\$33,920	\$3,015	\$753
Group 3 – Least Challenging				
Hanover County Municipal	\$596	\$536	\$48	\$12
Warrenton-Fauquier	2,926	2,633	234	59
Stafford Regional	17,713	15,942	1,417	354
Farmville Municipal	6,874	6,187	550	137
Lonesome Pine	476	28	38	10
Total Cost Group 3	\$28,585	\$25,727	\$2,287	\$572
Grand Total All Groups	\$100,432	\$90,389	\$8,035	\$2,009

Note: Totals have been rounded.

6.2.2 Business Class Airport Accessibility Provided by New and Replacement Airports and Associated Costs

The alternatives analysis also reviewed the benefit of supplementing Virginia’s existing airport system with three new and one replacement airport (Breaks Regional for Grundy Municipal). Funds for Breaks Regional airport have already been programmed in Grundy Municipal airport’s most recent ACIP. Of the three new system airports, the facilities for Franklin County-Rocky Mount and Lexington-Rockbridge County are included in the NPIAS. A third new general aviation airport in the Northern Neck area is not recognized in the NPIAS at this time. The previously identified new and replacement airports are “carry-over” recommendations from the prior update to the VATSP.

As part of this sensitivity analysis, other areas of the Commonwealth that may warrant consideration for additional new airports were reviewed. This review concluded that there is one additional area of Virginia that warrants consideration for a fourth new general aviation airport. This is the area west of Richmond, east of Charlottesville, and south of I-64. Rates of growth for population and employment for counties in this part of Virginia are among the highest in the state. Projected rates of growth for Fluvanna, Goochland and Henrico counties all exceed Virginia’s projected average annual rate of population growth (see Table 4-8).

As a result, it is a recommendation of this update to the VATSP that consideration be given to developing an additional new airport in this part of Virginia, as demand warrants and local support is available. This additional airport is referred to as “West Richmond”. As new airports are considered in this update, it shall be noted, one of DOAV’s goal is to develop any new airport to meet FS&E Objectives as they are established and defined for a GA-Regional airport.

It is important to point out that there are many challenges to building a new airport. One of the most important factors for constructing any new airport is a committed local and/or public sponsor for the airport. Planning, environmental, and financial feasibility analyses are all required. For Virginia to build new public general aviation airports, FAA support for these facilities will also be required to assist with the significant financial commitment.

Planning level cost estimates for Breaks Regional and the four new airports are shown in **Table 6-3**.

Table 6 - 3: Proposed and Replacement Airport Summary
(in millions of dollars)

Proposed/Replacement Airport	Cost to Build Airport by Phase
Breaks Regional (replacement)	(Business Class) - \$51.8
	Phase 1 (4,250 ft Runway) - 41.3
Franklin County-Rocky Mount (new)	Phase 2 (Business Class) - 18.4
	full initial build* - 57.2
Lexington-Rockbridge County (new)	Phase 1 (4,250 ft Runway) - 43.4
	Phase 2 (Business Class) - 19.8
	full initial build* - 60.3
Northern Neck (new)	Phase 1 (4,250 ft Runway) - 41.1
	Phase 2 (Business Class) - 18.3
	full initial build* - 56.9
West Richmond (new)	Phase 1 (4,250 ft Runway) - 41.1
	Phase 2 (Business Class) - 18.3
	full initial build* - 56.9
Total Phase 1 (including Breaks Regional Replacement)	218.7
Total Phase 2	74.8
Total Cost Phased Development	293.5
Total Cost Initial Build Development	\$283.1

* Build out of new facility within one phase rather than in two phases.

As shown in Table 6-2, the estimated cost for completing runway extensions at 11 airports to bring the length of their primary runway to 5,500 feet is \$100.4 million. The cost to fully implement the development of four new general aviation airports and one replacement general aviation airport, to meet all business class airport characteristics, has been estimated at \$283.1 million. Combined, the \$100.4 million needed to lengthen runways and the \$283.1 million needed to build and replace airports is 11 percent of all development costs identified for all general aviation airports over the entire planning period.

As concluded from analyses completed in Chapter 5, total estimated unconstrained development costs for all general aviation airports, existing and new, in the Virginia system is estimated at \$3.0 billion. If new and replacement airports are not fully developed to meet business class airport characteristics, lower development costs would be incurred. As noted, in this later case, development costs for new and replacement airports could decrease from an estimated \$283.1 million to \$218.7 million.

It is important to note, however, that the trade-off for lowering development costs would be reduced accessibility to an airport that has all of the characteristics of a business class airport. The following section addresses business class airport accessibility as determined by the sensitivity analysis.

6.2.3 Accessibility to a Business Class Airport

GIS analysis was undertaken to understand how accessibility to business class airports could change if existing airports are not upgraded and/or if new or replacement airports are not developed.

Figure 6-1 graphically depicts how accessibility to a business class airport could increase if all 5,500-foot runway extensions are implemented, all four new general aviation airports are built, and the one replacement airport is completed. As discussed previously in Chapter 4, current accessibility to an airport with all business class airport characteristics was estimated at 74.2 percent for all Virginia residents. If no action is taken by 2020, the accessibility rating would decrease slightly. If all improvements related to business class airports are realized, the accessibility rating would ultimately increase to 87.5 percent.

The sensitivity analysis investigated the potential risks to this increased accessibility rating as they relate to runway extensions and to developing new/replacement airports. Based on maximum accessibility to a business class airport of 87.5 percent, the following information shows possible impacts on accessibility:

- Group I airports have the most challenging runway extensions; if none of these extensions are realized, accessibility to a business class airport would be reduced by 1.6 percent.
- Group II airports have the next most challenging runway extensions; if none of these extensions are realized, accessibility to a business class airport would be reduced by another 2.1 percent.
- Group III airports have the least challenging runway extensions; if none of these extensions are realized, accessibility to a business class airport would be reduced by another 7.3 percent.
- Group I, II, and III runway extensions (without considering new and replacement airports) help to increase accessibility to a business class airport by 11.0 percent.
- Four new and one replacement general aviation airports, combined, contribute 1.9 percent to increasing accessibility to a business class airport. Combining the runway extensions with the new airports and replacement airport will increase accessibility to a business class airport by 12.9 percent.

As shown on Figure 6-1, development of Breaks Regional and four new airports with business class characteristics would provide accessibility to parts of the Commonwealth that do not have 30-minute access to a business class airport. The only two new airports that have a 30-minute service area that overlaps in any way with other existing or proposed business class airports are the new airport proposed for Franklin

County-Rocky Mount and the newly proposed West Richmond airport. The 30-minute service area for Franklin County-Rocky Mount has a slight overlap with Roanoke-Blacksburg Regional (an airport currently meeting all business class airport characteristics) to the north and Blue Ridge Regional Airport (a proposed business class airport) located to the south. West Richmond overlaps with the coverage areas of Richmond Executive/Chesterfield County, Farmville and Louisa County. In all instances, the overlapping service areas are fairly minimal.

Information from this sensitivity analysis for replacement and new airports will be used to help formulate a final recommended airport system plan for the Commonwealth. The costs and potential benefits of adding airports to the system to meet business needs will be considered when final recommendations are developed.

6.2.4 Summary of Business Class Airport Accessibility

Total unconstrained system development costs were identified in Chapter 5 as \$3.0 billion for general aviation airports for the entire 25-year development period. Costs to upgrade runways to improve Virginia's accessibility to business class airports represent 3.4 percent of total estimated development costs for all general aviation airports. Costs to build new and replacement airports in Virginia to meet all FS&E Objectives for a GA-Regional Airport with business class characteristics are estimated at \$283.1 million. This cost is 9.4 percent of all costs identified for general aviation airports in Virginia over the next 25 years. Combined, the costs to improve accessibility to business class airports represent 12.8 percent of all general aviation development costs for Virginia over the next 25 years.

The Alternatives Analysis showed that in terms of accessibility, access to a business class airport achieved the lowest rating among all system performance measures that were considered. While it may not be possible to implement all the identified accessibility upgrades, improving the Virginia Airport System to provide better access to business class airports is important to the State's transportation and economic objectives. Improvements to the system airports discussed in this section should be implemented as funding levels and local support allow.

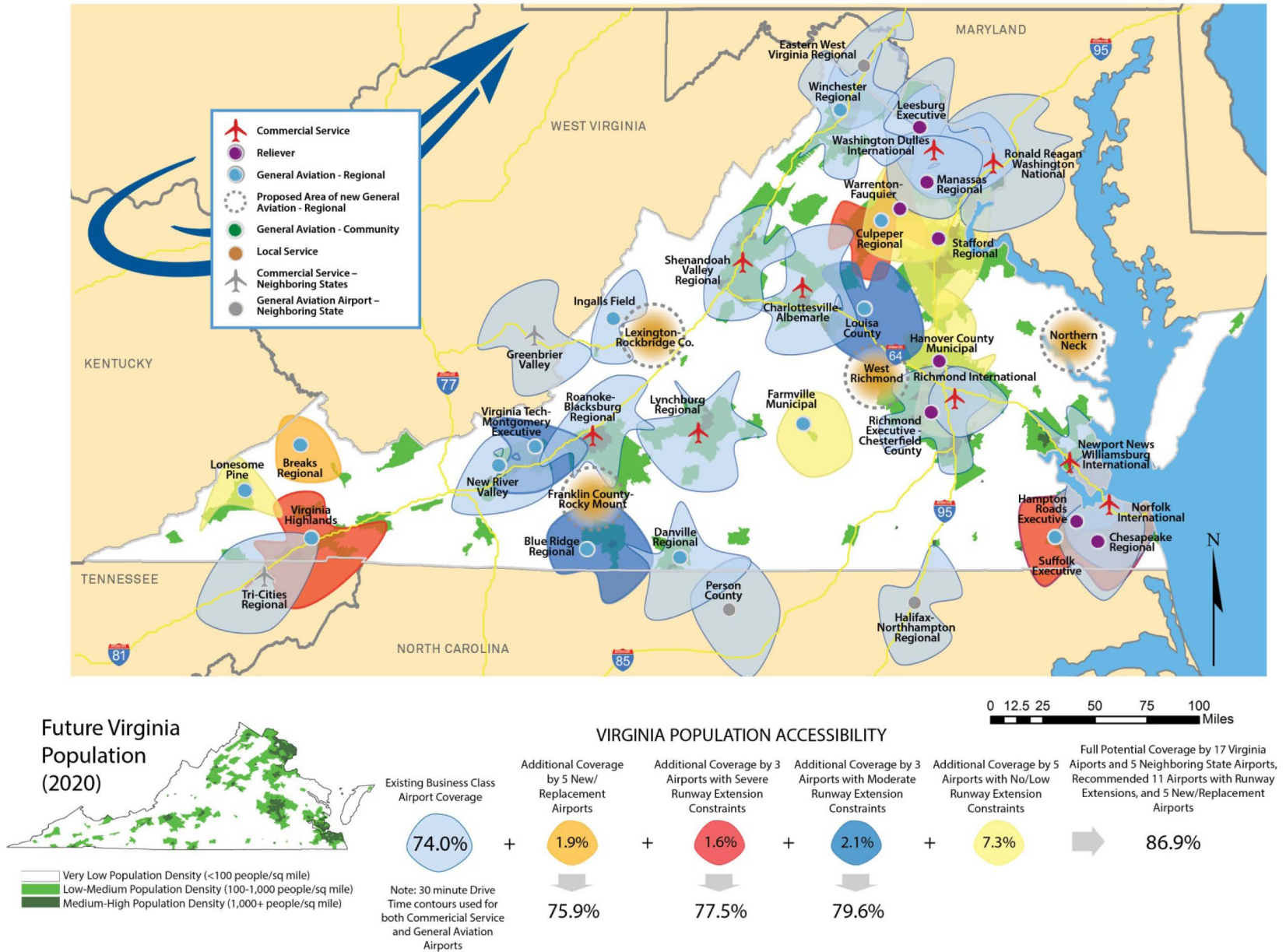
6.3 Accessibility Provided by Out-of-State, Privately-Owned, Non-NPIAS Publicly-Owned, and Commercial Service Airports

The major focus of the Alternatives Analysis was to determine current and future accessibility to airports and certain types of airport facilities. Accessibility was measured in terms of Virginia population within the service area of one or more airports, as a means of measuring the effectiveness of an enhanced Virginia airport system. Total population within airport service areas was then translated into the percent of Virginia's total population that has or that would have accessibility to various types of airports or airport facilities.

This category of the sensitivity analysis considers accessibility provided by:

- Out-of-state airports
- Privately-owned airports
- Publicly-owned Non-NPIAS airports
- Commercial service airports

Figure 6 - 1: Business Class Airports, Runway Extension Constraints



6.3.1 Accessibility Provided by Nearby Out-of-State Airports to Any Airport

The alternatives analysis showed what contribution airports in neighboring states make toward providing service to Virginia residents for certain types of airports and airport facilities. **Figure 6-2** shows accessibility contributions made to Virginia by commercial service and general aviation airports in neighboring states. The service areas for general aviation airports are based on 30-minute drive times and service areas for commercial service airports are based on both 30- and 45-minute drive times. Later in this chapter, population coverage for commercial service airports is further analyzed using longer drive time intervals.

During the system planning process, the proximity of airports in nearby states is considered to determine:

- If Virginia residents, businesses, and visitors are heavily reliant on airports that are outside of Virginia for their air transportation needs; and
- If there are airports or airport facilities that are already in place in other states that could influence Virginia's decisions on investment in particular geographic regions of its own airport system.

As shown on Figure 6-2, Virginia's accessibility to airports and airport facilities is augmented by airports in neighboring states. GIS analysis was used to determine the percentage of Virginia's future (2020) population that will be within a service area (30 or 45 minutes) of an out-of-state airport. Virginia is expected to have a total population of over 8.8 million in 2020. The out-of-state airports depicted on Figure 6-2 will provide accessibility to an estimated 1.4 million Virginia residents, or 15.6 percent of the state's estimated population. This accessibility calculation does not include any coverage provided by Virginia airports.

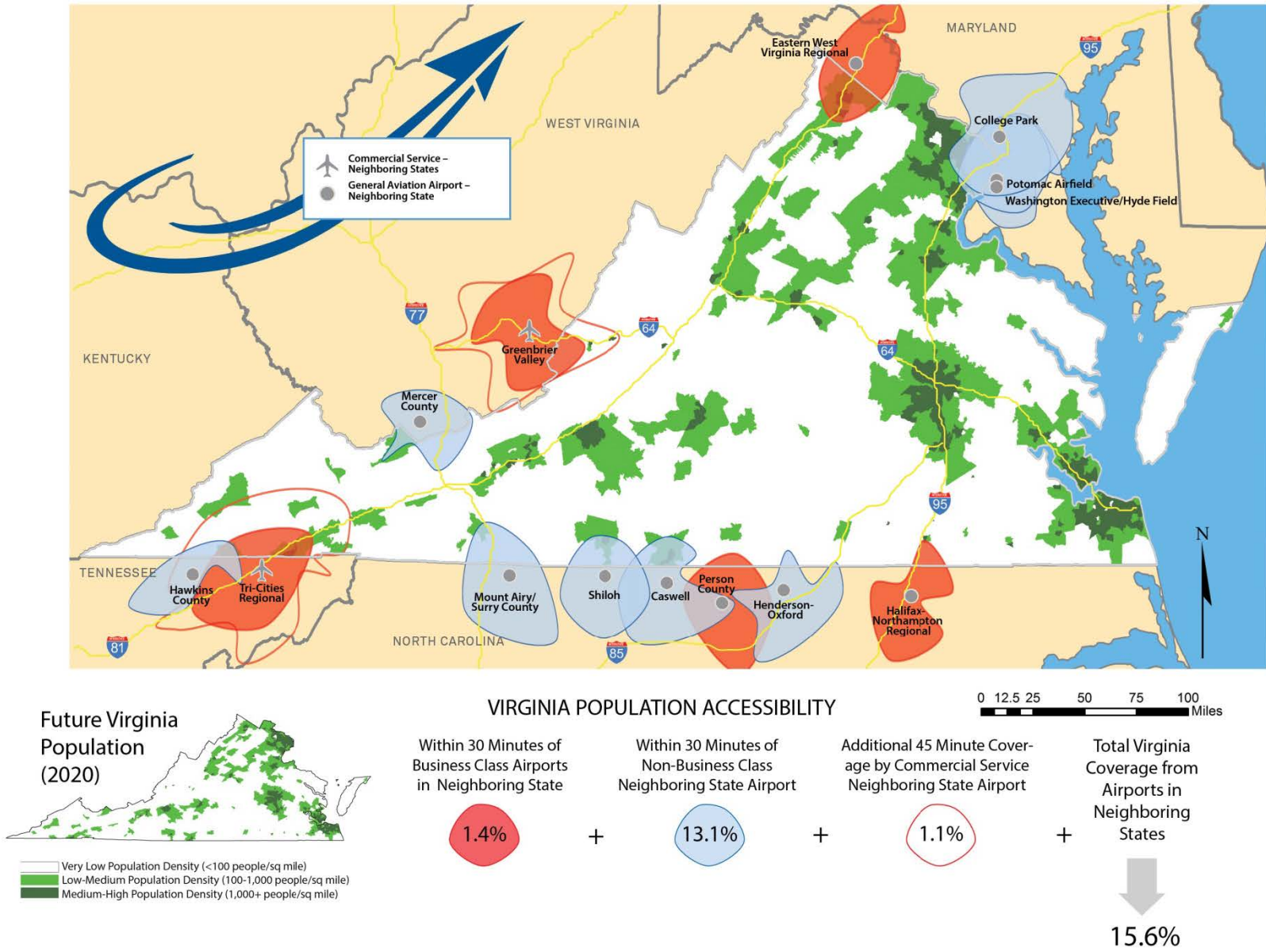
Analysis completed previously in Chapter 4 showed that service areas for several airports in nearby states overlap with existing Virginia airport service areas. In particular, most out-of-state airports along Virginia's southern border with North Carolina overlap with the service area of a Virginia airport (See Figure 4-1). In addition, the service area for Eastern West Virginia Regional overlaps almost entirely with the service area of the Winchester Regional Airport.

GIS analysis presented in Chapter 4 indicates that by 2020, 94.8 percent of Virginia's residents will be within either 45 minutes of a Virginia commercial service airport or 30 minutes of one or more Virginia general aviation airports. When additive accessibility (non-overlapping portions of service areas) provided to Virginia by out-of-state airports is considered, total coverage is expected to increase to 95.2 percent. The nearby out-of-state airports increase Virginia's total airport accessibility by an additional 0.4 percent. This clearly demonstrates that Virginia relies very little on access provided by airports outside of the Virginia system.

6.3.2 Accessibility Provided by Nearby Out-of-State Business Airports

Business class airports, as defined in this report, have runways that are a minimum of 5,500 feet long, precision approaches supported by vertical guidance, and on-site weather reporting equipment. Airports that accommodate a wide range of business category general aviation aircraft are important not only in

Figure 6 - 2: Accessibility Provided by Out-of-State Airports



supporting, but also leading and stimulating economic development in Virginia. One of the more substantial voids in the system was identified for this performance category, thereby placing an emphasis on the need to enhance the business class airport component of Virginia’s airport system.

Figure 6-2 shows the 30-minute service areas for airports in neighboring states that meet business class airport criteria. These airports are depicted on this figure using 30-minute “blue” service areas. There are five business class airports in neighboring states that have service areas that extend into Virginia. Four of these out-of-state business class airports help to provide additional accessibility to Virginia business and economic centers. The service area for Eastern West Virginia Regional Airport overlaps with Winchester Regional Airport, so Virginia receives no additive coverage from this particular out of state business class airport.

In total, the four business class airports in neighboring states are estimated to provide added accessibility for approximately 126,000 Virginia residents in 2020. This translates into an additional 1.4 percent of Virginia’s total population.

6.3.3 Accessibility Provided by Nearby Out- of- State Commercial Service Airports

Figure 6-2 provides information that shows commercial service airports in neighboring states that are within a 45-minute drive time of Virginia. A 45-minute service area for commercial service airports was used for the accessibility analysis to remain consistent with analysis that was completed in the prior iteration of the VATSP. There are two commercial service airports in neighboring states that provide 45-minute coverage to Virginia residents: Tri-Cities Regional in Tennessee and Greenbrier Valley in West Virginia. These two out-of-state commercial service airports serve parts of Virginia that are beyond the 45-minute service area for a commercial service airport in Virginia. The Virginia commercial service airport that is closest to both of these out-of state airports is Roanoke-Blacksburg Regional Airport. While the 45-minute service areas for the commercial service airports serving Roanoke and Greenbrier Valley are close, they do not overlap.

Areas of Virginia that are served by these two out-of-state commercial service airports are sparsely populated. Residents in these areas do, however, have access to a commercial service airport that Virginia airports do not provide. GIS analysis shows that there will be approximately 93,500 Virginia residents in the 45-minute service area of these two out-of-state commercial service airports in 2020. This represents approximately 1.1 percent of Virginia’s total estimated population.

6.3.4 Summary of Accessibility Provided by Out- of- State Airports

This sensitivity analysis has examined the role that out-of-state airports play in meeting Virginia’s air transportation needs and concludes the following:

- Virginia does not have significant reliance on airports in neighboring states to meet its air transportation needs. The DOAV has the ability to enhance future accessibility to airports and airport facilities for its residents, businesses, and visitors.
- There are five business class airports in neighboring states that provide accessibility to Virginia and its businesses. These include Tri-Cities Regional in Tennessee, Person County and Halifax Northampton Regional in North Carolina, and Greenbrier Valley and Eastern West Virginia Regional/Shepherd Field in West Virginia. The service areas for four of these five out-of-state business class airports are not duplicated by existing Virginia airports (excluding Eastern WV Regional/Shepherd Field).

- There are two commercial service airports in neighboring states that serve parts of Virginia (based on 45-minute drive times) that are not served by commercial service airports in Virginia. Greenbrier Valley in West Virginia and Tri-Cities Regional in Tennessee provide commercial service airport access to sparsely populated areas of Virginia that the Commonwealth otherwise may not have.

6.3.5 Accessibility Provided by Privately- Owned Airports

Within the Commonwealth’s system of 66 airports, most airports are publicly-owned, but 10 general aviation airports are privately-owned. While nine of the 10 privately-owned non-NPIAS airports in Virginia’s Airport System are eligible for grants from the DOAV, they are not eligible for FAA grants. Hampton Roads Executive Airport is a designated FAA Reliever Airport which qualifies this privately-owned airport to receive FAA funding. Out of 57 general aviation system airports, the 10 privately-owned facilities, make up 17.5 percent of the Virginia Airport System. They collectively serve an estimated 19 percent of all based aircraft. However, 460 of a total 614 aircraft are based on only four of the 10 privately-owned airports.

In general, the long-term viability of privately-owned airports is less certain than it is for publicly-owned airports. Because privately-owned airports often do not have the financial support of a publicly-owned facility, privately-owned airports sometimes find themselves under pressure to close. Potential closure could be caused by a multitude of factors. **Table 6-4** includes eight different factors that were used to provide an overview on the longer term availability of privately-owned airports.

Table 6 - 4: Privately-Owned, Public Use Airports – NPIAS Airports Only

Virginia Privately Owned Public Use Airports	Residential Encroachment Restrictions	Based Aircraft	Annual Operations	Meets Licensing Standards	Meets Basic Airport Unit Criteria	DOAV Funding (FY10-14)	NPIAS	VATSP Role
Hampton Roads Executive	Minimal	204	62,495	Yes	Yes	Yes	Yes	Reliever
Shannon	Moderate	103	30,063	No	Yes	No	No	GA-Community
Williamsburg-Jamestown	Moderate	73	27,482	Yes	Yes	Yes	No	GA-Community
Bridgewater Air Park	Moderate	81	11,975	Yes	No	Yes	No	Local Service
Falwell	Moderate	11	8,300	No	Yes	Yes	No	Local Service
Lake Anna	Minimal	2	760	No	No	Yes	No	Local Service
New London	Minimal	49	32,902	No	No	No	No	Local Service
New Market	Minimal	27	16,174	No	Yes	No	No	Local Service
Smith Mountain Lake	Minimal	12	5,128	No	Yes	No	No	Local Service
Waynesboro-Eagle’s Nest	Moderate	52	12,800	No	Yes	No	No	Local Service

Some of the privately-owned airports serve fairly notable levels of based aircraft and annual general aviation operations. Airports in that group serving the lowest levels of demand are: Falwell, Lake Anna, and Smith Mountain Lake. Only three of the ten privately-owned general aviation airports currently meet Virginia

Licensing Standards, but seven of these 10 airports meet all of Virginia’s Basic Airport Unit criteria. Only two privately-owned airports, Lake Anna and New Market, do not meet either the Licensing Standards or the Basic Airport Unit criteria. Encroachment levels at privately-owned airports were assessed from aerial photographs and based on visible development off each runway end. Other information includes DOAV grants that have been awarded in recent years to the privately-owned airports. It can be assumed that airports receiving and accepting state and federal grants are more likely to remain airports in the future than those that either have never received grants or rejected grant offers.

Information presented in Table 6-4 can be summarized as follows:

- 50 percent of the privately-owned airports are reported as being moderately encroached, and 50 percent are reported as being minimally or not encroached. Encroachment was determined based on existing residential development immediately next to the runway or runway ends within 500 feet or under the approach path of each runway end. An airport was deemed significantly encroached if both runway ends were impacted, moderately encroached if one runway end was impacted and minimally encroached if none of the runway ends were impacted.
- There are 614 based aircraft at privately-owned airports; 75 percent of aircraft are stored at four of the 10 privately-owned facilities (Hampton Roads Executive, Shannon, Williamsburg-Jamestown, and Bridgewater Air Park).
- The privately-owned, public-use general aviation airports accommodate 208,100 annual operations, but again, four of the 10 privately-owned, public-use airports (Hampton Roads Executive, Shannon, Williamsburg-Jamestown, and New London) serve about 75 percent of this total.
- 30 percent of the privately-owned, public use airports meet Virginia Licensing Standards, and 70 percent do not meet these standards.
- 70 percent of the privately-owned, public use airports meet Virginia’s Basic Airport Unit criteria, and 30 percent do not meet these criteria.
- 50 percent of the privately-owned, public use airports received a grant from DOAV between fiscal years 2010 and 2014; the other 50 percent did not.
- 90 percent of the privately-owned, public use general aviation airports are not included in the NPIAS, and, hence, are not eligible to receive public-use for federal funding.
- 70 percent of the privately-owned, public use airports are included in Virginia’s Local Service airport role, 20 percent are in the General Aviation-Community role, and 10 percent (one airport) is included in Virginia’s Reliever airport role.

All of these factors help to provide some insight into how viable these privately-owned airports may be in the future when it comes to continuing to support Virginia’s air transportation needs.

Figure 6-3 depicts the location of the privately-owned system airports and their 30-minute service areas. GIS analysis shows that when just privately-owned airports are considered, an estimated 30 percent of

Virginia's population in 2020 will be within the service area of one of these 10 airports. Given the role that privately-owned airports play in the Virginia system plan, from a sensitivity standpoint, it is important to consider the longer term role for these airports.

In assessing the privately-owned system airports, three of them, Smith Mountain Lake, Falwell, and New London, are all in close proximity to one another. Combined, these three privately-owned airports accommodate a total of 72 based aircraft. Lynchburg Regional is the closest publicly-owned airport with the capacity to accommodate demand and to provide accessibility to the areas served by Falwell and New London. As shown on Figure 6-3, one of the proposed new general aviation airports (Franklin County-Rocky Mount) would be in close proximity to Smith Mountain Lake Airport and would be able to provide coverage for that area of the Commonwealth.

Waynesboro-Eagle's Nest, Bridgewater Air Park, and New Market are all located in northwest Virginia. Collectively, these three privately-owned airports serve a total of 160 based aircraft. It is important to note that slightly more than 50 percent of these aircraft are based at Bridgewater Air Park. This privately-owned airport provides unique maintenance and modification services. This airport reports over 80 based aircraft. If this airport were to close, it is likely that a significant number of the aircraft reported as being "based" there would not necessarily re-locate to another Virginia airport.

Shenandoah Valley Regional is the closest existing publicly-owned airport in proximity to the privately-owned airports in northwestern Virginia. There is also a new general aviation airport proposed for Lexington-Rockbridge County Airport. As shown on Figure 6-3, this proposed new facility is in closest proximity to Waynesboro-Eagle's Nest (52 based aircraft) and could potentially accommodate demand from this privately-owned airport. For the New Market Airport, only Luray Caverns Airport is within in a 30 minute drive time radius.

Lake Anna Airport is located in central Virginia. This is a very low activity privately-owned airport and is in close proximity to the Louisa County Airport. The VATSP has identified the Louisa County Airport for a change to a General Aviation Regional Airport to serve growing areas west of Richmond. This publicly-owned airport serves as a back-up for the Lake Anna Airport.

Shannon Airport is located just to the north and east of Lake Anna Airport. This is a busy privately-owned airport with over 100 based aircraft and more than 30,000 annual operations. It is in proximity to one of Virginia's larger public general aviation airports, Stafford Regional, which currently has 70 based aircraft. To the west of Shannon Airport is another publicly-owned facility, Orange County Airport, which serves as a back-up Shannon. Further to the south and east, the proposed new airport in the Northern Neck area serves as a more distant third alternate for Shannon Airport.

The remaining two privately-owned airports in the Virginia system are Williamsburg-Jamestown Airport and Hampton Roads Executive, both in southeastern Virginia. Hampton Roads Executive is eligible for federal funding and is included in the NPIAS, thus the long term viability of this privately-owned airport is greatly increased. For the Williamsburg-Jamestown Airport, with its 73 based aircraft, the three closest public airports in the area are Newport News-Williamsburg International, New Kent County, and Middle Peninsula Regional Airports. To the west of the Williamsburg-Jamestown Airport is Wakefield Municipal Airport, which

is publicly-owned, but not included in the NPIAS. Therefore, Wakefield Municipal is not eligible for FAA funding making it somewhat less of an option for supporting privately-owned airports. FAA has recently funded a study to consider future aviation needs in this part of Virginia.

6.3.6 Summary of Accessibility Provided by Privately- Owned Airports

The ten privately-owned airports in Virginia play a role in meeting the needs of based general aviation aircraft and aircraft operations. There is no way to accurately predict the long-term viability for any particular privately-owned airport in the system. In fact, it is possible that in 25 years all privately-owned airports in the Virginia system will still be operating. Airport ownership is a factor that has the greatest bearing on the continued viability of Virginia's privately-owned airports. Future ownership cannot be predicted.

There are publicly-owned airports throughout Virginia that could, if need be, absorb demand now served at privately-owned facilities. In addition, two of the proposed general aviation airports, Franklin County-Rocky Mount and Lexington-Rockbridge County, would have the potential to serve as back-up facilities for privately-owned airports. If they are constructed, these new airports may provide additional capacity, suitable facilities for business aircraft operations and may have the resources of a sponsor in the capacity of a public entity. The location of these two new airports in relationship to some of Virginia's privately-owned airports may help to support the need for these new airports.

Figure 6 - 3: Accessibility Provided by Privately-Owned and Non-NPIAS Airports

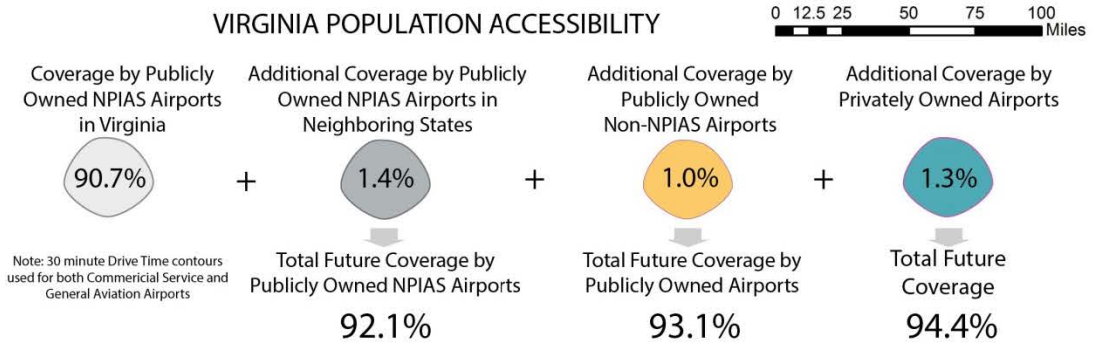
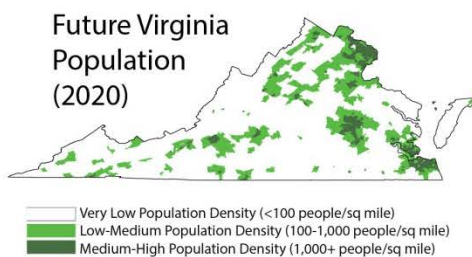
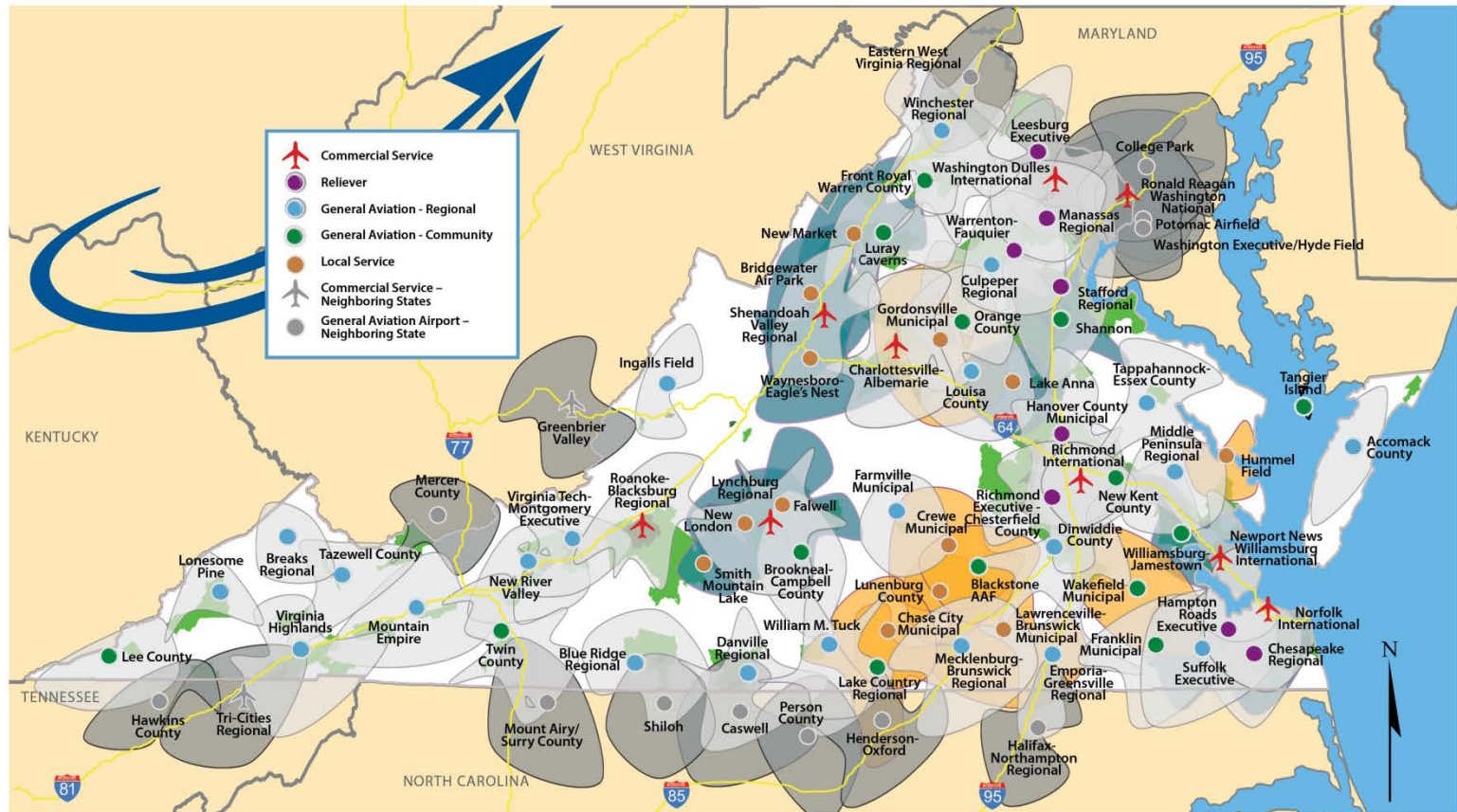


Table 6-5 presents total 25-year development costs for each of the privately-owned airports. Based on analysis conducted in Chapters 3 and 5, these are the levels of investment that would be needed at each to meet their associated FS&E Objectives or to address other development needs that have been identified on the local level. Over the next 25 years, an estimated \$273.1 million could be needed to address development needs at the ten privately-owned airports. More than 56 percent of this cost is for Hampton Roads Executive, a NPIAS airport that is eligible for federal funding. Another 30 percent of the costs are for two privately-owned General Aviation-Community airports, Shannon and Williamsburg-Jamestown airports. The remaining 14 percent of privately-owned airport costs are for seven general aviation airports in the Local Service airport role category.

Table 6 - 5: Privately-Owned, Public Use Airport Development Costs (in thousands of dollars)

Airport Name	Airport Code	Role	Total 25 Year Development Cost
Hampton Roads Executive	PVG	Reliever	\$153,769
Shannon	EZF	GA-Community	20,059
Williamsburg-Jamestown	JGG	GA-Community	62,220
Bridgewater Air Park	VBW	Local Service	5,274
Falwell	W24	Local Service	470
Lake Anna	7W4	Local Service	15,916
New London	W90	Local Service	2,676
New Market	8W2	Local Service	5,940
Smith Mountain Lake	W91	Local Service	3,157
Waynesboro-Eagle's Nest	W13	Local Service	3,623
Total			\$273,104

6.3.7 Accessibility Provided by Publicly- Owned, Public Use Non- NPIAS Airports

Some airports in the Virginia system have public sponsors, but are not included in the NPIAS. As a result, these publicly-owned airports are not eligible for FAA funding; they rely entirely on local funding and grants from DOAV. Figure 6-3 depicts the location of the nine non-NPIAS publicly-owned general aviation airports in Virginia. Collectively, these airports accommodate an estimated 120 based aircraft.

Development needs for Virginia's publicly-owned, non-NPIAS airports are addressed through a combination of DOAV and local owner/sponsor investment. Because these airports are not eligible for FAA funding, they require a higher level of DOAV investment. The data presented in **Table 6-6** provides information that helps to set a context for the collective role that the nine publicly-owned non-NPIAS airports play in Virginia's Airport System. Data presented in Table 6-6 can be summarized as follows:

- There are 120 aircraft based at the publicly-owned, non-NPIAS airports; almost 70 percent of these aircraft are based at just three of the nine airports.
- The nine airports with these characteristics accommodate an estimated 62,000 annual operations. Operations are defined as either a take-off or a landing by an aircraft. Of these operations, over 65 percent take place at just two (2) of the publicly-owned, non-NPIAS airports.

- 33 percent of these airports currently meet all Virginia Licensing Standards, the remaining 67 percent do not meet the standards.
- 78 percent of these airports meet Virginia's Basic Airport Unit criteria, the remaining 22 percent do not meet Basic Airport Unit criteria.
- 44 percent of the publicly-owned non-NPIAS airports received a grant from DOAV between fiscal years 2010 and 2014; the remaining 56 percent did not.
- 22 percent of these airports are included in VATSP General Aviation-Community airport role; the remaining 78 percent are included in the Local Service role.

Table 6-5 provides information on based aircraft, annual operations, Virginia Licensing Standards, Basic Airport Unit criteria, airport encroachment, prior DOAV investment, and the airports' role designation in the state airport system. This information helps to set a context for each of the publicly-owned, non-NPIAS general aviation airport.

Gordonville Municipal is one of the non-NPIAS airports with slightly higher level of aircraft operations than other comparable airports in the VATSP. This airport is in proximity to both Orange County and Louisa County airports, which are both public NPIAS airports. Hummel Field accommodates an estimated 34 based aircraft. There are no existing publicly-owned NPIAS airports in proximity to Hummel Field. However, Figure 6-3 illustrates one of the three proposed new general aviation airports for Virginia (Northern Neck) is just north of Hummel Field.

The remaining seven existing publicly-owned non-NPIAS airports are all clustered in south central Virginia. Collectively, they accommodate a total of 64 based aircraft.

Table 6 - 6: Publicly-Owned, Public Use Non-NPIAS Airports

Virginia Public, Non-NPIAS Airports	Residential Encroachment Restrictions	Based Aircraft	Annual Ops	Meets Licensing Standards	Meets Basic Airport Unit Criteria	Funding Received FY10-14	VATSP Role
Blackstone AAF	Moderate	13	1,053	Yes	Yes	Yes	GA-Community
Lake Country Regional	Moderate	6	760	No	Yes	Yes	GA-Community
Chase City Municipal	Moderate	4	2,600	No	No	No	Local Service
Crewe Municipal	Moderate	10	4,200	No	Yes	No	Local Service
Gordonville Municipal	Moderate	22	9,125	No	No	No	Local Service
Hummel Field	Moderate to Significant	34	12,990	No	Yes	No	Local Service
Lawrenceville-Brunswick Municipal	Minimal	3	2,700	No	Yes	Yes	Local Service
Lunenburg County	Moderate	2	392	Yes	Yes	No	Local Service
Wakefield Municipal	Minimal	26	27,482	Yes	Yes	Yes	GA-Community

Table 6-7 provides a summary of 25-year development costs that have been identified for each of the publicly-owned non-NPIAS airports as part of the VATSP. The final recommended plan will identify appropriate investment levels for these airports, given their contributions to the system.

Table 6 - 7: Publicly-Owned, Non-NPIAS Airport Development Costs (in thousands of dollars)

Airport Name	Airport Code	VATSP Service Role	Total 25 Year Development Cost
Gordonsville Municipal	GVE	Local Service	\$14,433
Blackstone AAF*	BKT	GA-Community	18,207
Wakefield Municipal	AKQ	GA-Community	22,105
Lake Country Regional	W63	GA-Community	29,734
Hummel Field	W75	Local Service	45,400
Lawrenceville-Brunswick Municipal	LVL	Local Service	7,496
Chase City Municipal	CXE	Local Service	8,595
Crewe Municipal	W81	Local Service	5,558
Lunenburg County	W31	Local Service	10,850
Total			\$162,378

*This airport has joint use military operations. DOD Special Funds will be used to cover more than \$5 million of the total estimated costs for this airport. The DOD Special Funds project costs are not included in the 25-year development cost.

6.3.8 Summary of Accessibility Provided by Publicly- Owned Public Use Non- NPIAS Airports

Collectively, these nine publicly-owned non-NPIAS airports currently serve about three percent of all aircraft based at general aviation airports in Virginia. Seven of the nine non-NPIAS public airports are essentially serving the same area in south central Virginia. Given the overlapping service areas for these seven airports, an opportunity could exist to take a more regional approach to meeting the future aviation needs of this part of the Commonwealth.

6.3.9 Accessibility to Commercial Service Airports

The alternatives analysis in Chapter 4 measured the accessibility of commercial service airports (both in and out-of-state) using 45-minute drive time service areas. This is the same drive time service area that was used for commercial service airports in the prior update to the VATSP. The alternatives analysis showed that 77.5 percent of Virginia's population will be within the 45-minute drive time of a Virginia commercial service airport in 2020. An additional 93,000 Virginia residents will be in the 45-minute service area of a commercial service airport in a neighboring state, placing 78.5 percent of Virginia's population within 45 minutes or less of an airport served by a scheduled commercial airline.

In reality, it is not uncommon for customers departing from a commercial service airport to drive more than 45 minutes to reach the airport of choice. Depending upon factors such as choice of airlines, schedules, non-stop versus connecting service, and fares; passengers often drive 60 to 120 minutes to reach their departure airport. As part of this sensitivity analysis, additional GIS analyses were completed to determine the percentage of Virginia's population that would have accessibility to a commercial service airport if drive time

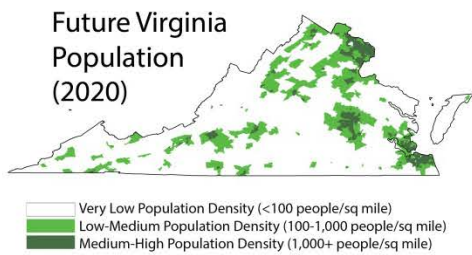
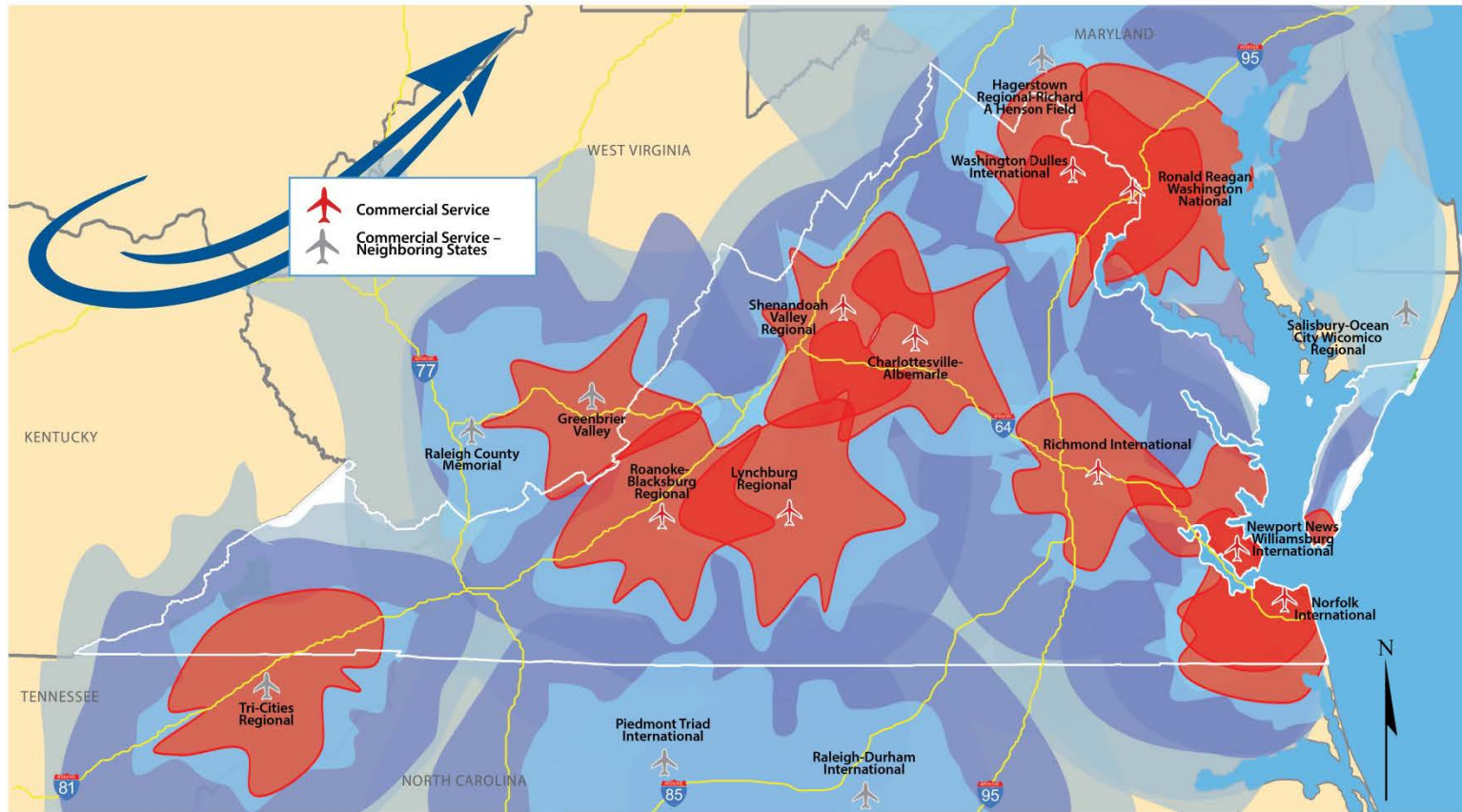
service areas are extended to 60, 90, and 120 minutes for all Virginia airports and those in neighboring states.

Figure 6-4 shows the results of this GIS analysis. When commercial service airport service areas are extended beyond 45 minutes, additional out-of-state commercial service airports have service areas that extend into Virginia. When 60-minute drive time service areas for Virginia and nearby commercial service airports are considered, by 2020, 86.4 percent of Virginia’s population would be within a service area for one of Virginia’s commercial service airports and an additional 3.1 percent would be within 60-minutes of a commercial service airport in a neighboring state. Considering 60-minute service areas, a total of 7.9 million Virginia residents (89.5 percent of total 2020 population) would be within the service area of a commercial service airport.

When service areas are extended to 90-minute drive times, more overlap in the service areas result. A 90-minute drive time service area results in 93.7 percent of Virginia’s population being within a Virginia airport service area and an additional 3.6 percent being within the 90-minute service area of a neighboring state airport. In total, considering 90-minute service areas, nearly 8.6 million Virginia residents (97.3 percent of total 2020 population) would be within the service area of a commercial service airport.

At a 120-minute drive time, Virginia commercial airport service areas cover 95.6 percent of the Virginia population, with commercial service airports in neighboring state contributing an additional 3.0 percent.

Figure 6 - 4: Commercial Service Airport Accessibility



VIRGINIA POPULATION ACCESSIBILITY

Within 45 Minutes of 9 Commercial Service Virginia Airports	Additional Coverage within 45 Minutes of 2 Commercial Service Neighboring State Airports	Total Coverage in Virginia	Within 60 Minutes of 9 Commercial Service Virginia Airports	Additional Coverage within 60 Minutes of 7 Commercial Service Neighboring State Airports	Total Coverage in Virginia	Within 90 Minutes of 9 Commercial Service Virginia Airports	Additional Coverage within 90 Minutes of 7 Commercial Service Neighboring State Airports	Total Coverage in Virginia	Within 120 Minutes of 9 Commercial Service Virginia Airports	Additional Coverage within 120 Minutes of 7 Commercial Service Neighboring State Airports	Total Coverage in Virginia
77.5%	1.0%	78.5%	86.4%	3.1%	89.5%	93.7%	3.6%	97.3%	95.6%	3.0%	98.6%

Table 6-8 shows varying levels of accessibility to commercial service airports with 45, 60, 90, and 120-minute service areas ranging from a low of 78.5 percent at 45 minutes to a high of 98.6 percent at 120 minutes. There is a considerable degree of change in the accessibility to commercial service airports, depending upon service area/drive time assumptions. It is likely that Virginia commercial air travelers are most often driving between 45 and 120 minutes to reach their departure.

Table 6 - 8: Commercial Service Airport Accessibility by Drive Times

Commercial Service 60, 90, and 120-Minute Coverage					
Virginia 60-Minute VATSP Commercial Service Coverage		Virginia 90-Minute VATSP Commercial Service Coverage		Virginia 120-Minute VATSP Commercial Service Coverage	
Population 2020	7,672,360	Population 2020	8,324,573	Population 2020	8,497,648
Percent 2020	86.4%	Percent 2020	93.7%	Percent 2020	95.6%
Additional 60-Minute Coverage by Neighbor States Airports		Additional 90-Minute Coverage by Neighbor States Airports		Additional 120-Minute Coverage by Neighbor States Airports	
Population 2020	274,775	Population 2020	323,329	Population 2020	266,046
Percent 2020	3.1%	Percent 2020	3.6%	Percent 2020	3.0%
Total 60-Minute Coverage		Total 90-Minute Coverage		Total 120-Minute Coverage	
Population 2020	7,947,135	Population 2020	8,647,901	Population 2020	8,763,694
Percent 2020	89.5%	Percent 2020	97.3%	Percent 2020	98.6%

6.3.10 Summary of Accessibility to Commercial Service Airports

This sensitivity analysis shows that significantly more Virginia residents, businesses, and visitors have access to Virginia commercial service airports and commercial service airports in neighboring states within 60, 90 and 120-minute drive times than the 45-minute drive time DOAV set as the State’s anticipated service area goal. Population coverage within 60-minute service areas reach 89.5 percent, within 90-minute service areas 97.3 percent, and within 120-minute service areas 98.6 percent of Virginia’s population, compared to 78.5 percent reported in the alternatives chapter when only 45-minute drive times are considered.

6.4 Sensitivity to Costs

Additional sensitivities from the standpoint of cost are associated with:

- Deviations in the baseline aviation demand forecasts
- Changes in FAA funding levels

6.4.1 Sensitivity to Deviations in Aviation Demand Forecasts

Chapter 2 provides detailed forecasts for various components of aviation demand. These forecasts helped to establish the need for future airport facilities. According to the FAA in their *2014 National Aerospace Forecast*, there are many factors that have the potential to cause forecast deviations.

The FAA identifies some of these factors as changes in the Gross Real Domestic National Product, changes in aviation fuel costs, changes in the Consumer Price Index, and changes in unemployment. As part of their most current national forecast, the FAA prepared various forecast scenarios that examined baseline growth

in comparison to pessimistic and optimistic growth. FAA rates of growth from their demand scenarios were used in this sensitivity analysis to develop high and low projections of aviation demand for the Virginia airports. These scenarios were compared to the baseline FAA and DOAV approved forecasts presented in Chapter 2.

Sensitivity forecast scenarios are shown in **Table 6-9**. Deviations to the baseline demand projections were reviewed to provide a general sense of what impacts demand deviations could have on estimated development costs and corresponding development needs and priorities.

Deviations from the baseline demand projections have the most potential to impact costs related to demand driven facility needs, including terminal, hangar, apron, and auto parking development.

Table 6 - 9: Forecast Demand Ranges

Airport Operations/Enplanements	High	Baseline	Low
Based Aircraft	5,420	4,946	4,730
	1.14% AARG**	1.0% AARG	0.86% AARG
Annual General Aviation Operations at GA and CS Airports	1,804,000	1,756,000	1,717,000
	0.85% AARG	0.75% AARG	0.64% AARG
Passenger Enplanements*	7,777,783	7,128,741	6,012,906
	2.52% AARG	2.1% AARG	1.43% AARG
Commercial Air Carrier Operations	933,980	920,141	877,990
	1.14% AARG	1.0% AARG	0.86% AARG

*Excludes MWAA Airports

**Average Annual Rate of Growth (AARG)

Table 6-10 shows sensitivity to identified costs that could result from deviations to the baseline demand projections. Given baseline demand, unconstrained estimated costs to improve terminals, hangars, aprons, and auto parking are estimated at \$2.6 billion.

Table 6 - 10: Forecast Demand Deviation Effect on Project Costs (in millions of dollars)

Project Type	High	Baseline	Low
Auto Parking	\$68	\$62	\$55
Hangars	1,298	1,137	1,087
Apron	1,114	1,094	1,051
Terminal – General Aviation	96	90	87
Terminal – Commercial Service*	242	221	187
Total	\$2,767	\$2,604	\$2,449

*Excludes MWAA Airports

If the high forecasts are achieved, total costs for these facilities would be \$2.8 billion. If the lower range of demand is realized, estimated development costs for these facilities would be \$2.4 billion.

The \$2.6 billion costs for improving terminals, hangars, aprons, and auto parking represents 59.5 percent of the estimated unconstrained costs for commercial service and general aviation airport development. This represents a notable portion of total costs that have been identified to improve the Virginia airport system over the next 25 years. Since fluctuations in forecast demand levels are almost a certainty, it will be important for system airports to confirm, from bottom-up local analyses, the need to expand and invest in additional terminal space, aircraft storage facilities, aircraft parking, and auto parking facilities.

As this section has shown, development costs have the potential to experience change if there are deviations from the VATSP demand projections. As a result, the planning and development of terminal facilities, hangars, auto parking, and aircraft apron areas should be justified based on individual airport demand and priorities.

6.4.2 Sensitivity to FAA Funding Levels

Changes in FAA funding would have a notable impact on the level of state and local investment needed to fund the unconstrained development costs for general aviation airports. This final portion of the sensitivity analysis focuses on future funding for NPIAS general aviation airports in Virginia's system.

The sensitivity analysis focuses on NPIAS general aviation airports because these airports are largely dependent on discretionary funding from the FAA. Changes in FAA levels of funding for these airports would have a direct impact on funding needs from DOAV. While some commercial service airports do benefit from discretionary funding, they have other fees and sources of funding that they can draw upon. These include passenger facility charges (PFCs), excess operational revenues, entitlement funding from enplanements and air cargo, and funds from their ability to sell bonds. As a result, changes in FAA's level of discretionary funding have the greatest potential to influence future funding scenarios for Virginia's general aviation airports included in the NPIAS.

Of the 57 general aviation airports in the Virginia system, 19 of these are privately-owned or are publicly-owned and not included in the NPIAS. Generally, privately-owned airports and non-NPIAS airports are not eligible for FAA funding. The exception in Virginia is Hampton Roads Executive, an FAA Reliever Airport which is included in the NPIAS and is eligible for FAA funding. Among Virginia's general aviation airports, 31.5 percent are not eligible to compete for funding from the FAA. This places the need to fund development for these airports exclusively with the Virginia Department of Aviation and local airport owners or their public sponsors. If FAA funding for NPIAS airports decreases, there would be more emphasis on the need for DOAV funding for these airports. On the other hand, should FAA funding levels increase, the DOAV could potentially have more funds to direct to non-NPIAS airports in the state system.

The 25-year development costs have been identified for Virginia's general aviation airports in **Table 6-11**.

Table 6 - 11: Forecast Demand Deviation Effect on Project Costs

Airport Name	Total 25 Year Development Cost
NPIAS GA airports	\$2.3 billion
Non-NPIAS publicly-owned airports	0.16 billion
Privately-owned public use airports	0.27 billion
Total GA Development Costs	\$2.7 billion

Currently, the FAA funds 90 percent of eligible projects, with state and/or local sources supplying the remaining 10 percent of project costs. In recent years, FAA’s funding for eligible projects has been as high as 95 percent. Future changes in FAA funding levels could impact the level of state funding required to implement the proposed development plan from the VATSP Update. This sensitivity category considers the following as they relate to cost sensitivity:

- A. Develop all projects identified in the VATSP Update along with projects identified in individual airport CIPs for FAA eligible, NPIAS general aviation airports. These costs are referred to in this part of the sensitivity analysis as “unconstrained” costs.
- B. Develop all projects at NPIAS general aviation airports without the one replacement and four new airports.
- C. Develop all projects at NPIAS general aviation airports without the replacement airport, any new airports or any of the 5,500-foot runway extensions.

Table 6-12 identifies the annualized 25-year development cost estimates for Scenarios A, B, and C above, as well as what the state and local funding levels would be with FAA funding levels at 95, 90, and 80 percent. This gauges the impact to DOAV funding needs should FAA funding increase by 5 percent, or in a worst-case, decrease by as much as 10 percent from current levels.

For the 25-year period, average annual unconstrained development costs for the Virginia general aviation airports included in the NPIAS are estimated at \$107.3 million. By forgoing the cost of airport replacement, new airport development, and all 5,500-foot runway extensions, this cost would be reduced to \$94.0 million. This particular analysis of various development scenarios shows that there is a development cost influence on the order of 12.4 percent for the NPIAS general aviation airports by eliminating the new airports and major runway extension projects.

In addition to general aviation NPIAS airports, DOAV also funds development projects at privately-owned general aviation and publicly-owned airports that are not included in the NPIAS. For a publicly or privately-owned non-NPIAS airport to be eligible to receive funding from the Commonwealth of Virginia, the airport must be a public-use facility and identified in the VATSP. If FAA funding levels were to decrease to 80 percent on eligible projects, a large percentage of DOAV’s annual funds would be needed for the NPIAS general aviation airports.

Table 6-12 shows potential impacts on DOAV funding, based on theoretical changes in the level of FAA funding. If FAA discretionary funding for the NPIAS general aviation airports was reduced to 80 percent, a

greater burden would be put on the DOAV to fund development at these system airports, leaving less to fund state and local projects at the privately-owned and public non-NPIAS airports.

Table 6 - 12: Impact of FAA Funding Scenarios on State Funding Levels

Funding Allocation % Split (FAA/State/Local)	Projects Eligible for Federal Funding			Projects Eligible for State Funding		Total State Contributions Required	
	Federal Share Required	State Share Required	Local Share Required	State Share Required	Local Share Required	Total State Share Required	Variance from Baseline (%)
Scenario A							
80-18-2*	\$106,603,000	\$23,986,000	\$2,665,000			\$27,353,000	95.0
90-8-2	\$119,929,000	\$10,660,000	\$2,665,000	\$3,367,000	\$841,000	\$14,027,000	Baseline
95-3-2	\$126,591,000	\$3,998,000	\$2,665,000			\$7,365,000	-47.5
Scenario B							
80-18-2*	\$98,522,000	\$22,167,000	\$2,463,000			\$25,007,000	97.0
90-8-2	\$110,837,000	\$9,852,000	\$2,463,000	\$2,840,000	\$710,000	\$12,692,000	Baseline
95-3-2	\$116,995,000	\$3,695,000	\$2,463,000			\$6,535,000	-48.5
Scenario C							
80-18-2*	\$95,308,000	\$21,444,000	\$2,383,000			\$24,284,000	96.3
90-8-2	\$107,221,000	\$9,531,000	\$2,383,000	\$2,840,000	\$710,000	\$12,371,000	Baseline
95-3-2	\$113,178,000	\$3,574,000	\$2,383,000			\$6,414,000	-48.2

*State and local share is shown as 18% State 2% Local based on the historic 2% local share provided under the current FAA 90% and the FY 2009-2011 95% contribution levels.

Note: Annual costs for scenarios in table above do not include 100% locally sponsored project costs

Conversely, higher levels of FAA funding would allow the state to devote a higher percentage of its funding to cover state/local projects at all general aviation airports in the Commonwealth. If the FAA discretionary funding share were decreased to 80 percent, this 10 percent reduction would translate to a 95 percent order-of-magnitude increase in the state based funding needs. At a 95 percent FAA discretionary funding level, the five percent increase from current levels would allow Virginia to contribute 48 percent of additional funding to its state/local projects.

6.4.3 Summary of Cost Sensitivity

Deviations to the baseline demand projections were used to identify impacts on demand driven facility needs and corresponding development costs—specifically for terminal, hangar, apron, and auto parking development. The forecast demand deviation range reviewed would result in an order-of-magnitude development cost variation of six percent above or below the cost associated with the baseline demand.

Future levels of FAA discretionary funding for the NPIAS general aviation airports in Virginia is critical to Virginia’s ability to continue its programs that are based on state/local funding. Decreases in FAA discretionary funding would have a magnified impact on the ability of the DOAV to continue these programs at historic funding levels.

The sensitivity analysis served as a test to determine what corresponding effect a change in FAA funding levels would have on state funding needs. In summary, a five percent increase from current FAA funding levels would reduce the corresponding need for state funds by approximately 48 percent. Conversely, a 10 percent reduction in FAA contribution levels would present the state with an additional 95 percent burden in the form of state funding needs.

6.5 DOAV Turf Runway Initiative

It is the DOAV's objective to increase accessibility to turf runways throughout the airport system. This initiative, similar to the very successful AWOS installation program implemented since the last VATSP update, would look to commit substantial state aviation funding to those airports that are willing and able to develop a minimum 2,000 foot long by 100 foot wide turf runway on their property. In an initial analysis, 24 airports were identified as able to develop a turf runway at the minimum required length and width, and 19 of those sponsors expressed interest in participating.

A general analysis, based on aerial photography, was conducted to assess the level of difficulty associated with siting a turf runway at each facility. Each one was then categorized as more or less challenging for the purpose of establishing estimated construction cost. This cursory review of the 19 airports determined that the most common challenge encountered in establishing a clear site for a turf runway, parallel to the existing paved runway, was the need for obstruction removal. It should be noted that an ALP update and additional airspace and cost analysis will be required to finalize location and cost of each runway.

In addition to an ALP Update, and the associated coordination with FAA regarding the new runway, the sponsor will have to bring the airport up to State Minimum Standards for Licensing an Airport and fulfill the application requirements to be considered further for a public use airport license. The following must be accomplished in order for the airport to come into compliance with the Code and Regulations:

- A) Signed Copy of the resolution of the airport's governing body or owner supporting or requesting a new airport, the addition of a new runway, or the extension of a runway;
- B) Copy of airport layout plan depicting the proposed airport, new runway of runway extension;
- C) Copy of airport property map (Exhibit A) depicting the proposed airport, new runway, or extension;
- D) Letter or documentation from the local jurisdiction that the proposed airport, new runway or, runway extension complies with any local zoning ordinances and or zoning requirements;
- E) Copy of FAA Form 7480-1 Notice of Landing Area Proposal as submitted to FAA;
- F) Copy of FAA's Determination in response to the Form 7480-1Submission;
- G) Copy of Certificate of Financial Responsibility (DOAV ASD03-1) in accordance with Code of Virginia 5.1-88.7;
- H) Copy of environmental determination prepared pursuant to Code of Virginia 5.1-7 if applicable;
- E) Documentation of public hearing.

In summary, we categorized the following airports as less difficult for construction of a 2,000 foot by 100 foot turf runway:

- Brookneal-Campbell County
- Dinwiddie County
- Emporia-Greenville Regional
- Farmville Municipal
- Franklin Municipal
- Lawrenceville-Brunswick Municipal
- Middle Peninsula Regional
- New River Valley
- Suffolk Executive
- Tappahannock-Essex County

The cost for a less difficult turf runway construction is estimated at \$1,497,600, totaling \$14,976,000 (2014 dollars) for the ten airports identified above. It should be noted that each turf runway will need to be included in an updated Master Plan and approved by DOAV and FAA (for all NPIAS airports) before development can be considered.

The following airports were seen as more challenging to construct the turf runway due to existing obstructions and/or terrain conditions:

- Ingalls Field
- Lake Anna
- Lonesome Pine
- Lunenburg County
- Mecklenburg–Brunswick Regional
- Mountain Empire (highly constricted)
- New London (highly constricted)
- Tazewell County
- Twin County

The construction of a turf runway under these more involved conditions is estimated at \$2,097,600 (2014 dollars) for a total cost of \$18,878,400 for all nine airports in this category.

The total cost for all 19 new turf runways is estimated at \$33,854,400.

6.6 Summary

Chapter 4 of the VATSP Update, Alternatives Analysis, examined options to optimize the performance of Virginia’s airport system relative to a set of accessibility measures. The sensitivity analysis, completed in this chapter, indicates how deviations from maximum system performance could result from all facets of the alternative enhancements not being implemented.

From an accessibility standpoint, the Virginia airport system had its lowest ranking for providing accessibility to airports that are fully equipped to meet the needs of almost all general aviation business jets. Airports were

considered were to have business class airport characteristics with a 5,500-foot runway, an RNAV/LPV or ILS approach, and on-site weather reporting. The sensitivity analysis considered how upgrading existing or providing new and replacement airports could increase accessibility and improve system performance relative to business class airports. A total of 11 existing airports were identified for possible runway extensions to increase accessibility in this category. The final recommended plan will provide guidance on which of these extensions should be pursued. In some instances, runway lengths are already close to the 5,500-foot target so extensions may not be necessary.

Privately-owned and non-NPIAS publicly-owned airports play a role in serving Virginia's general aviation needs. Airports in these two categories are totally dependent on DOAV and local/private funding. The sensitivity analysis provides insight into the specific financial needs of these airports and compares those needs to the role these airports play in serving aviation demand. This information is important to DOAV's future funding decisions.

The sensitivity analysis determined that while out-of-state airports do play some role in serving Virginia's aviation demand, it is not a major role. This finding confirms that DOAV is in a position to enhance and improve airports that are essential to Virginia's air transportation and economic needs.

Access to commercial service airports is important for Virginia residents and businesses and also for visitors who come to the Commonwealth. The sensitivity analysis showed varying degrees of accessibility that are associated with the length of time a person drives to reach a commercial service airport. The sensitivity analysis showed the following changes in commercial service airport accessibility for 2020 based on varying drive times:

- 45-minute drive time – 86.4 percent population coverage
- 60-minute drive time – 89.5 percent population coverage
- 90-minute drive time – 97.3 percent population coverage
- 120-minute drive time – 98.6 percent population coverage

It is possible, but not likely, that additional airports in Virginia will be served by a commercial airline in the future. There is no FAA or other standard for establishing optimum accessibility to a commercial service airport. At a 60-minute drive time, almost 90 percent of Virginia's population is within the service area of a commercial service airport.

Actual costs to implement recommendations in the VATSP Update will be influenced by many factors; future demand is one of those factors. For this analysis, future needs for terminal building space, auto parking, aircraft apron areas, and aircraft storage (hangars) were based on aviation demand projections. The sensitivity analysis showed how fluctuations in VATSP demand projections could influence development costs in these four categories. Before funds are allocated for the development of terminals, hangars, auto parking, or aircraft aprons, needs for these facilities should be verified through airport specific analysis incorporating sound master planning practices, detailed environmental assessments of any social, economic, and environmental impacts, and other feasibility and conceptual studies as needed in order to support the justification for the proposed developments.

Future changes in the level of funding available from FAA for airports included in the NPIAS will have an impact on levels of funding that will be needed from DOAV to implement recommendations contained in the system plan. As part of the cost analysis completed in Chapter 5 of the VATP Update, all projects at NPIAS airports that are “eligible” for FAA funding were “assumed” to receive such funding. In reality, each year, sufficient funds from FAA are not available to fund all eligible projects. As result, these projects either go unfunded, or the airport may decide to turn to DOAV for 80/20 funding to move the project forward. As a result, estimates for DOAV funding to implement recommendations in the VATSP are most likely significantly understated. It is not possible, however, to provide an accurate estimate of the additional DOAV funds that might be needed to address project which are not funded by the FAA.

Recently, FAA changed their matching funds formula, reducing their share of funding for eligible projects from 95 percent to 90 percent. This reduction has placed an increased burden on DOAV funding requirements. Going forward, if FAA would reduce their match on eligible projects to 80 percent, this would increase DOAV funding needs by 80 percent, just for NPIAS airports. It is important to restate that DOAV funds also are distributed to non-NPIAS and privately-owned general aviation airports in the Commonwealth system of airports. In the future, there is little doubt that system airports will have increased reliability on funding from DOAV; and as a result, there will be increased completion for DOAV funds and the possible need to increase DOAV’s budget for funding the needs of the airport system.