

## 4. Current System Performance

### 4.1. INTRODUCTION

This chapter presents the analyses and results of evaluating the existing performance of the Vermont Aviation System. As described in Chapter 2, *System Parameters*, the evaluation is based upon the following metrics:

- Facility and Service Objectives
- Geographic Performance Metrics

The process for evaluating the performance of the existing system involves two steps. First, each airport is measured against minimum facility and service objectives to confirm which facilities and services are provided and those specific facilities and services are not fully met. The evaluations of each system airport are aggregated by system role, such that a report card can be developed that clearly illustrates how each category of airports performs, and how each airport contributes to category and statewide system performance. Vermont Aviation System Airports are illustrated by Airport Category in **Figure 4-1**.

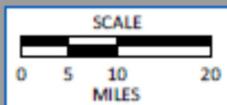
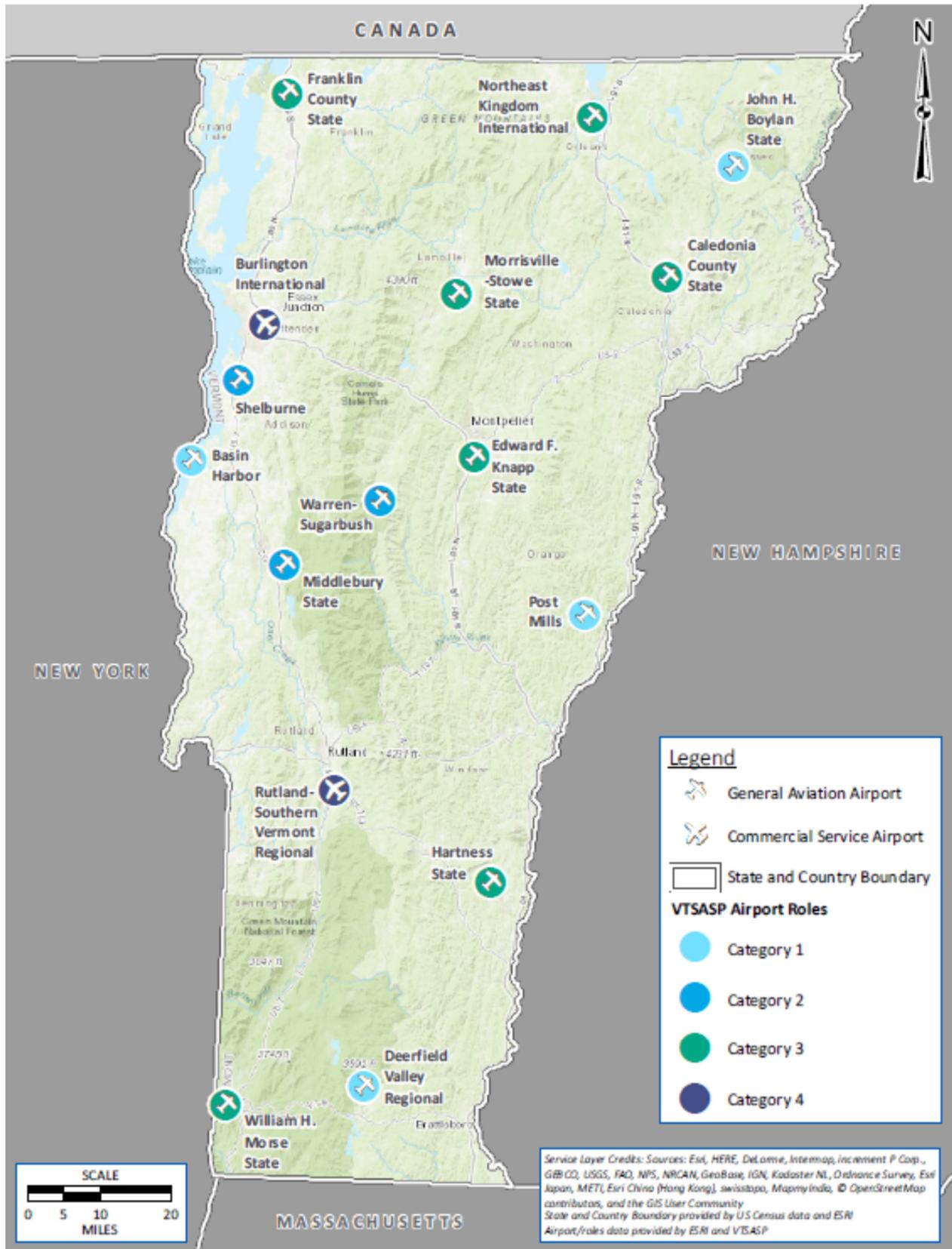
The second step to evaluating the performance of the existing system is to consider geographic performance metrics based upon geographic service areas. Geographic service areas for *ground access* are polygons that represent areas of the state that can reach a system airport within a 30-minute drive time for general aviation services. As noted in Chapter 2, a 60-minute drive time for scheduled passenger service is used exclusively for Burlington International. Geographic service areas for *air access* are polygons that represent a 15-nautical mile radius around each airport.

As presented in this Chapter, this approach produces a quantified assessment of the current Vermont Aviation System's performance, and documents specific facilities and services that are provided – or not provided – at each system airport, and the geographic reach of those facilities in terms of area, population, and employment centers.

### 4.2. FACILITY AND SERVICE OBJECTIVES PERFORMANCE

The facility and service objectives assigned to each airport category serve as the baseline benchmark for infrastructure, equipment, and services to accommodate the types of users each airport is best positioned to serve. This section presents the analysis of statewide aviation system performance against facility and service objectives outlined in Chapter 2. The analysis yields a report card for how well each airport performs against those objectives as well as how each category of airports is performing relative to the minimum facility and service objectives defined for that category.

Figure 4-1: VTSASP Airport Roles



Service Layer Credits: Sources: Esri, HERE, DeLorme, Intermap, increment P Corp., GB/CQ, USGS, FAD, NPS, NRCAN, GeoBasis, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), Swisstopo, MapmyIndia, © OpenStreetMap contributors, and the GIS User Community  
 State and Country Boundary provided by US Census data and ESRI  
 Airport/roles data provided by ESRI and VTSASP

4.2.1. System Performance Model

The analysis of statewide aviation system airports utilized a weighted sum model to measure the performance of each system airport for the VTSASP. The weighted sum model is designed such that each facility and service objective within each VTSASP Category is assigned a relative weight that corresponds to the importance of the objective within each Category. **Table 4-1** illustrates the design of the weighted model, and how the relative weight of each objective is used with an assigned value to produce a score for each VTSASP airport. Points are the product of the assigned value given to the airport is multiplied by the objective’s weight.

Table 4-1: System Performance Model Design

Facility or Service Objective <sup>1/</sup>	Weight <sup>1/</sup>	Assigned Value Range Options			Assigned Value	Points
		Yes	No	Partial		
Runway Length	4%	100	0	50	Yes = 100 →	Yes = 4
					No = 0	No = 0
Full Time Management & Operations Staff On-Site	3%	100	0	50	Yes = 100 →	Yes = 3
					No = 0	No = 0
Full-Service FBO On-Site	5%	100	0	50	Yes = 100 →	Yes = 5
					No = 0	No = 0

Source: McFarland Johnson, 2017.

<sup>1/</sup> Facility or Service Objectives and Weights shown for illustrative purposes.

When aggregated, the facility and service objectives’ weights for the entire statewide system sum to 100 percent. The performance model then produces point values for each system airport, such that an airport that meets all objectives will score 100 points, with all system airports scoring along the point scale from zero to 100. The points scored for each VTSASP airport determine within which VTSASP category each airport is placed.

**Qualitative Scoring Adjustments**

Once the system performance model is complete, some qualitative adjustments to the assigned values were deemed necessary to reflect the relative value of certain facility and/or service objectives at airports within Categories 2, 3, and 4. No adjustments are required to Category 1 because the minimum requirements are very basic.

The adjustments to certain assigned values for airports in Categories 2, 3, and 4 are required because the minimum facility and service objectives become more demanding in those Categories, and are measured among a greater number of system airports, which have a wider variety of infrastructure, equipment, services, and operational characteristics. One example of qualitative

adjustments made to Category 2 airports is to assign partial value (i.e., 50) for airports that have, say, a full-service FBO, full-time airport management, and self-serve fuel but do not meet the minimum runway length requirement of 4,000 feet. Conversely, airports that have a minimum runway length of 5,000 feet are assigned a full value of 100. In this way, the performance model captures the difference between system airports that are a result of having a complimentary mix or combination of facilities and services that – on a statewide basis, and within particular VTSASP Categories – have a greater impact to the Vermont State Aviation System’s performance. The quantitative analysis alone does not account for the unique combination of facilities, services, and operational nuances that truly distinguish some VTSASP airports from each other, and create different levels of value and impact for the statewide system.

#### 4.2.2. System Performance Results

The results of the performance analysis for the Vermont State Aviation System is presented in **Table 4-2**, sorted by score in ascending order.

**Table 4-2: System Performance Results**

Airport	Performance Score	VTSASP Category
John H. Boylan State	7	1
Basin Harbor	9	1
Post Mills	12	1
Deerfield Valley Regional	17	2
Warren Sugarbush	31	2
Shelburne	36	2
Middlebury State	40	2
William H. Morse State	54	3
Caledonia County State	54	3
Morrisville-Stowe State	59	3
Franklin County State	59	3
Edward F. Knapp State	84	3
Hartness State	90	3
Northeast Kingdom International	90	3
Rutland – Southern Vermont Regional	97	4
Burlington International	100	4

Source: McFarland Johnson Analysis, 2017.

As shown, the weighted sum performance model for the Vermont State Aviation System places each VTSASP airport into a category based upon the value assigned to each minimum facility and service objective.

#### 4.2.3. System Performance Results by VTSASP Category

This section summarizes the performance of each VTSASP category with a report card comprised of a table that illustrates whether each VTSASP airport meets the minimum facility and/or service objective, and a chart that reflects the qualitative adjustments made as a measure of the

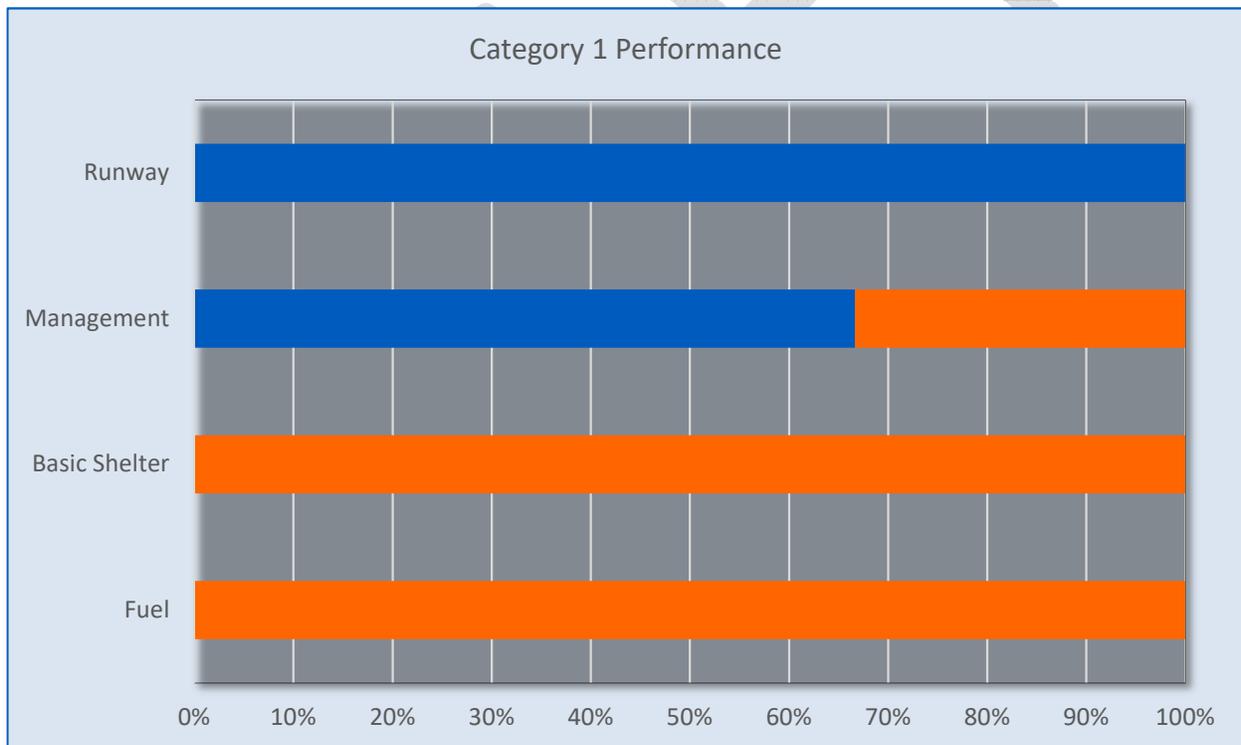
contribution that each airport’s performance makes within their respective VTSASP airport category. The purpose of the weighted performance model is to identify areas of need at the VTSASP category level, which can guide decision-making for the short-, mid-, and long-term periods.

**Category 1 Airports**

Vermont Aviation System airports in Category 1 were measured against the minimum facility and service objectives defined for that role. **Table 4-3** presents the current performance of each Category 1 Airport in the Vermont Aviation System. The accompanying chart presents how Category 1 Airports perform against the minimum facility or service standard as a group.

**Table 4-3: Category 1 Airport Performance**

Airport	Facility & Service Requirement			
	Runway	Management	Basic Shelter	Fuel
Basin Harbor	✓	✓	x	x
John H. Boylan State	✓	x	x	x
Post Mills	✓	✓	x	x



Source: McFarland-Johnson Analysis, 2017.

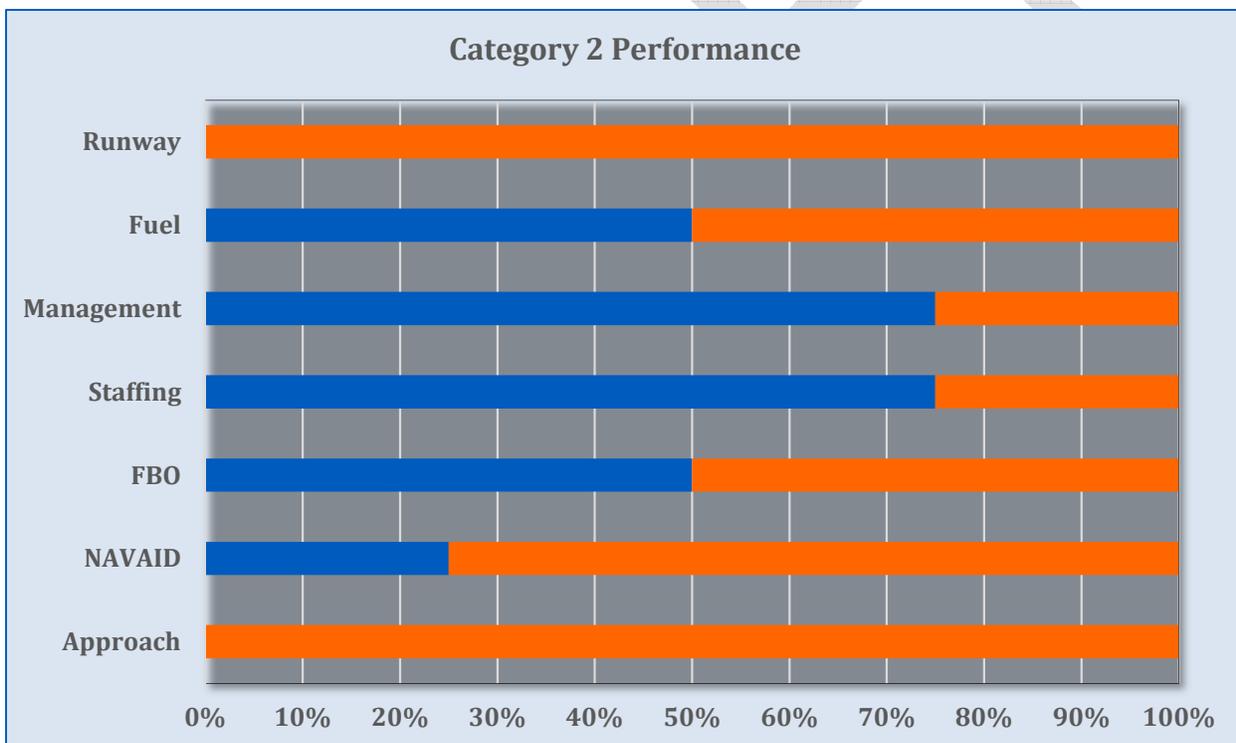
As shown in **Table 4-3**, all system airports in Category 1 meet the runway requirement (≥2,500 feet). Basin Harbor and Post Mills each meet the management requirement for part-time airport manager on-site. All Category 1 Airports do not have a basic shelter or offer aviation fuel services.

Category 2 Airports

Vermont Aviation System airports in Category 2 were measured against the minimum facility and service objectives defined for that role. **Table 4-4** presents the current performance of Category 2 Airports in the Vermont Aviation System. The accompanying chart presents how Category 2 Airports perform against the minimum facility or service standard as a group.

**Table 4-4 Category 2 Airport Performance**

Airport	Facility & Service Requirement						
	Runway	Fuel	Management	Staffing	FBO	NAVAID	Approach
Deerfield Valley Regional	X	X	X	X	X	✓	✓
Middlebury State	X	✓	✓	✓	X	X	X
Shelburne	X	X	✓	✓	✓	X	X
Warren-Sugarbush	X	✓	✓	✓	✓	X	X



Source: McFarland-Johnson Analysis, 2017.

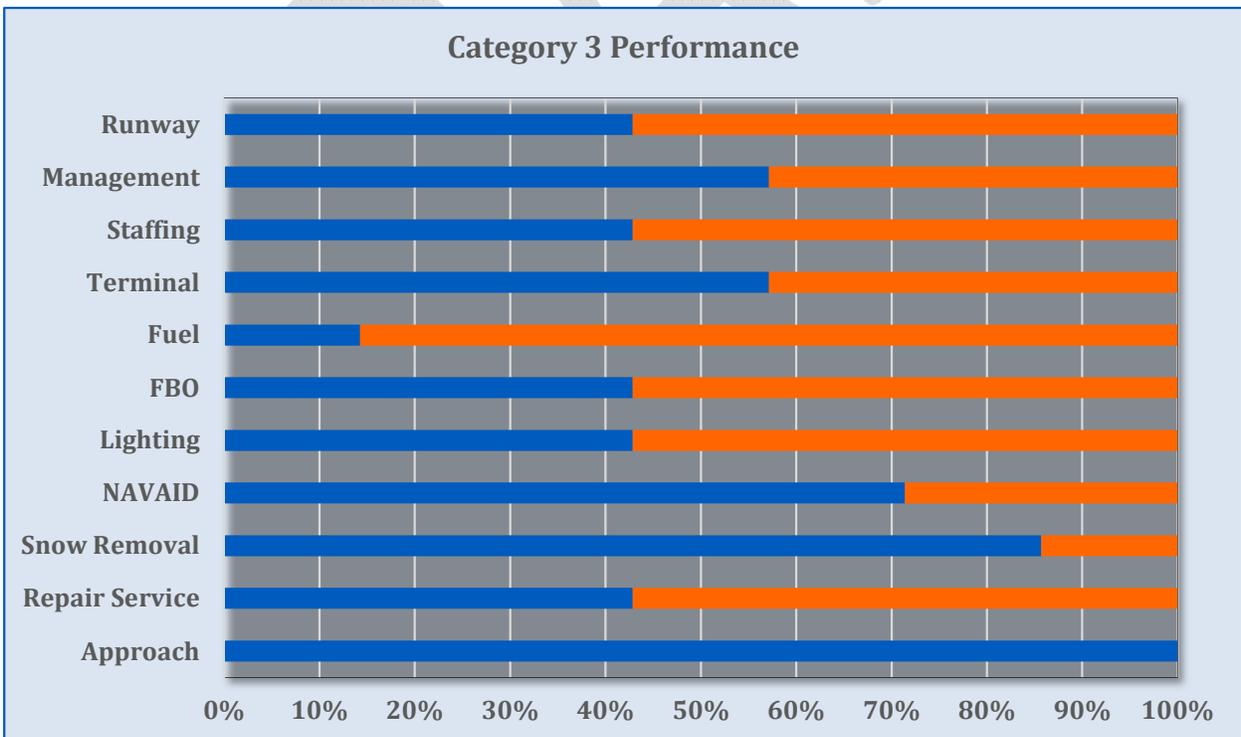
As shown in **Table 4-4**, no VTSASP airports in Category 2 meet the minimum requirements for primary runway length ( $\geq 4,000$  feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. However, as shown in the accompanying chart, a qualitative adjustment is made to the Category’s scoring for the approach at Deerfield Valley Regional because the primary runway is just 2,650 feet in length.

Category 3 Airports

Vermont Aviation System airports in Category 3 were measured against the minimum facility and service objectives defined for that role. **Table 4-5** presents the current performance of Category 3 Airports in the Vermont Aviation System. The accompanying chart presents how Category 3 Airports perform against the minimum facility or service standard as a group.

Table 4-5: Category 3 Airport Performance

Airport	Facility & Service Requirement										
	Runway	Management	Staffing	Terminal	Fuel	FBO	Lighting	NAVAID	Snow Removal	Repair Service	Approach
Caledonia County State	x	✓	✓	✓	✓	✓	✓	✓	✓	x	✓
Edward F. Knapp State	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓
Franklin County State	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hartness State	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Morrisville-Stowe State	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Northeast Kingdom International	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
William H. Morse State	x	✓	✓	✓	✓	x	✓	✓	✓	✓	✓



Source: McFarland-Johnson Analysis, 2017.

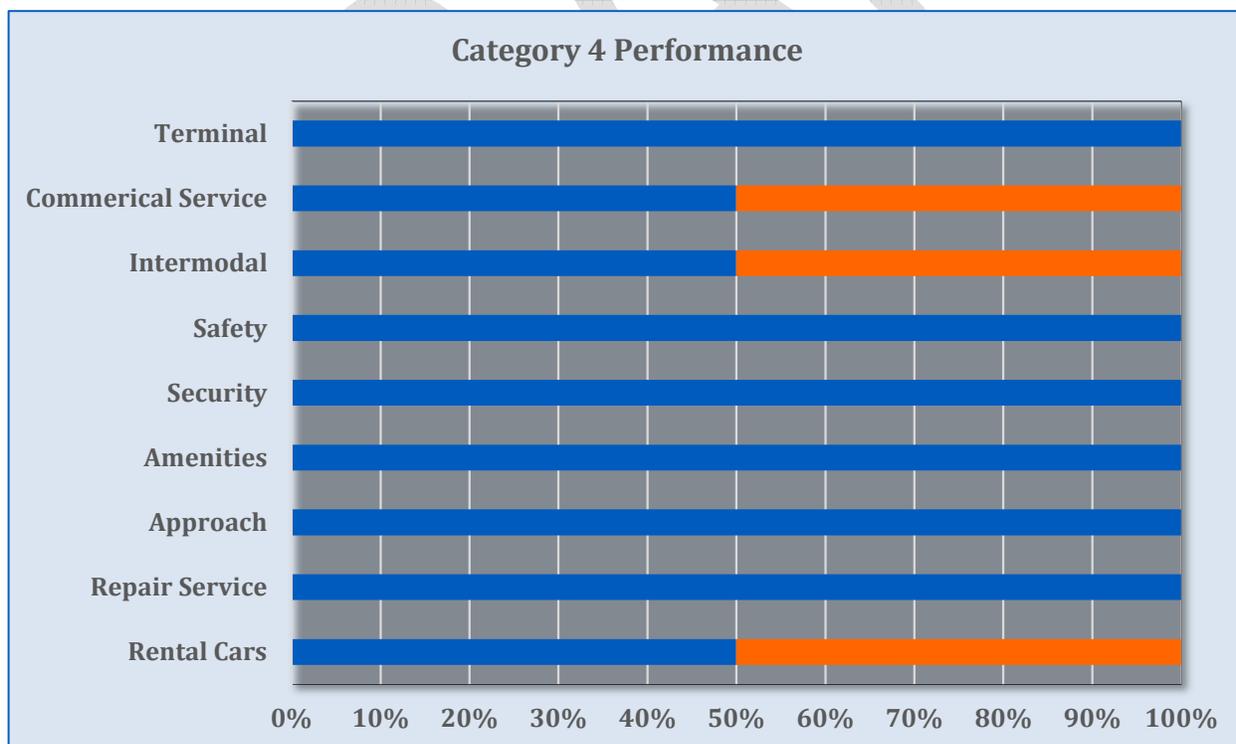
Many of the minimum facility and service objectives are met by VTSASP airports in Category 3, including: airport management and operations staffing; airfield lighting; rotating beacons; snow removal equipment; and, GPS instrument approaches with vertical guidance. However, the chart illustrates the impact of qualitative adjustments made to performance model scoring for Caledonia County State, Franklin County State, Morrisville-Stowe State, and William H. Morse State, each of which do not meet the minimum requirement for runway length of  $\geq 5,000$  feet.

**Category 4 Airports**

Vermont Aviation System airports in Category 4 were measured against the minimum facility and service objectives defined for that role. **Table 4-6** presents the current performance of Category 4 Airports in the Vermont Aviation System. The accompanying chart presents how Category 4 Airports perform against the minimum facility or service standard as a group.

**Table 4-6: Category 4 Airport Performance**

Airport	Facility & Service Requirement								
	Terminal	Commercial Service	Intermodal	Safety	Security	Amenities	Approach	Repair Service	Rental Car
Burlington International	✓	✓	✓	✓	✓	✓	✓	✓	✓
Rutland-Southern Vermont Regional	✓	✓	x	✓	✓	✓	✓	✓	x



Source: McFarland-Johnson Analysis, 2017.

As shown in **Table 4-6**, Burlington International meets all minimum facility and service objectives for Category 4 Airports. As shown in the accompanying chart, a qualitative adjustment is made to the Category's scoring for commercial service at Rutland-Southern Vermont Regional because the nature of passenger service at the airport is not a network/legacy-level as provided at Burlington.

#### 4.2.4. Facility and Service Performance Analysis Summary

The evaluation of Vermont Aviation System performance presented in the preceding section and illustrated in the accompanying report cards is summarized as follows:

- **VTSASP Category 1 Airports:** As described, all system airports in Category 1 meet the runway requirement ( $\geq 2,500$  feet). Basin Harbor and Post Mills each meet the management requirement for having a part-time airport manager on-site. The primary areas of need for VTSASP Category 1 Airports are basic shelter facilities and 100LL fuel services.
- **VTSASP Category 2 Airports:** No VTSASP airports in Category 2 meet the minimum requirements for primary runway length ( $\geq 4,000$  feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. As shown, the primary areas of need for VTSASP Category 2 Airports are: runway length, GPS instrument approaches, visual NAVAIDs, FBO and self-serve 100LL fuel services, and airport management and operations staff on-site.
- **VTSASP Category 3 Airports:** As discussed, system airports in Category 3 meet many of the minimum facility and service objectives. However, as a group, the performance and impact of these facilities is weakened due to several airports not meeting the minimum runway length requirement ( $\geq 5,000$  feet). The areas of primary need for Category 3 airports will be explored further in Chapter 5., *Future System Performance*, where specific modifications to existing conditions might create a more optimal mix of complimentary infrastructure, facilities, equipment, and services might improve performance.
- **VTSASP Category 4 Airports:** For the VTSASP, Burlington International meets all minimum facility and service objectives for Category 4 Airports. Rutland-Southern Vermont Regional also has all of the basic facilities and services required of a commercial passenger service airport; however, not at the level of maturity or as Burlington. The areas of primary need for Category 4 airports also be explored further in Chapter 5., but take a more general approach toward system-level general aviation needs and positioning of Rutland-Southern Vermont Regional to capture additional passenger service offerings as the airline industry evolves in the future.

### 4.3. AIRPORT SYSTEM GEOGRAPHIC PERFORMANCE

Following the evaluation of airports and roles against minimum facility and service objectives, this section considers geographic areas of the state that are proximate to system airports as a measure of the area each airport – and each VTSASP Airport Category – serves.

One overarching and reasonable assumption for evaluating the current performance of the Vermont Aviation System is that an airport’s performance is based upon its location relative to existing and prospective users. In this way, drive times and nautical mile distances from system airports represent service areas for the Vermont Aviation System, where aviation services are available to aircraft owners, operators, passengers, and the general public. The analysis provides information on airport service areas and geographic gaps in service for the Vermont Agency of Transportation (VTRANS) Aviation Program, airport management, aviation businesses, and aviation policy makers.

As described in Chapter 2, *System Parameters*, performance of the Vermont Aviation System is evaluated by estimating geographic service areas for ground access and air access. **Figure 4-2** and **Figure 4-3** illustrate population and employment centers in the state for reference, which will be discussed in the following sections.

#### 4.3.1. Ground Access Service Area Coverage

Each system airport’s service area, defined by automobile drive-times, was utilized to quantify discrete values for coverage in terms of land area, population and employment centers. These metrics are applied using 30-minute drive times for all system airports. A 60-minute drive time is used to evaluate the coverage of scheduled passenger service by Burlington International.

Additionally, as described in Chapter 3, *Inventory*, scheduled commercial passenger service at Rutland-Southern Vermont Regional (RUT) consists of daily flights to Boston Logan International utilizing the 9-passenger Cessna 402. While RUT is included in the VTSASP as a Category 4 airport for this service, the airport was not assigned a 60-minute drive time service area because the nature of that service is not network airline service as offered at Burlington International.

#### *Land Area*

Drive-time coverage was assessed for each airport category, and is summarized below. As shown on each figure, individual airport drive time service areas overlap in some areas. Therefore, total coverage noted for each category of airport is not a sum of each individual category, but a combination. Quantities and percentages are for Vermont land area only, and do not include adjacent state land areas covered by system airports.

**Table 4-7** presents drive time land area coverage for each of the VTSASP Airport Categories, which is illustrated in **Figure 4-4**.

Figure 4-2: Existing Airports by Role and Population

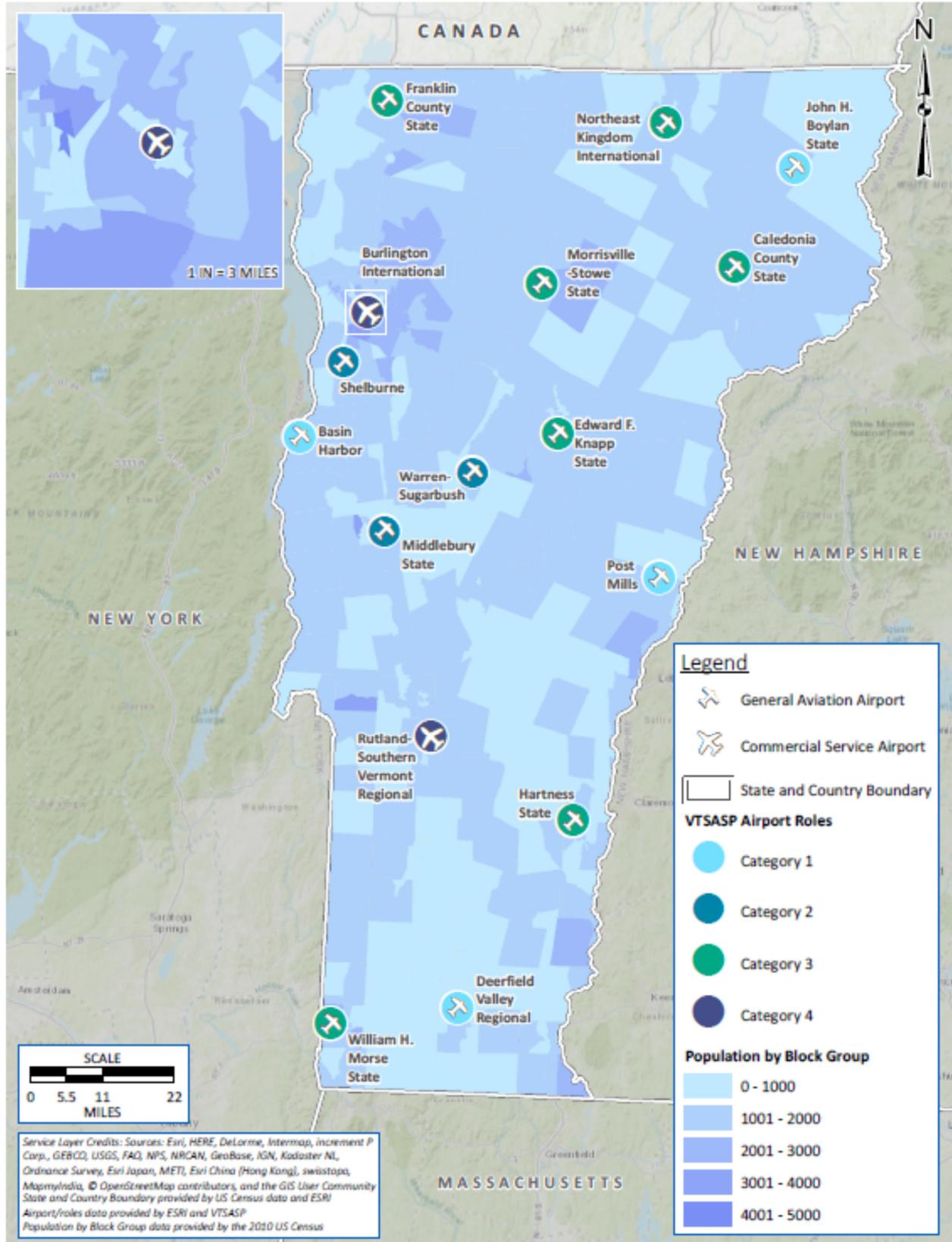


Figure 4-3: Existing Airport Coverage by Role and Employment Centers

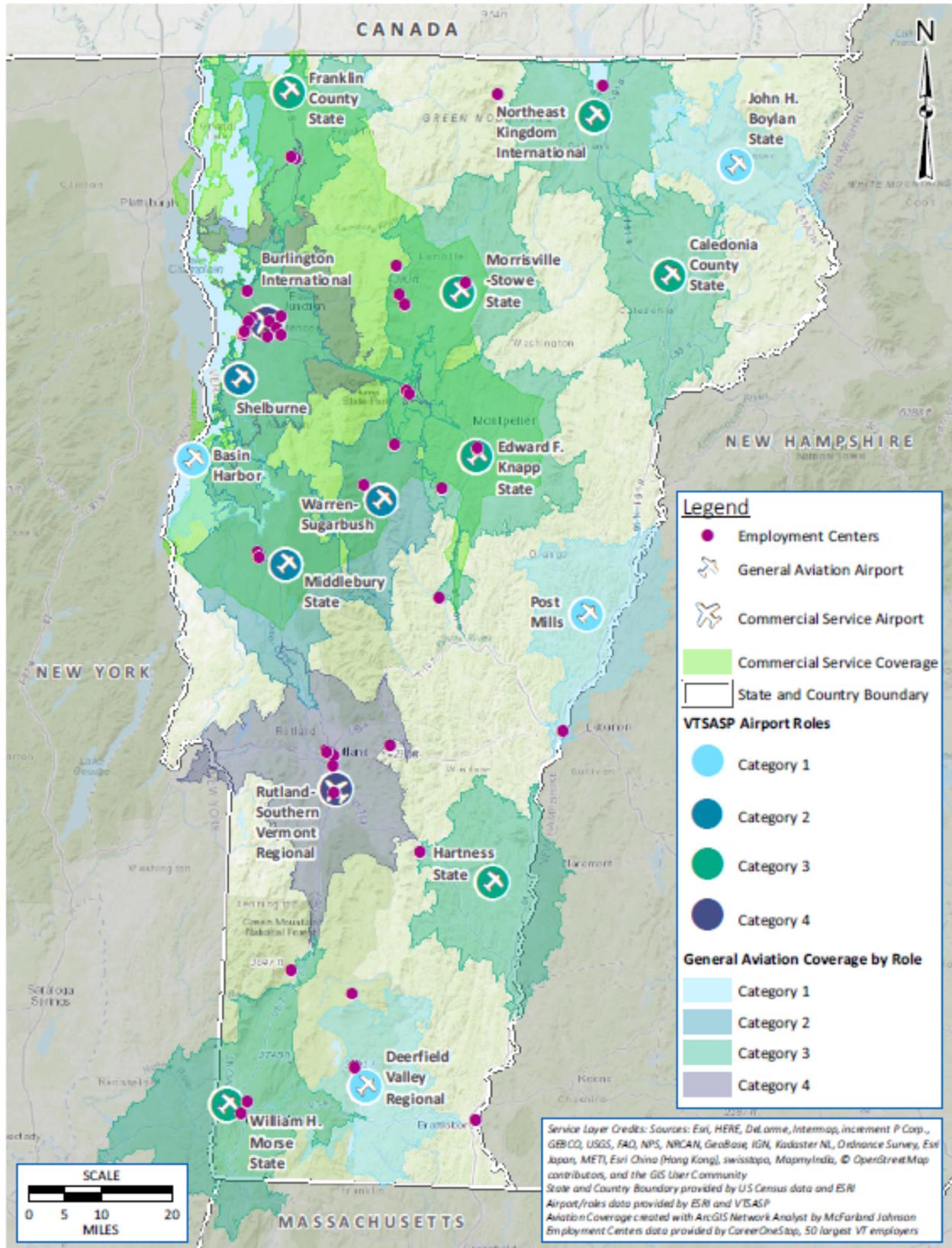


Figure 4-4: Existing General Aviation Coverage by Role

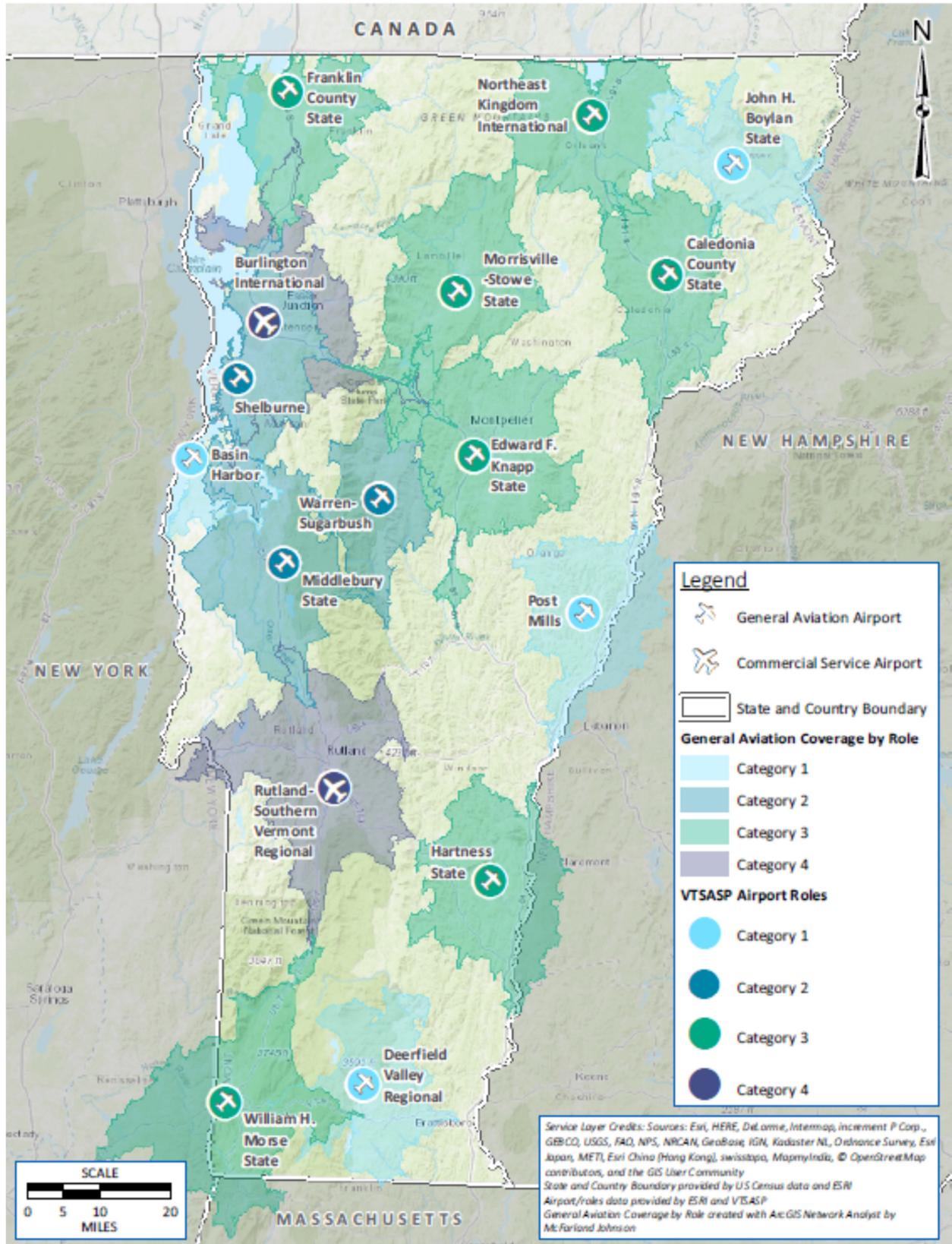


Table 4-7 presents drive time land area coverage for each of the VTSASP Airport Categories.

**Table 4-7: Ground Access Land Area Coverage by VTSASP Airport Categories**

Airport Category	Land Area Coverage (SQMI)	Land Area Coverage (% Total) <sup>1/</sup>
Category 1 Airports	1,070	11%
Category 2 Airports	1,008	10%
Category 3 Airports	2,892	30%
Category 4 Airports	1,019	11%

Source: McFarland Johnson Analysis, 2017.

1/ Vermont has a total land area of 9,614 square miles.

Importantly, the total coverage area for each Category of VTSASP airport cannot be summed to determine total coverage. This is due to overlaps in 30-minute drive time geographic coverage for a number of airports, which is illustrated in **Figure 4-4**.

**Table 4-8** presents 60-minute drive time coverage area for Burlington International, which is illustrated in **Figure 4-5**. The land area coverage for Rutland-Southern Vermont Regional is shown for comparative purposes.

**Table 4-8: Ground Access Land Area Coverage by Burlington International**

Airport Category	Land Area Coverage (SQMI)	Land Area Coverage (% Total)
Burlington International	2,257	23%

Source: McFarland Johnson Analysis, 2017.

Evaluating the 30-minute drive coverage for all Vermont Aviation System Airports places all system airports on a level playing field in terms of providing coverage for general aviation users. In this way, Burlington International is not unfairly weighted when measuring the reach of the general aviation services airport businesses provide to those owners and operators.

**Table 4-9** summarizes the geographic reach of VTSASP airports, which includes areas of overlap. As indicated, system airports combine to cover 5,475 square miles, or 57 percent of the state.

**Table 4-9: Ground Access Land Area Coverage – All VTSASP Airports**

Airport Category	Land Area Coverage (SQMI)	Land Area Coverage (% Total)
All VTSASP Airports	5,475	57%

Source: McFarland Johnson Analysis, 2017.

Considering that the State of Vermont is 9,614 miles, the analysis indicates that there are 514 square miles of area within the state that benefit from being within a 30-minute drive from more than one VTSASP airport. Additionally, the analysis shows that approximately 4,139 square miles, or 43 percent of the state, is not within a 30-minute drive of a VTSASP airport. The next two sections discuss the population and employment centers served by VTSASP airports, which provides insights into the value of VTSASP geographic coverage and performance.

*Population*

Population coverage was assessed for each airport category by drive-time, and is summarized in this section. As shown on preceding Figures, individual airport drive time service areas overlap in some areas. Therefore, total coverage noted for each VTSASP Category accounts for this overlap, and is not the simple sum of each individual airport’s service area population.

Figures 4-4, and 4-5 that show service areas in terms of drive times also represent the areas of population that are served. Quantities and percentage served are for Vermont population data only, and do not include adjacent state data.

Table 4-10 presents drive time population coverage for each of the VTSASP Airport Categories.

**Table 4-10: Ground Access Population Coverage by VTSASP Airport Categories**

Airport Category	Population Coverage	Population <sup>1/</sup> Coverage (% Total)
Category 1 Airports	73,560	12%
Category 2 Airports	216,636	35%
Category 3 Airports	288,690	46%
Category 4 Airports	263,423	42%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>U.S. Census Bureau, Topologically Integrated Geographic Encoding and Referencing (TIGER) Vermont GIS Data, 2010.

Table 4-11 presents the population served within a 60-minute drive from Burlington International.

**Table 4-11: Ground Access Population Coverage by Burlington International**

Airport Category	Population Coverage	Population Coverage (% Total)
Burlington International	328,090	52%

Source: McFarland Johnson Analysis, 2017.

Table 4-12 summarizes the geographic reach of VTSASP airports in terms of population served.

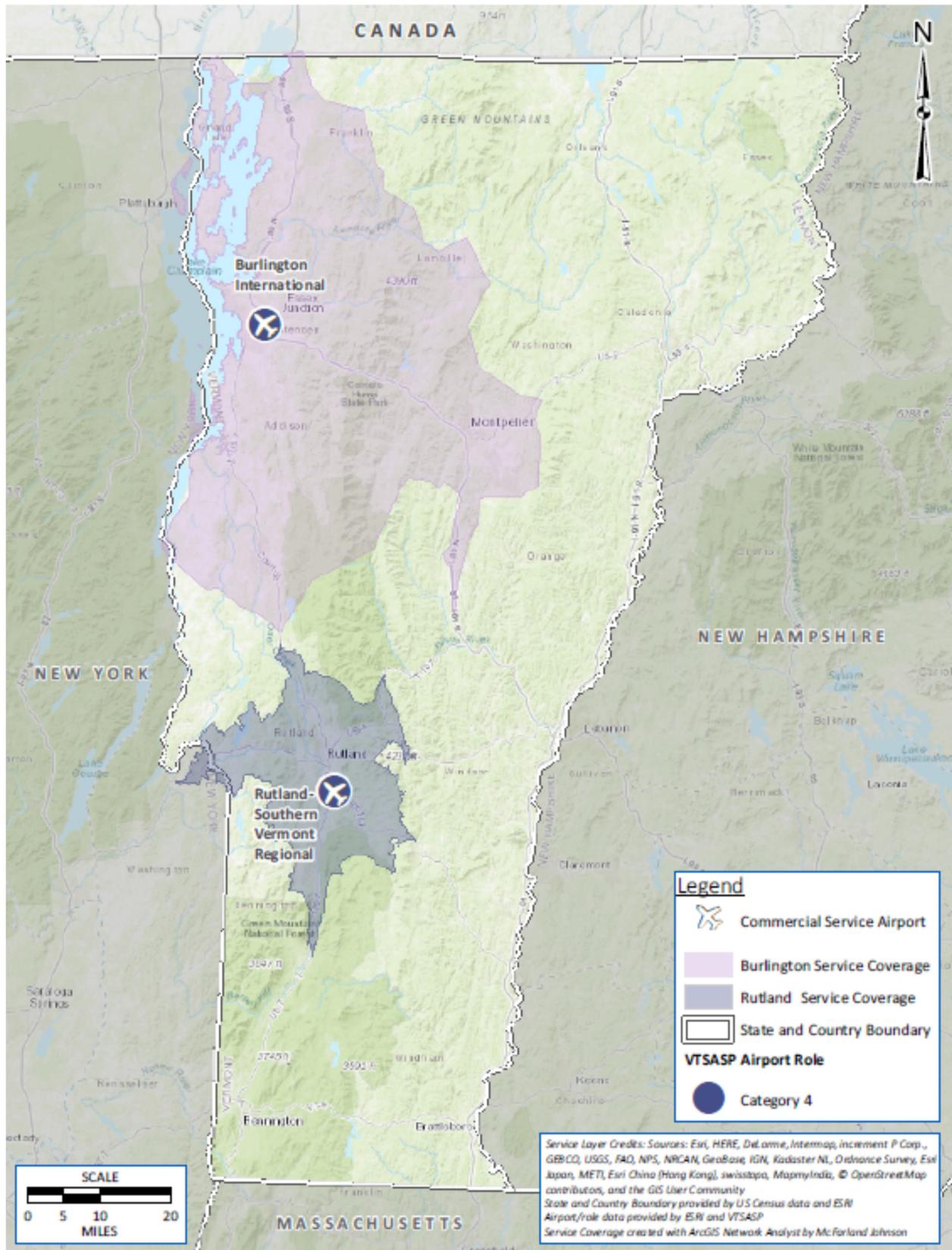
**Table 4-12: Ground Access Population Coverage – All VTSASP Airports**

Airport Category	Population Coverage	Population Coverage (% Total)
All VTSASP Airports	583,356	93%

Source: McFarland Johnson Analysis, 2017.

As indicated in Table 4-12, VTSASP airports serve an impressive 93 percent of the State’s population despite not reaching 43 percent of the state’s geographic area. This reflects the concentrations of population in and near major cities and towns, versus more remote and undeveloped areas of the state.

Figure 4-5: Existing Commercial Service Coverage



*Employment Centers*

Employment center coverage was assessed in the same way as population coverage, and for each airport category by drive-time. Third party data available from Infogroup, Inc. was used for the top 50 employers in the state (2015). For the VTSASP, these top 50 employers are utilized to represent the major centers of employment and economic activity in Vermont.

**Table 4-13** shows the industries represented by Vermont’s top 50 employers and total employment by these top 50 employers within these industries provided by the Infogroup dataset.

**Table 4-13: Employment Industries of Top 50 Employers**

Top 50 Employer Industries	Employment
Hospitals & Healthcare	19,993
Resorts	14,358
Manufacturing & Technology	9,630
Colleges & Universities	3,130
Retail & Logistics	1,430
Military	980
Insurance	430
<b>Total</b>	<b>49,951</b>

Source: ReferenceUSAGov, infogroup, Inc., 2015.

**Table 4-14** presents employment center coverage for each of the VTSASP Airport Categories.

**Table 4-14: Ground Access Employment Center Coverage by VTSASP Airport Categories**

Airport Category	Employment Center Coverage	Employment Center Coverage (% Total)
Category 1 Airports	3	6%
Category 2 Airports	19	38%
Category 3 Airports	18	36%
Category 4 Airports	23	46%

Source: McFarland Johnson Analysis, 2017.

**Table 4-14** indicates that VTSASP airports in Categories 2, 3, and 4 are within a 30-minute drive from 38-46 percent of the State’s major employment centers.

**Table 4-15** presents employment center coverage for Burlington International, which reaches 28 of the top 50 employment centers.

**Table 4-15: Ground Access Employment Center Coverage by Burlington International**

Airport Category	Employment Center Coverage	Employment Center Coverage (% Total)
Burlington International	28	56%

Source: McFarland Johnson Analysis, 2017.

**Table 4-16** summarizes the geographic reach of VTSASP airports in terms of major employment centers and economic activity centers served.

**Table 4-16: Ground Access Employment Center Coverage – All VTSASP Airports**

Airport Category	Employment Center Coverage	Employment Center Coverage (% Total)
All VTSASP Airports	44	88%

Source: McFarland Johnson Analysis, 2017.

Similar to population coverage, **Table 4-16** shows impressive coverage of the state’s employment centers, with 44 of the top 50 being within a 30-minute drive of a VTSASP airport.

*Neighboring State Ground Access Coverage in Vermont*

An important consideration while evaluating ground access coverage of VTSASP airports is the extent to which neighboring states’ airports serve areas, population, and employment centers in Vermont. **Table 4-17** shows the NHSASP identified the following airports in New York, New Hampshire, and Massachusetts for consideration:

**Table 4-17: Neighboring State Airports – Ground Access Coverage**

New York	New Hampshire		Massachusetts
Plattsburgh International	Mount Washington Regional	Parlin Field	Harriman and West
Ticonderoga Municipal	Dean Memorial	Claremont Municipal	Turners Falls
Chapin Field	Lebanon Municipal	Dillant-Hopkins	
Albany International			

Source: McFarland Johnson Analysis, 2017

Geographic coverage into Vermont by general aviation airports in neighboring states is illustrated in **Figure 4-6**. Geographic coverage into Vermont by airports that provide scheduled commercial passenger service in neighboring states is illustrated in **Figure 4-7**.

Figure 4-6: Neighboring General Aviation Coverage

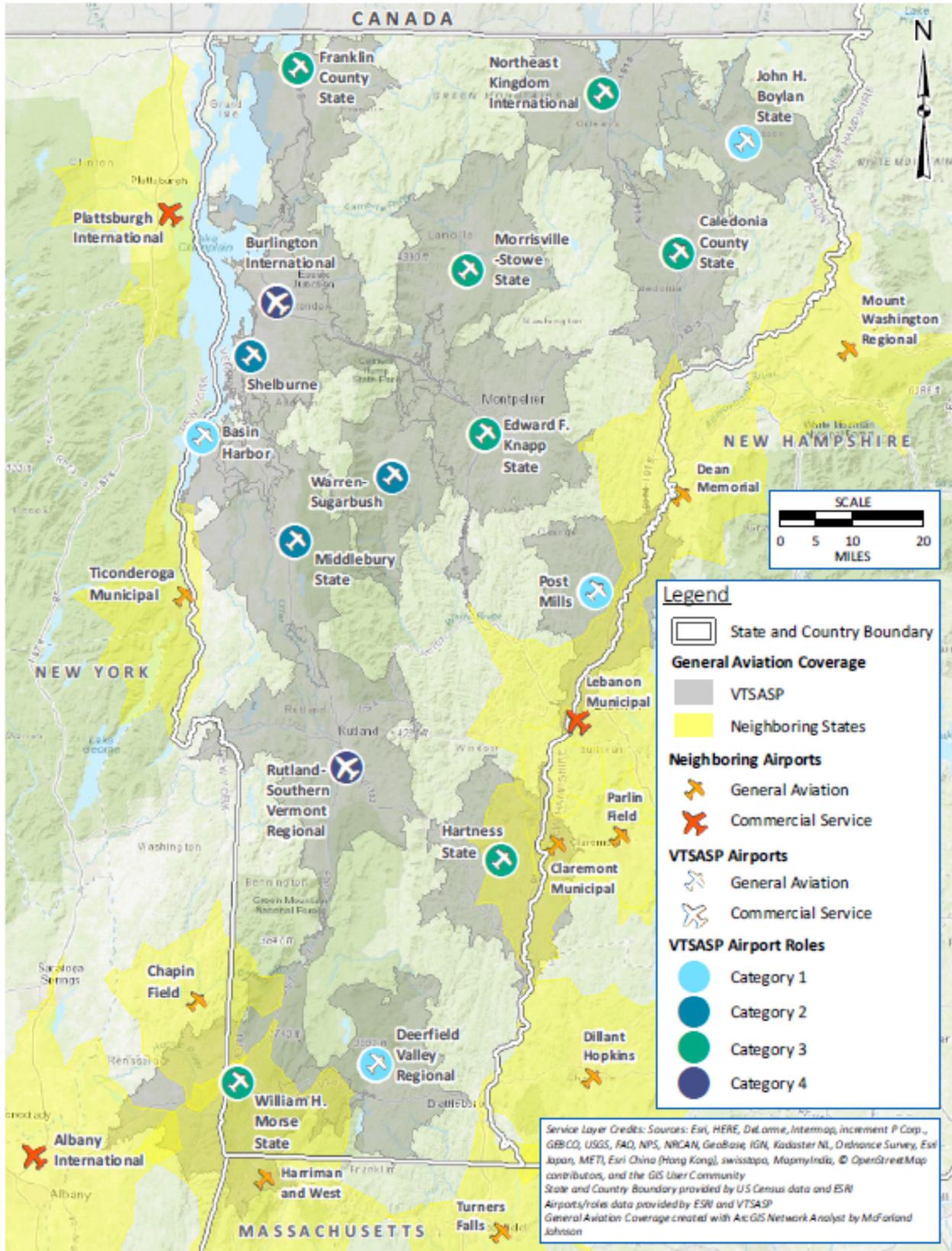


Figure 4-7: Neighboring Commercial Service Coverage

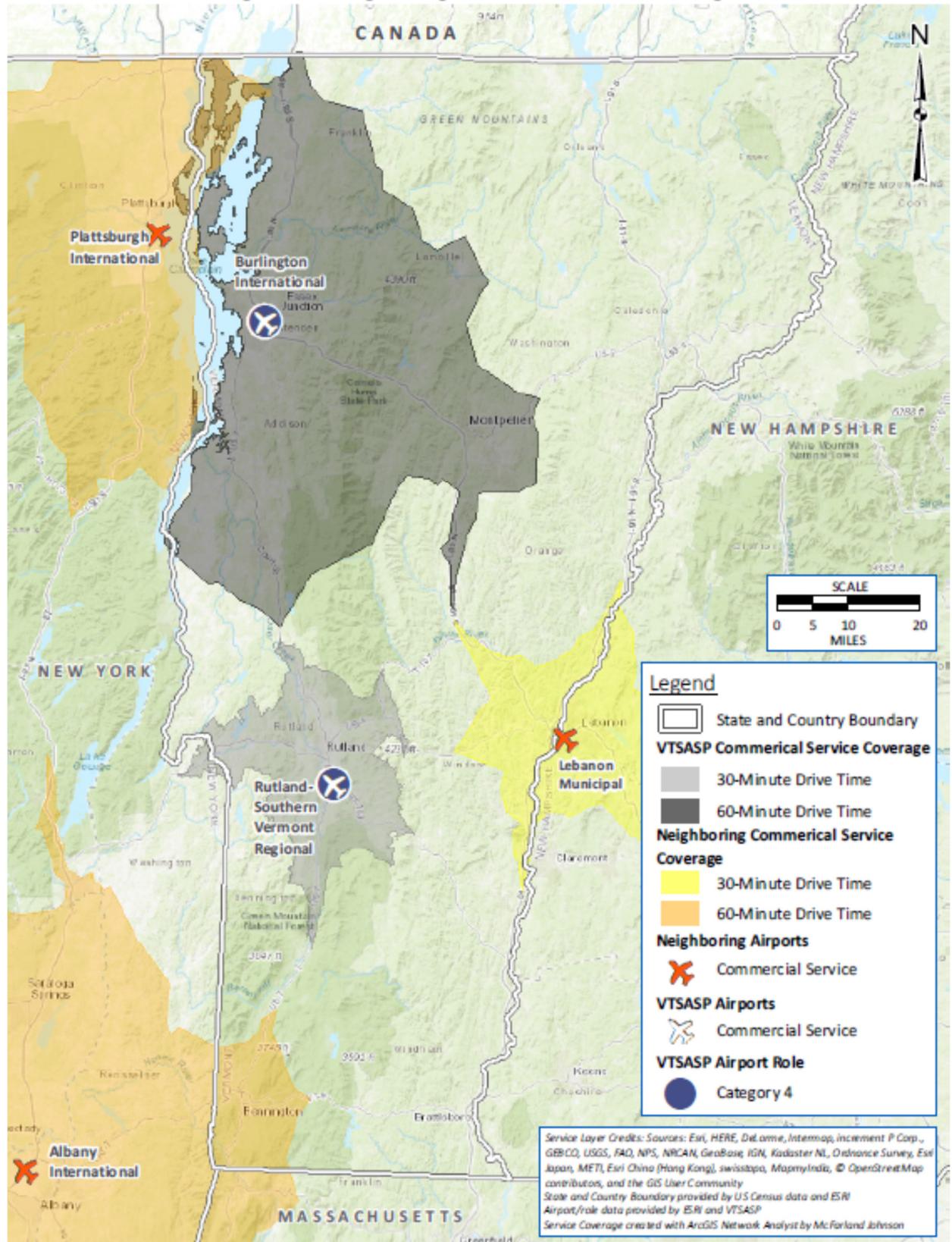


Table 4-18 presents land area, population and employment center coverage in Vermont by general aviation and commercial service airports in neighboring states.

**Table 4-18: Neighboring State Ground Access Coverage in Vermont**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
<b>General Aviation Facilities and Services (30-Minute Drive Time)</b>		
Land Area	1,001 SQMI	10%
Population	81,148	13%
Employment Centers	4	8%
<b>Commercial Service (60-Minute and 30-Minute Drive Times)</b>		
Land Area	586 SQMI	6%
Population	49,254	8%
Employment Centers	3	6%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities.

As shown in **Table 4-18**, neighboring states’ airports have service areas that reach approximately 1,000 square miles of Vermont. Within these areas, adjacent states’ airports serve more than 81,100 Vermont residents and 4 of the state’s top 50 employers.

#### 4.3.2. Air Access Service Area Coverage

In addition to the analyses of service area coverage by airport category presented thus far, the analysis also considered air access service area coverage by system airports with specific infrastructure, equipment, and services. Chapter 2, *Inventory*, includes a summary of data collected for VTSASP airports. This section focuses on a set of key infrastructure elements that are important for aircraft in operation within and in route over Vermont. The key infrastructure elements included in the analysis of air access coverage are:

- Coverage by Airports with a Primary Runway Length ≥ 4,000-feet
- Coverage by Airports with a Primary Runway Length ≥ 5,000-feet
- Coverage by Airports with Precision Instrument Approaches
- Coverage by Airports with Non-Precision Instrument Approaches
- Coverage by Airports with On-Site Weather Reporting Service/Equipment
- Coverage by Airports with AvGas (100LL) Fueling Services
- Coverage by Airports with Jet A Fueling Services

These key infrastructure elements are important decision factors for many operators; however, they can be more critical to those utilizing more sophisticated aircraft filing flight plans for cross-country routes in the northeast or traveling from other regions of the U.S. Focusing on air access by measuring the reach of these key infrastructure elements provides another perspective on the performance of the Vermont State Aviation System, and one that can highlight the types of needs operators originating outside the State may find most important. Air access coverage by VTSASP airports is illustrated in **Figure 4-8** through **Figure 4-14**, and show neighboring states’ airports with the same key infrastructure elements for comparison purposes.

**Coverage by Airports with a Primary Runway Length  $\geq$  4,000-feet**

System airports with primary runways 4,000 feet or greater in length combine to serve nearly 356,600 million people, or 57 percent of the population in the state, and 31 of the top 50 employers. **Table 4-19** presents the breakdown of nautical mile coverage by these system airports. **Figure 4-8** illustrates this coverage.

**Table 4-19: Air Access Coverage – VTSASP Airports with Primary Runway Length  $\geq$  4,000-feet**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	4,000 SQMI	42%
Population	356,574	57%
Employment Centers	31	62%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities

**Coverage by Airports with a Primary Runway Length  $\geq$  5,000-feet**

System airports with runways 5,000 feet or greater are the same VTSASP airports with 4,000 feet or greater, which are Burlington International, Edward F. Knapp State, Hartness State, Northeast Kingdom International, and Rutland-Southern Vermont Regional. **Table 4-20** presents the same breakdown of nautical mile coverage by these system airports. **Figure 4-9** illustrates this coverage.

**Table 4-20: Air Access Coverage – VTSASP Airports with Primary Runway Length  $\geq$  5,000-feet**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	4,000 SQMI	42%
Population	356,574	57%
Employment Centers	31	62%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities

**Coverage by Airports with Precision Instrument Approaches**

VTSASP airports with precision approach capability combine to serve 46 percent of the state’s population and 29 of the top 50 employers. **Table 4-21** presents the breakdown of nautical mile coverage by these system airports. **Figure 4-10** illustrates this coverage.

**Table 4-21: Air Access Coverage – VTSASP Airports with Precision Instrument Approach**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	2,618 SQMI	27%
Population	289,517	46%
Employment Centers	29	58%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities.

Figure 4-8: Existing Air Access Coverage - Airports with 4,000-Foot Paved Runway or Greater

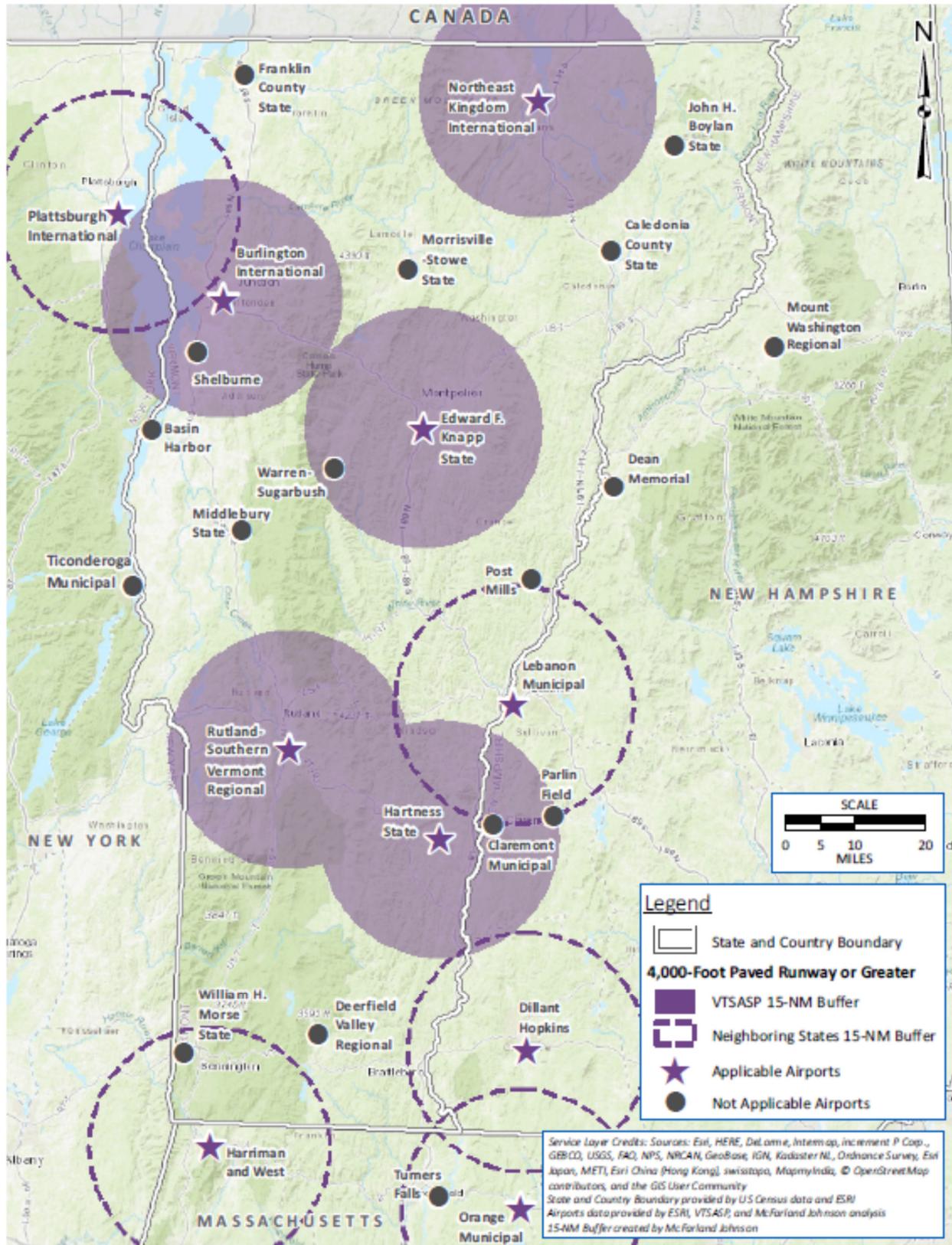


Figure 4-9: Existing Air Access Coverage - Airports with 5,000-Foot Paved Runway or Greater

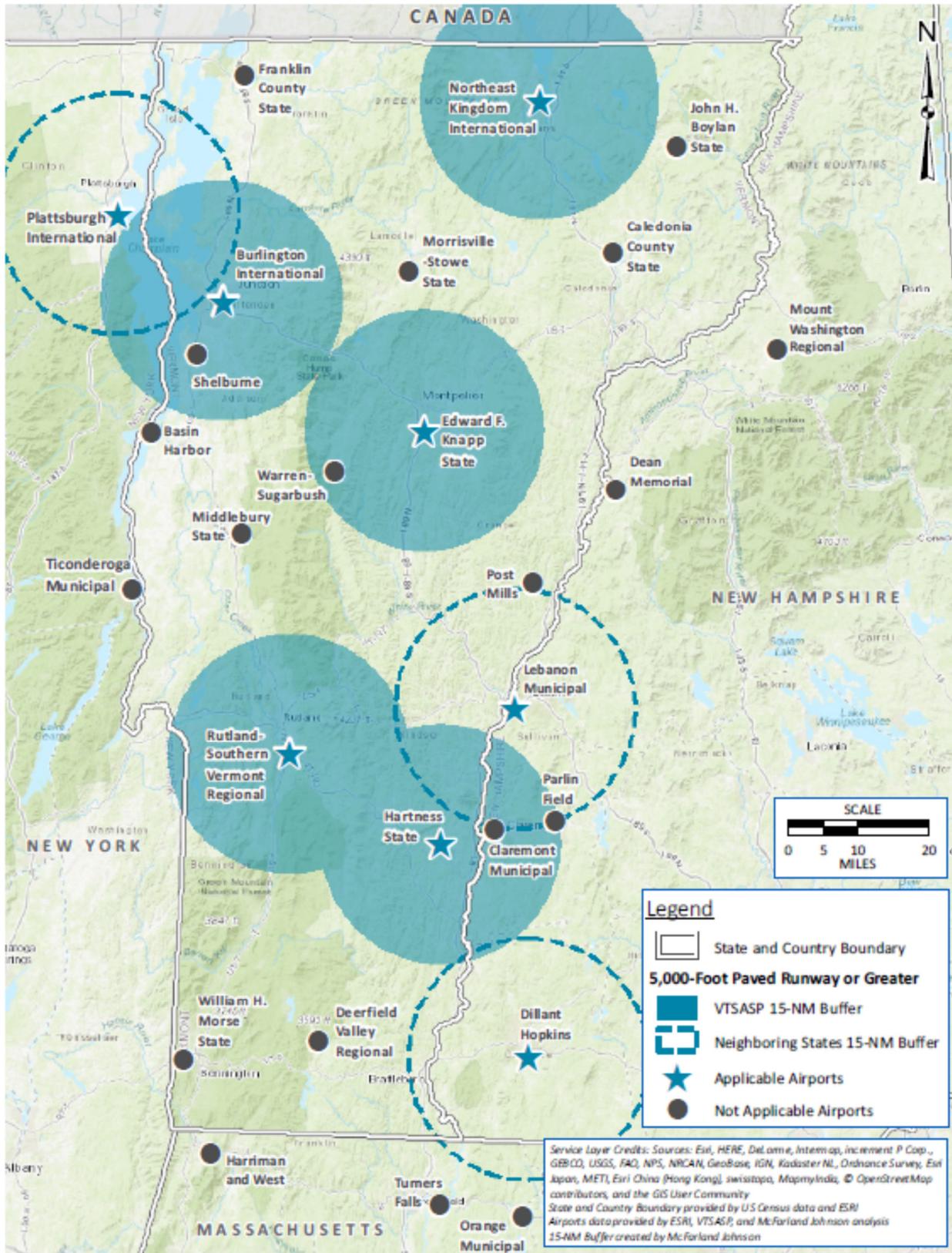
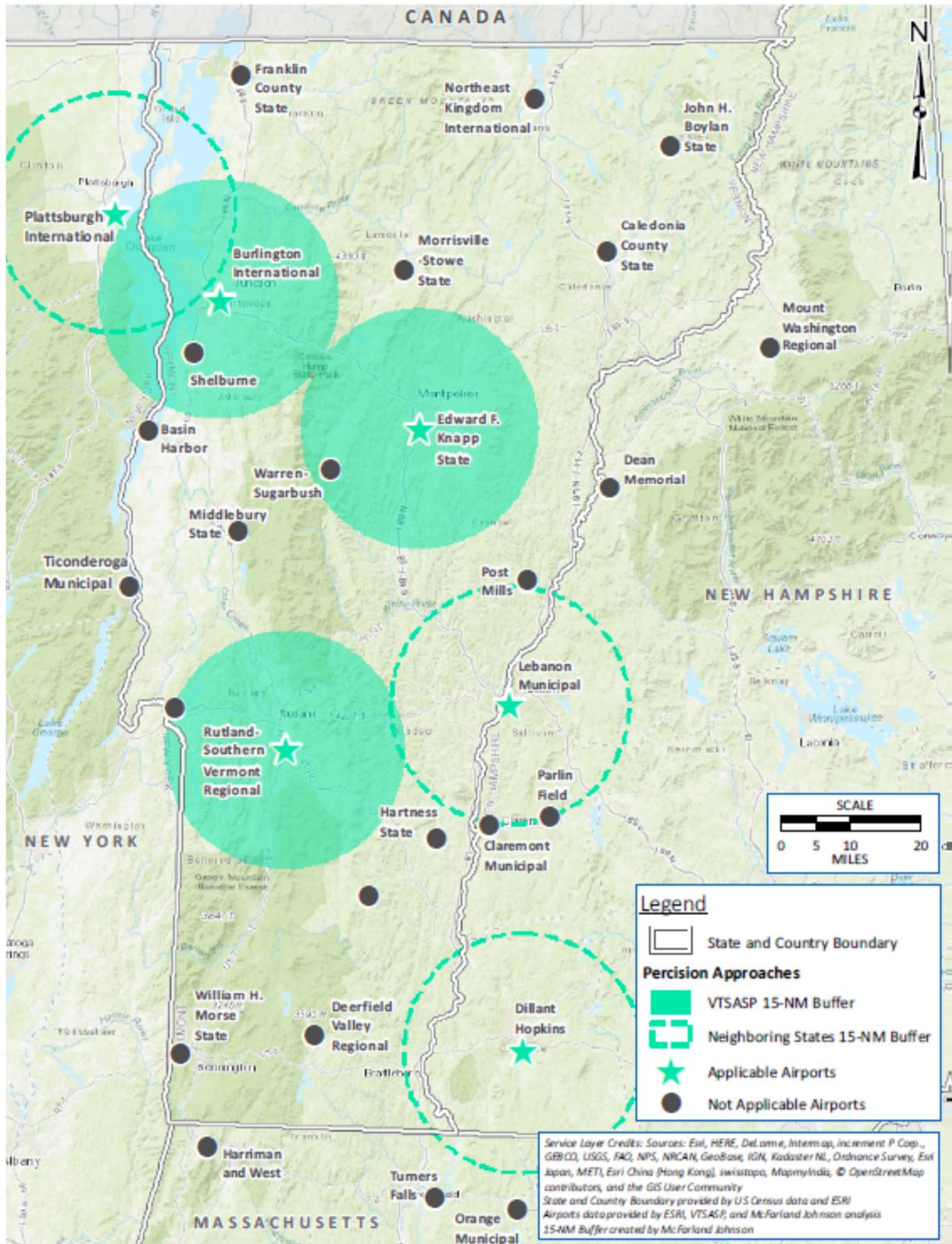


Figure 4-10: Existing Air Access Coverage - Airports with Precision Approaches



*Coverage by Airports with Non-Precision Instrument Approaches*

VTSASP airports with non-precision approach capability serve more nearly 472,000 people, or 75 percent of state population and all 44 of the top 50 employers. **Table 4-22** presents the breakdown of coverage by these system airports. **Figure 4-11** illustrates this coverage

**Table 4-22: Air Access Coverage – VTSASP Airports with Non-Precision Instrument Approach**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	6,714 SQMI	70%
Population	471,880	75%
Employment Centers	44	88%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities

*Coverage by Airports with On-Site Weather Reporting Service/Equipment*

System airports with on-site official weather reporting service combine to serve 78 percent of the state population and 42 of the top 50 employers. **Table 4-23** presents the breakdown of coverage by these system airports. **Figure 4-12** illustrates this coverage.

**Table 4-23: Air Access Coverage – VTSASP Airports with On-Site Weather Reporting Service/Equipment**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	6,991 SQMI	73%
Population	488,659	78%
Employment Centers	42	84%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities

*Coverage by Airports with AvGas (100LL) Fueling Services*

System airports offering Avgas fuel service combine to serve more than 79 percent of the state’s population and 43 of the 50 top employers. **Table 4-24** presents the breakdown of coverage by these system airports. **Figure 4-13** illustrates this coverage.

**Table 4-24: Air Access Coverage – VTSASP Airports AvGas (100LL) Fueling Service**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	7,056 SQMI	73%
Population	494,327	79%
Employment Centers	43	86%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities

Figure 4-11: Existing Air Access Coverage - Airports with Non-Precision Approaches

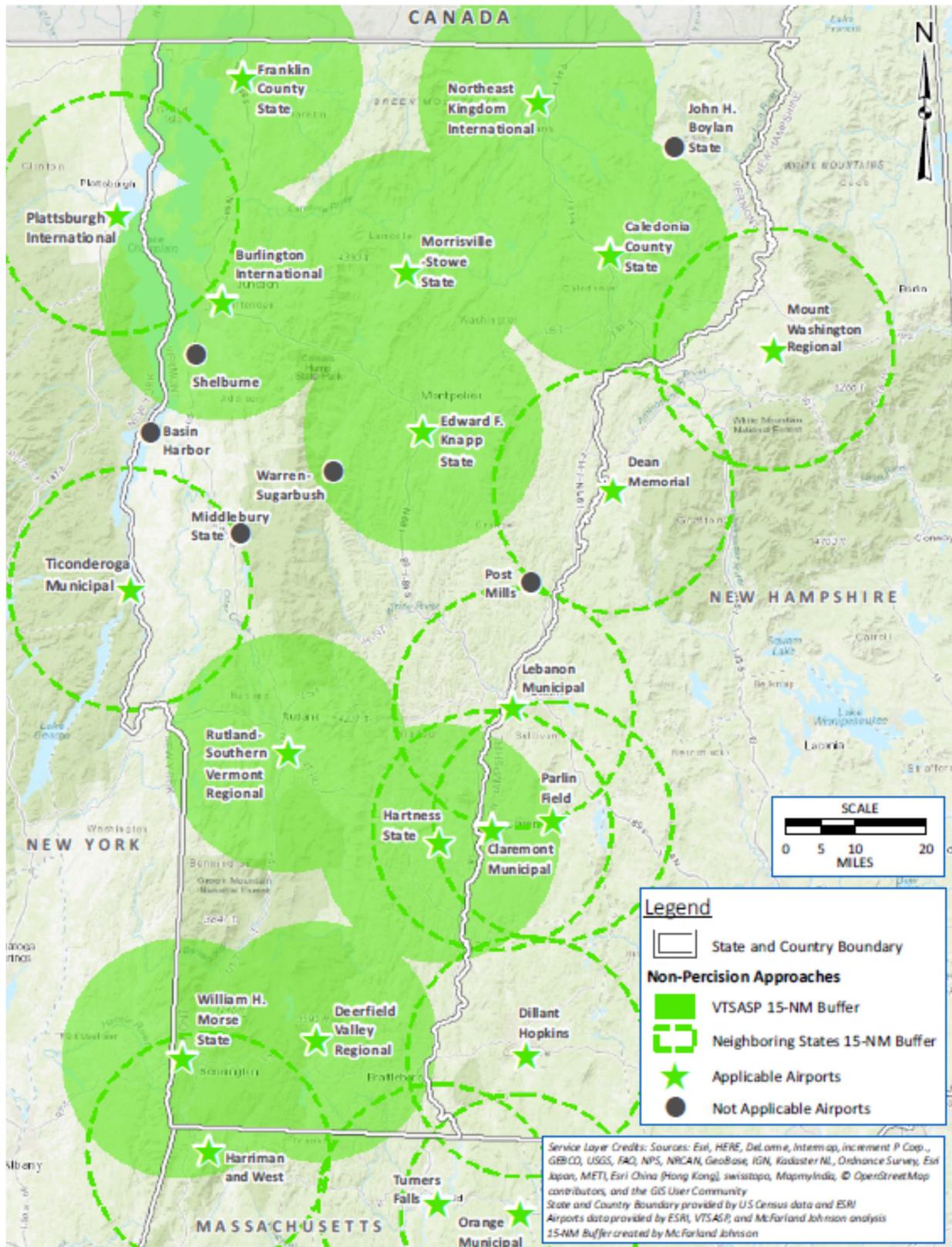


Figure 4-12: Existing Air Access Coverage - On-Site Weather Reporting Service

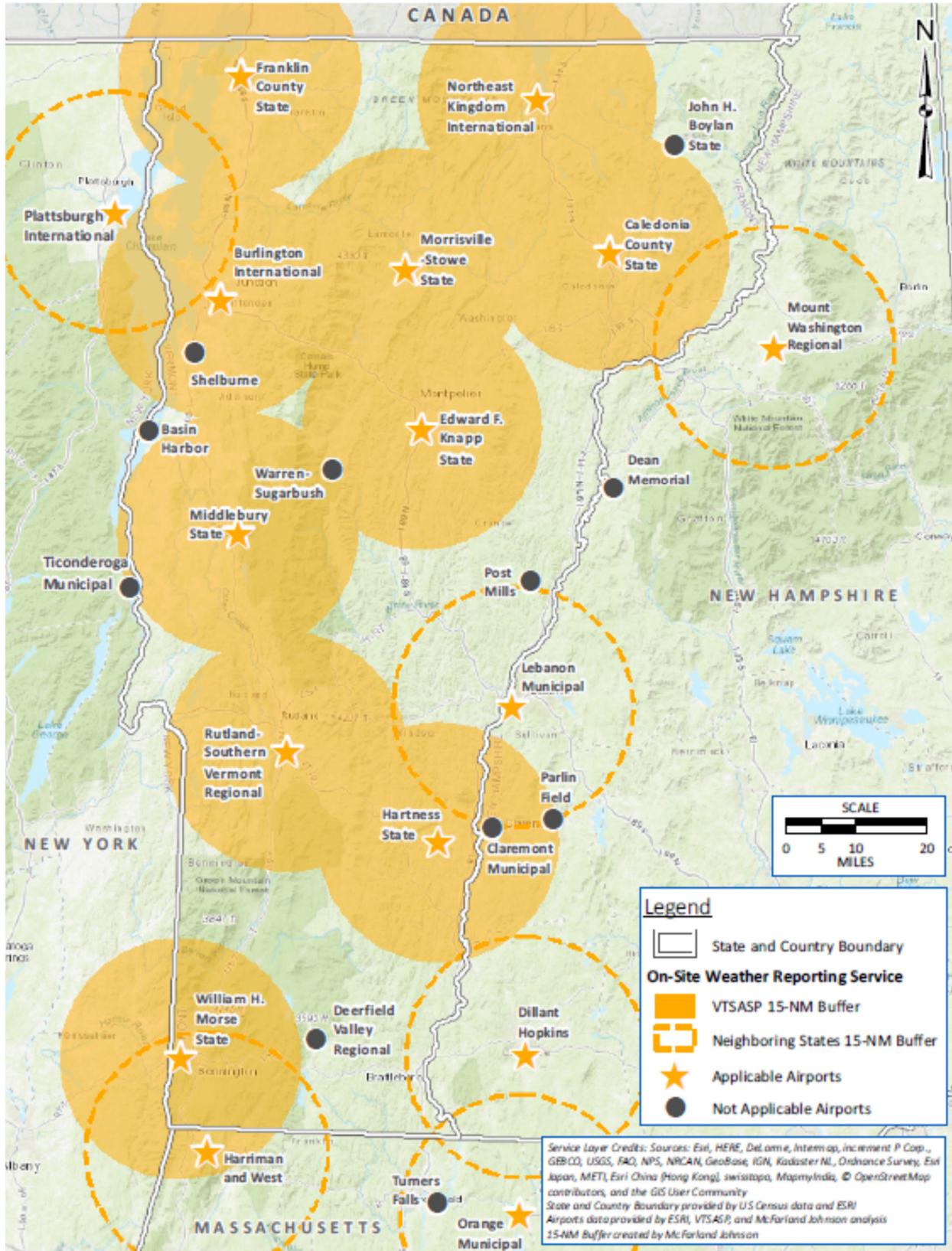
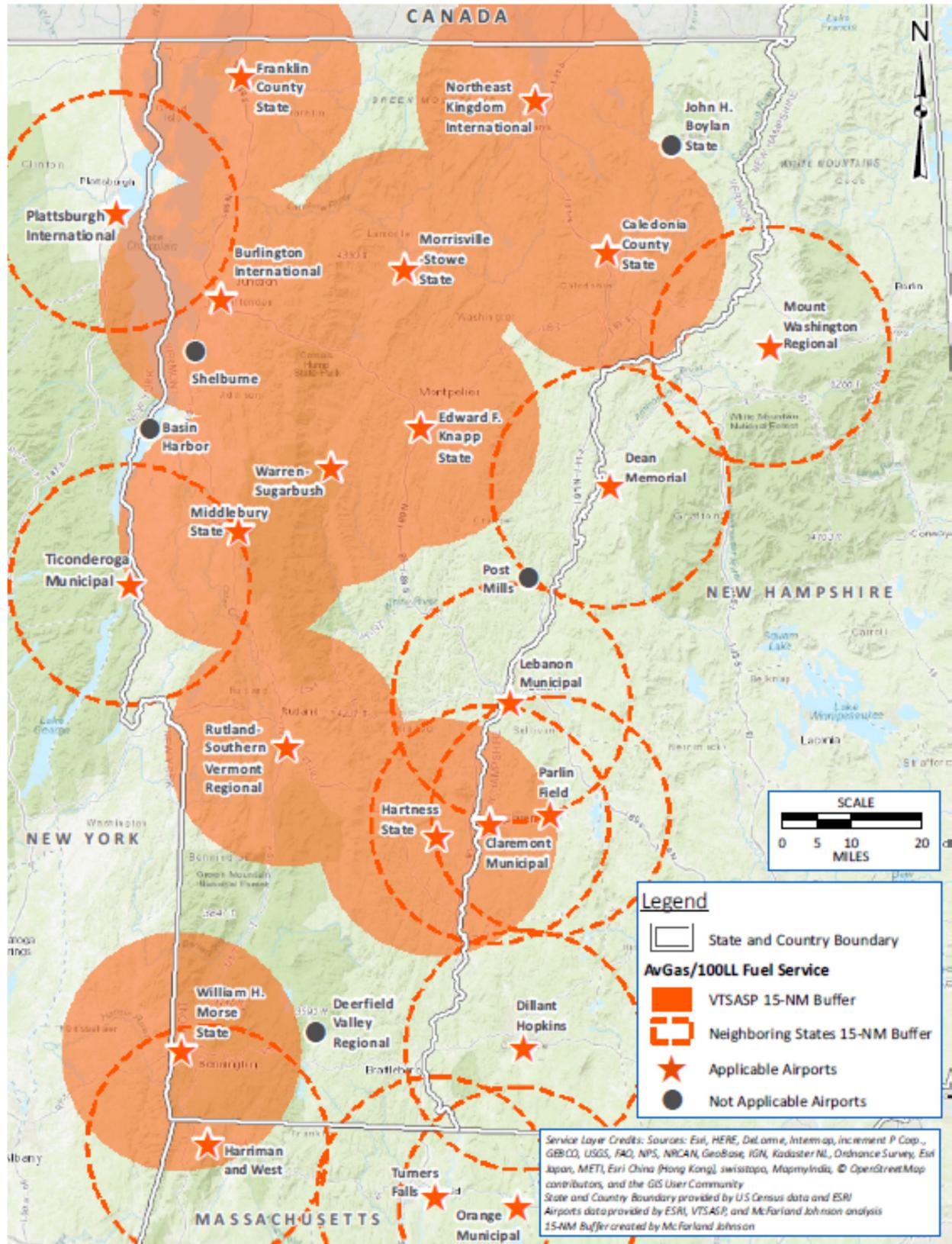


Figure 4-13: Existing Air Access Coverage - AvGas/100LL Fuel Service



*Coverage by Airports with Jet A Fueling Services*

System airports offering Jet-A fuel service combine to serve roughly 69 percent of the state’s population and 39 of the top 50 employers. **Table 4-25** presents the breakdown of nautical mile coverage by these system airports. **Figure 4-14** illustrates this coverage.

**Table 4-25: Air Access Coverage – VTSASP Airports Jet A Fueling Service**

Metric	Coverage <sup>1/</sup>	Coverage (% Total) <sup>1/</sup>
Land Area	5,438S QMI	57%
Population	430,118	69%
Employment Centers	39	78%

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities.

*Neighboring State Air Access Coverage in Vermont*

Air access for neighboring state airports was also assessed to measure the geographic reach into Vermont for the same air access features. **Table 4-26** presents the airports considered.

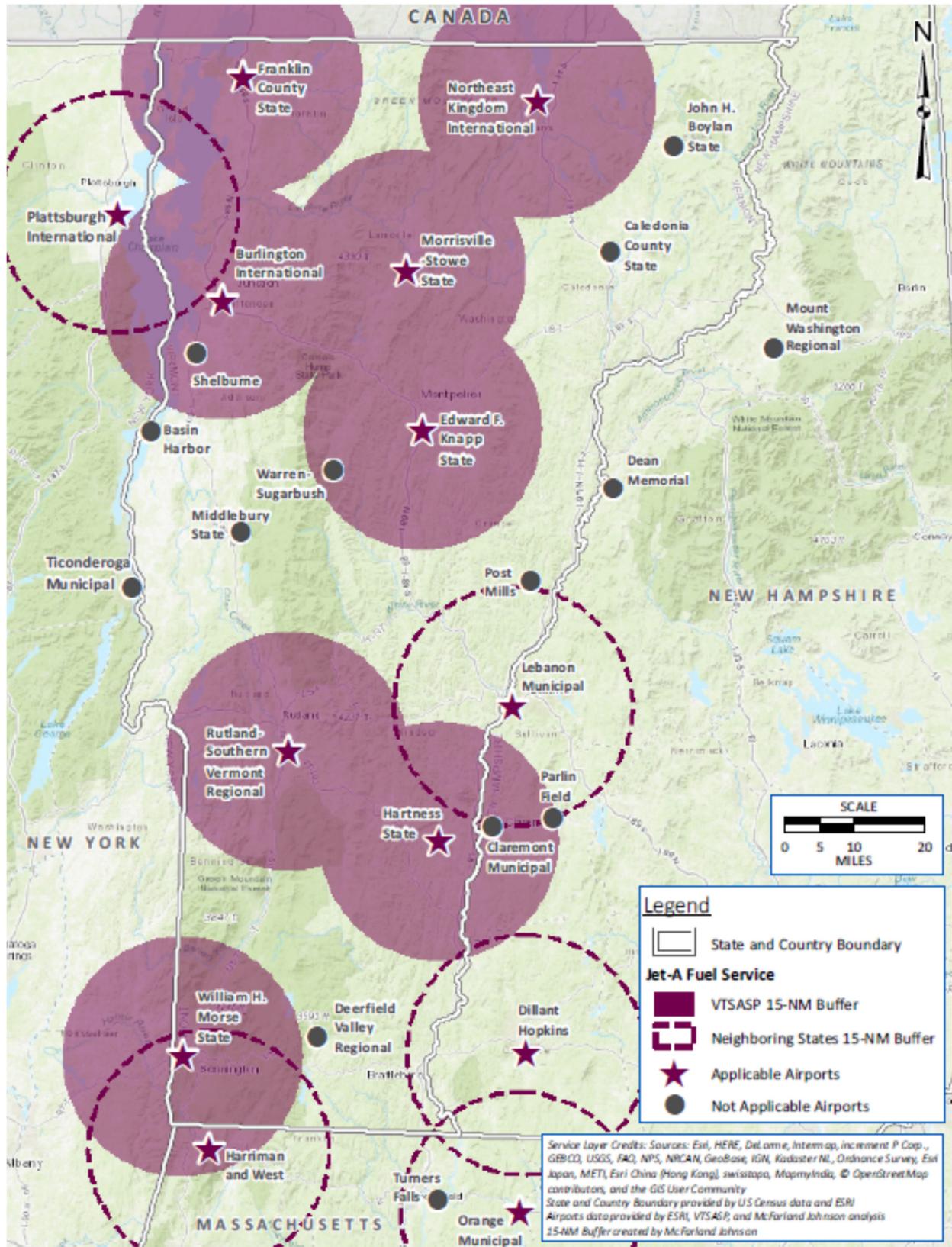
**Table 4-26: Neighboring State Airports - Air Access Coverage by Infrastructure, Equipment, & Service Offered**

Airport	≥4,000' Runway	≥ 5,000' Runway	Precision Approach	Non-Precision	On-Site Weather	100LL Fuel	Jet A Fuel
<b>New York</b>							
Plattsburgh International	✓	✓	✓	✓	✓	✓	✓
Ticonderoga Municipal				✓		✓	
<b>New Hampshire</b>							
Mount Washington Regional				✓	✓	✓	
Dean Memorial				✓		✓	
Lebanon Municipal	✓	✓	✓	✓	✓	✓	✓
Parlin Field				✓		✓	
Claremont Municipal				✓		✓	
Dillant Hopkins	✓	✓	✓	✓	✓	✓	✓
<b>Massachusetts</b>							
Orange Municipal	✓			✓	✓	✓	✓
Harriman & West	✓			✓	✓	✓	✓
Turners Falls				✓		✓	

Source: Airnav.com, 2017

Air access coverage into Vermont by neighboring states’ airports is illustrated in **Figure 4-8** through **Figure 4-14** along with VTSASP airports for comparison purposes.

Figure 4-14: Existing Air Access Coverage - Jet-A Fuel Service



Airports such as Albany International, Lake Placid, and Floyd Bennett Memorial in New York State, and Plymouth Municipal, Hawthorne-Feather, and Jaffrey-Silver Ranch in New Hampshire were included in the analysis because they offer various infrastructure, equipment, and services evaluated for air access coverage in Vermont. However, these airports are all beyond a 15-nautical mile distance from Vermont and were therefore not considered further.

Table 4-27 presents the results of the air access coverage analysis for neighboring state airports.

**Table 4-27: Neighboring State Airports - Air Access Coverage**

Metric	Land Area Coverage <sup>1/</sup>	Population Coverage <sup>1/</sup>	Employment Center Coverage <sup>1/</sup>
Airports with a Primary Runway Length ≥ 4,000-feet	1,094 SQMI (11%)	119,320 (19%)	6 (12%)
Airports with a Primary Runway Length ≥ 5,000-feet	837 SQMI (9%)	100,442 (16%)	4 (8%)
Airports with Precision Instrument Approaches	837 SQMI (9%)	100,442 (16%)	4 (8%)
Airports with Non-Precision Instrument Approaches	2,379 SQMI (25%)	168,883 (27%)	9 (18%)
Airports with On-Site Weather Reporting Service/Equipment	1,255 SQMI (13%)	122,016 (19%)	6 (12%)
Airports with AvGas (100LL) Fueling Services	2,379 SQMI (25%)	168,883 (27%)	9 (18%)
Airports with Jet A Fueling Services	1,094 SQMI (11%)	119,320 (19%)	6 (12%)

Source: McFarland Johnson Analysis, 2017.

<sup>1/</sup>Land Area, Population, and Employment Center Coverage refers to the portions of Vermont only and does not include coverage in neighboring airports’ host communities.

As shown in 0, neighboring states’ airports serve a range of areas, population, and employment centers in Vermont. Figure 4-8 through Figure 4-14 illustrate that neighboring state airports overlap service areas by VTSASP airports, but also serve areas of Vermont that are not within a 20-nautical miles to a VTSASP airport.

### 4.3.3. Airport System Geographic Performance Analysis Summary

In terms of geographic coverage, the Vermont State Aviation System performs at a high level, reaching approximately 93 percent of the state’s population and 44 of the top 50 employers in the state. While state population exhibits concentrations around major cities, Vermont residents are well distributed across the state. A significant portion of the top 50 employers in the state are located in the western half of the state, along Interstate 89 between Burlington and the State Capitol region, and south from Burlington along U.S. Route 7. Other major employers are those in the resort areas of Jay Peak, Killington, Mount Snow, Stowe, Stratton and others. **Table 4-28** shows ground access for each VTSASP Airport Category, and combined coverage for the statewide system of all airports.

**Table 4-28: Ground Access Coverage by VTSASP Airport Categories**

Airport Category	Land Area Coverage (% Total)	Population Coverage (% Total)	Employment Center Coverage (# of Top 50)
Category 1 Airports	11%	12%	3
Category 2 Airports	10%	35%	19
Category 3 Airports	30%	46%	18
Category 4 Airports	11%	42%	23
<b>VTSASP Coverage</b>	<b>57%</b>	<b>93%</b>	<b>44</b>

Source: McFarland Johnson Analysis, 2017.

In terms of air access provided by VTSASP airports offering key infrastructure, equipment, and services, the Vermont State Aviation System, coverage is the broadest by VTSASP airports with non-precision approaches, on-site weather reporting service, and 100LL fueling service. **Table 4-29** shows air access for VTSASP airports that provide these specific key infrastructure elements.

**Table 4-29: Air Access Coverage by VTSASP Airport Categories**

Air Access Coverage Metric	Land Area Coverage (% Total)	Population Coverage (% Total)	Employment Center Coverage (# of Top 50)
VTSASP Airports - Runway Length ≥ 4,000-feet	42%	57%	31
VTSASP Airports - Runway Length ≥ 5,000-feet	42%	57%	31
VTSASP Airports - Precision Instrument Approach	27%	46%	29
VTSASP Airports - Non-Precision Approach	70%	75%	44
VTSASP Airports - On-Site Weather Reporting Service/Equipment	73%	78%	42
VTSASP Airports - AvGas (100LL) Fueling Services	73%	79%	43
VTSASP Airports - Jet A Fueling Services	57%	69%	39

Source: McFarland Johnson Analysis, 2017.