Vermont Airport System Plan

DRAFT

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Executive Summary

SYSTEM PLAN BACKGROUND

The Vermont Airport system Plan (VASP) is the Vermont's Agency of Transportation's (AOT) statewide 20-year strategic plan for developing and maintaining the State's 16 public-use airports. The VASP is updated every ten years and is required for eligible airports to receive federal aviation funding. This Plan will update the 2007 Airport system and Policy Plan, consistent with Federal Aviation Administration (FAA) planning guidance. The overarching goal of the VASP is to provide a framework that supports informed decision-making related to the development of Vermont's Airport system. These decisions play an important role in ensuring that the State's public-use airports support the needs of residents and businesses and contribute to the nation's Airport system.

A system plan provides detailed assessments and evaluations of aviation needs, and recommendations that serve as a foundation to guide the development of individual airport master plans, which provide more specific details on improvements and layout plans. A listing of individual airport master plans will be developed at the conclusion of the VASP and will be posted at - http://vtrans.vermont.gov/aviation.

VASP PLAN PROCESS

The VASP will be developed in compliance with FAA Circular # 50/5070-7 (The Airport System Planning Process), which provides guidance on how to conduct statewide airport planning. The 2007 Airport System Plan's vision, mission, and goals were also reviewed to help drive the system's ability to meet future needs. This resulted in a two-component approach to the VASP that culminated in a series of recommendations to communicate the results of the VASP to airports, aviation stakeholders, and the public.

The two core components to the VASP are as follows:

Airport System Component – a data-driven technical evaluation of current and future needs, which culminates with a recommended development plan that identifies a prioritized, strategic approach for developing facilities at system airports over the 20-year planning period.

Policy Component - the identification and analysis of policy-related recommendations that can improve the performance of Vermont's airport system and allow it to better meet the needs of system users, residents, and businesses.

System Component

The System component of the VASP consists of compiling inventories of various airport characteristics and evaluating current and future system needs based on established facility and service objectives. The process is detailed graphically and descriptively below:

- Facility and Service Objectives – The initial task in the development of a system plan is establishing the framework for the desired airport system in terms of facilities and services provided. Establishing facility and service objectives will serve as the benchmark to measure the effectiveness of the current and future system.

- Inventory - To establish the baseline for the subsequent analysis and recommendations, a comprehensive system-wide inventory of system airports and aviation assets is undertaken. The inventory analysis focused on the elements identified in the facility and service objectives as well as collecting data needed for the analysis on airport economic benefits.

- Current System Performance – Inventory data is measured against the facility and service objectives, which serve as minimum requirements. The analysis identifies the airports that do not meet the desired objectives, and places airports into categories that reflect existing conditions and each system airport's role in the statewide system. The analysis provides a quantitative measure of how the system is performing based on the established objectives, including geographic service areas for each airport.

- Forecast – The forecasts developed as part of the system plan focus on the bigger picture, state-level indicators of existing aviation activity such as the number of based aircraft and overall socioeconomic conditions. These indicators inform the development of realistic forecasts of future activity at public-use airports.

- Future System Performance - The deficiencies identified in the current system performance are combined with the forecast for an analysis of potential changes to the airport system. Proposed changes in the Vermont airport system are reevaluated to demonstrate how the system will perform against the same desired objectives in the future.

Policy Component

The Policy component of the VASP examines aviation in the broader context of state goals and investigates current and likely future issues to affect Vermont's Airport system. This assessment of policy issues will guide the development of state aviation goals and strategies to meet the future aviation needs of the State.

STAKEHOLDER AND PUBLIC PARTICIPATION

Throughout the planning process, a collaborative effort was emphasized to obtain input on findings, policy issues, and recommendations. Public outreach consisted of a series of regional

Some policy issues to be addressed include:

- Aviation's Integration with Other Transportation Modes
  - Passenger interlining
  - Freight needs
- Land Use-Built Environment Linkages
  - Growth of airports and impacts to surrounding communities and environments
  - Protecting airports from encroachment from incompatible land uses via zoning
  - Understanding limits of airport growth with surrounding built-up areas
- Economic Impacts
  - Economic impacts of airports on local and regional economies, and the state's economy.
- Financial Sustainability
  - Budget impacts of capital investments, operations and maintenance
  - Private sector involvement in financing airport improvements
  - Incorporating financial sustainability into project prioritization
- Project Prioritization
  - How to target investments
  - How to address FAA requirements / priority focus areas with other priorities, such as economic development.
- Performance Measures
  - Incorporating broader socio-economic performance measures.
- State and Federal Policies Affecting Aviation
  - Funding priorities
  - Pre-construction issues (i.e. permitting, Right-of-Way)
  - Public-Private Partnerships
- Purpose and Role of Aviation in Vermont
  - Local, regional, and state economic development
  - Contribution to the national Airport system
  - Emergency and disaster response, military use, medical transportation.
- Technological Developments
  - Preparing for evolving technologies such as Next Generation Aircraft System (NextGen)
  - Supporting emerging technologies

public input meetings throughout the planning process, outreach with individual airport officials, and coordination with the Vermont Aviation Advisory Council (VAAC), who will serve as the project advisory committee for the Plan's development.

Regional input meetings provided an opportunity for interested parties to learn more about the System Plan, aviation in general, and allow for input throughout the different phases of the VASPs development. The presentations and summaries of these meetings can be found at http://vtrans.vermont.gov/aviation/vermont-airport-system-plan

The focus of outreach with airport officials was to collect information on airport facilities and aviation activity patterns and volumes. In addition, the visits provide an opportunity to gain a firsthand understanding of the issues and needs that are specific to each airport being analyzed as part of the VASP.

The VAAC is an executive-appointed council tasked with evaluating policy and making aviation recommendations to AOT. Its members include aviation stakeholders from across the state with a broad range of knowledge and experience in airports, aviation, and other statewide issues impacting the state Airport system. Each stakeholder group provided a broad range of knowledge and experience that helped to inform the recommendations of the VASP.

AIRPORTS IN VERMONT

Vermont's public-use airport system consists of 16 airports, 10 of which are state-owned, 1 which is municipally-owned, and which are 5 privately-owned. Twelve public-use airports are part of the National Plan of Integrated Airport Systems (NPIAS) The NPIAS consists of a network of approximately 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive federal funding under the Airport Improvement Program (AIP). In addition, two airports (Burlington International Airport and Rutland-Southern Vermont Regional Airport) are classified by the FAA as Commercial Service Airports (publicly-owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service) while the other fourteen are classified as General Aviation Airports (public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings).

Beyond their national significance and designation, Vermont's public-use airports are a critical component of local, regional and the State's economy. These airports are used for a variety of purposes, including passenger transportation, recreational flying, on-airport employment, education and training, medical flights, and disaster response activities.

Vermont's airports also support essential services, such as military flights, emergency medical flights, and disaster response. During Tropical Storm Irene, highways and railways sustained damage and cut off substantial parts of the State from essential services and supplies. Vermont's airports served as staging sites and communication centers that coordinated logistics among emergency response teams, first responders, the National Guard, and other entities participating in disaster response activities.

Like many modes of transportation, funding levels do not cover all airport needs. Airports require both capital investments to maintain and expand infrastructure and undertake safety projects, as well as operating funding to maintain the infrastructure. As part of this Plan Update, the State's airport projects prioritization system will be evaluated to determine whether any changes are needed to align program and project outcomes with aviation system goals.

AIRPORT CATEGORIES

To reflect the various levels of airports in the Vermont Airport system, it follows that each airport has a role in the system, which can be categorized based upon facility infrastructure and services offered. Defining these categories aids the system planning process by providing a benchmark of minimum facilities and services that enable each airport to meet the current and future demand of users that rely on them.

The VASP airport roles are defined as follows:

Category 1 Airports: Category 1 Airports are those facilities that provide a basic level of facilities and services that are best suited to serve single engine piston and light twin engine aircraft. In Vermont, these airports may close during winter months or be attended for irregular hours, provide air access to vacation destinations such as ski resorts and golf courses, or communities that do not benefit from a nearby publicly owned airport. Some of these airports have runways that are unpaved. Services offered vary based on the discretion of the owner.

Category 2 Airports: Category 2 Airports are facilities that offer a higher level of facilities and services than Category 1 Airports, supporting more operations as access points for more active operators in their host community and surrounding areas. Category 2 Airports typically have equipment that enhances safety of use during inclement weather, and complimentary facilities and services that may be able to accommodate smaller jet aircraft during favorable conditions.

Category 3 Airports: Category 3 Airports are those airports that can accommodate jet activity during a broader range of weather conditions and serve as regional gateways for activities such as corporate aviation, charter services and small cargo-feeder operations. These airports generally offer a greater variety of facilities and services than Category 2 Airports that can service a more diverse base of regular operators and aircraft.

Category 4 Airports: For the VASP, Category 4 Airports are those facilities with the most robust compliment of facilities, equipment, and services that can accommodate the full-range of aircraft in the active fleet – from small, single engine piston aircraft to passenger aircraft and airlines that operate them. Category 4 Airports offer 24-hour access during all weather conditions.

FACILITY AND SERVICE OBJECTIVES

The design of minimum and recommended facility and service objectives for each VASP category of airport is cumulative, or additive. This means that as VASP categories progress from basic to sophisticated, so also do the minimum and recommended facility and service objectives become more robust. The result of this design for the Vermont Airport system is that system airports must meet all minimums to be placed into a category. Therefore, each subsequent airport category includes the “lower-order” minimums from the previous airport category.

Category 1 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway Length (≤ 2,500') - Paved or Turf	Primary Runway (≥4,000') - Paved
Part-Time Airport Manager on Site (Seasonal OK)	Full-Time Airport Manager on Site (Seasonal OK)
Mogas or 100LL Fuel on Site	100LL Self-Service Aviation Fuel on Site
Basic Terminal Building/Shelter	Part-time Operations Staff on Site or Contracted
	Single-Service SASO or Full-service FBO on Site at Least Part-Time
	Lighted Windsock
	GPS Instrument Approach Procedure

Category 2 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway (≥4,000') – Paved	Primary Runway (≥5,000')
100LL Self-Service Aviation Fuel on Site	100LL AND Jet-A Self-Service Aviation Fuel on Site
Full-Time Airport Manager on Site (Seasonal OK)	Full-Time Airport Manager on Site
Part-time Operations Staff on Site or Contracted	Full-Time Operations Staff on Site
Single-Service SASO or Full-service FBO on Site at Least Part-Time	One Full-Service FBO on Site Full-Time
Lighted Windsock	Runway and Taxiway Edge Lights
GPS Instrument Approach Procedure	GPS Instrument Approach Procedure with Vertical Guidance
	Terminal Building with Pilot and Visitor Amenities
	Own/Operate Snow-Removal Equipment
	Aircraft/Avionics Maintenance Services on Site
	Rotating Airport Beacon

Category 3 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway (≥5,000')	On Site Concessions or Restaurant
Full-Time Airport Manager on Site	Precision Instrument Approach (ILS /CAT I)
Full-Time Operations Staff on Site	Rental Cars
Terminal Building with Pilot and Visitor Amenities	No system-wide recommended Facilities & Service Objectives related to Scheduled Passenger Service.
100LL AND Jet-A Self-Service Aviation Fuel on Site	
One Full-Service FBO on Site Full-Time	
Runway and Taxiway Edge Lights	
Rotating Airport Beacon	
Own/Operate Snow-Removal Equipment	
Aircraft/Avionics Maintenance Services on Site	
GPS Instrument Approach Procedure with Vertical Guidance	

Category 4 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Terminal Building - Full-Time Passenger and/or Cargo Handling Capabilities (TSA, Customs, etc.)	There are no system-wide recommended Facilities & Service Objectives for Category 4 Airports. Most appropriate for Airport Master Plans to address requirements based on passenger service demand.
Scheduled Air Passenger/Cargo Service	
Intermodal Transportation Connections at/near Site	
On Site Concessions or Restaurant	
Airport Security Measures (SIDA, Badging, Staff etc.)	
Aircraft Rescue and Firefighting (ARFF)	
Precision Instrument Approach (ILS/CAT I)	
Aircraft/Avionics Maintenance Services on Site	
Rental Cars	

INVENTORY

A comprehensive inventory of the Vermont Airport System's physical infrastructure was critical to developing baseline performance and fundamental knowledge for the VASP. The inventory effort relied upon site visits, an extensive survey effort, regional meetings, and face-to-face interviews to build the most up-to-date information for each system airport. The following summarizes the key findings about the existing system of Vermont airports.

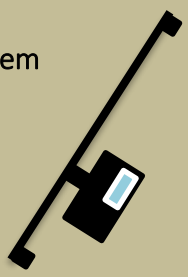
RUNWAYS

- 10 Airports have Runway Edge Lighting
- 6 Airports do not have Runway Lighting
- 5 Runways over 5,000' (Jet Activity)
- 5 Airports have Crosswind Runways
- 4 Unpaved Runways
- 1 Airport has a Turf Crosswind Runway

12 of 16 Airports are Part of the National Plan of Integrated Airport Systems (NPIAS)

TAXIWAYS

- 5 Airports have turnarounds at Runway End
- 4 Airports have a Partial Parallel Taxiway System
- 3 Airports have Parallel Taxiways
- 1 Airport has a Partial Parallel Taxiway
- 1 Airport has Taxiway Lighting



Airports with turnarounds only or stubs connecting to aprons require aircraft to back-taxi to either depart or taxi to the apron upon landing

LANDSIDE FACILITIES

Airport	Tie-Downs	Conventional Hangars	T- Hangars
Burlington International	18	4	12
Caledonia County	21	6	8
Edward Knapp	39	31	0
Franklin County	41	38	4
John H Boylan	10	3	0
Middlebury	73	11	12
Morrisville-Stowe	25	1	19
Northeastern Kingdom	56	16	0
Warren-Sugarbush	4	5	0
William H Morse	40	2	20

SERVICES

11 Airports offer AvGas Fueling Services

11 Airports Provide FBO Services

10 Airports have Aircraft Maintenance Services

9 Airports offer Flight Instruction

8 Airports offer Jet-A Fueling Services

11 Airports offer 24-hour fueling through self-service facilities

ACTIVITY HIGHLIGHTS

Airport	Based Aircraft	Aircraft Operations	Passenger Enplanements
Burlington International	79	70,800	593,311
Shelburne	53	-	-
Edward Knapp	52	24,125	-
Franklin County	88	12,600	-
Warren-Sugarbush	-	17,620	-
Rutland Southern	-	12,382	5,120

**Additional Non-VASP Airports have 68 based aircraft*
(-) Denotes low figures not mentioned in top activity highlights

APPROACH SUPPORT

10 Airports offer Weather Reporting

9 Airports have Airport Beacons

8 Airports offer Vertical Guidance

6 Airports have Nonprecision Instrument Approaches

3 Airports have Precision Instrument Approaches

1 Airport has an Air Traffic Control Tower

9 of 16 Airports offer instrument approaches to help pilots navigate safely in poor weather conditions

SYSTEM PERFORMANCE MODEL

The analysis of statewide Airport System airports utilized a weighted sum model to measure the performance of each system airport for the VASP. The weighted sum model is designed such that each facility and service objective within each VASP Category is assigned a relative weight that corresponds to the importance of the objective within each Category. The table below 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 VASP airport. Points are the product of the assigned value given to the airport is multiplied by the objective's weight. The purpose of the weighted performance model is to identify areas of need at the VASP category level, which can guide decision-making for the short-, mid-, and long-term periods. 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.

System Performance Model Design

Facility or Service Objective	Weight	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

System Performance Results

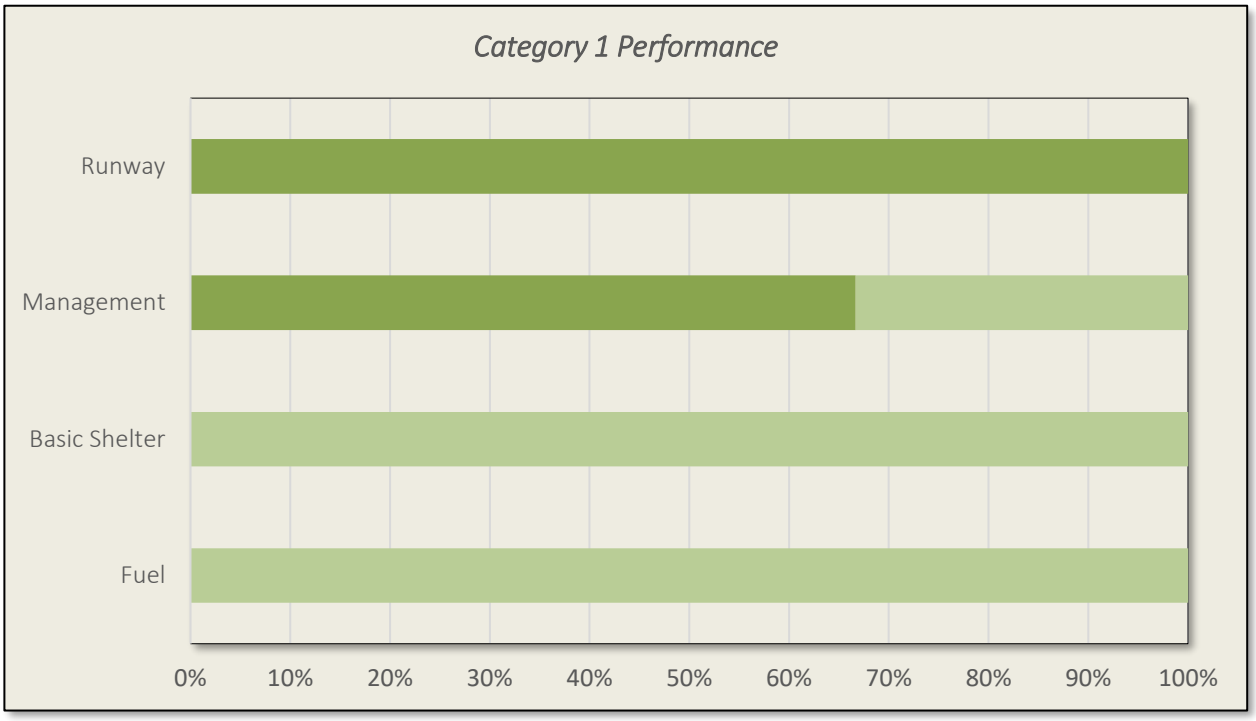
Airport	Performance Score	VASP Category
John H. Boylan State	7	1
Basin Harbor	9	1
Post Mills	12	1
Deerfield Valley Regional	17	2
Warren Sugarbush	31	2
Shelburne	36	2
Middlebury State	40	2
William H. Morse State	54	3
Caledonia County State	54	3
Morrisville-Stowe State	59	3
Franklin County State	59	3
Edward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

System Performance Results by VASP Category

Vermont Airport system airports in Category 1,2,3, and 4 were measured against the minimum facility and service objectives defined for that role. The following tables present the current performance of each category of airport in the Vermont Airport system.

Category 1 Airport Performance

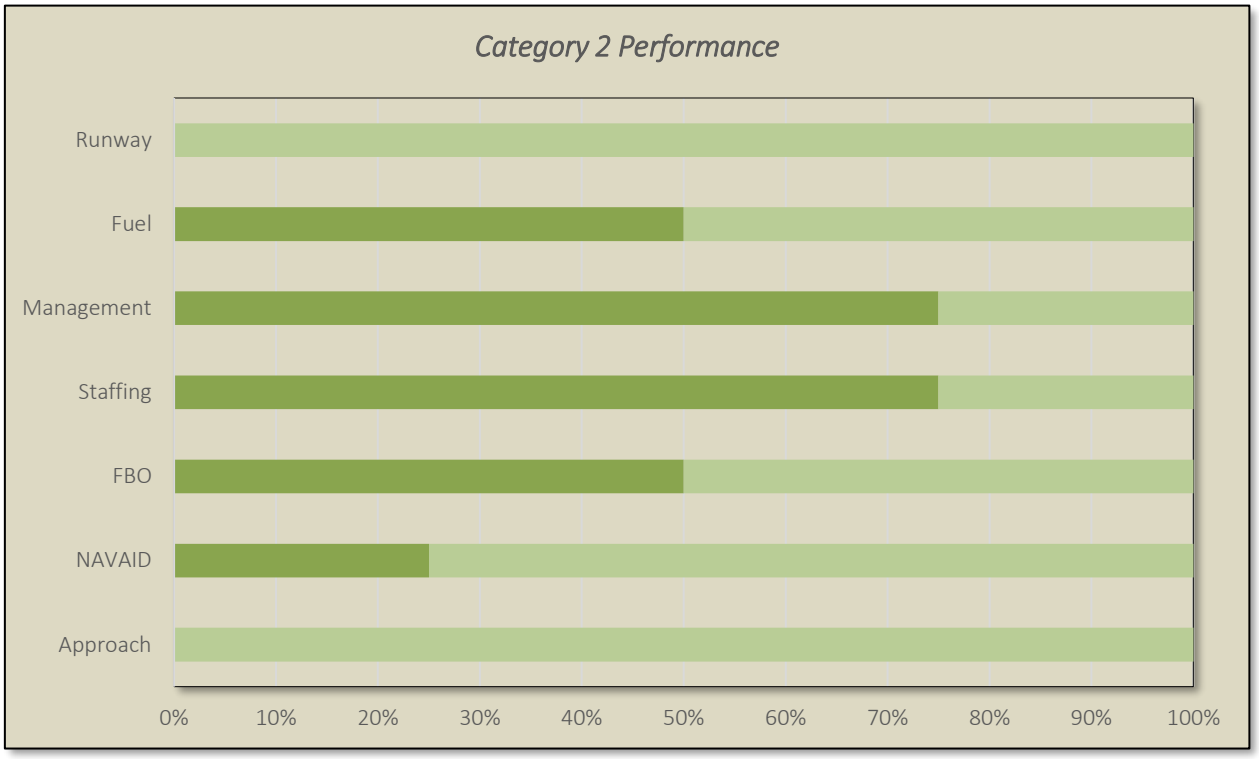
Airport	Facility & Service Requirement			
	Runway	Management	Basic Shelter	Fuel
Basin Harbor	✓	✓	x	x
John H. Boylan State	✓	x	x	x
Post Mills	✓	✓	x	x



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 Airport Performance

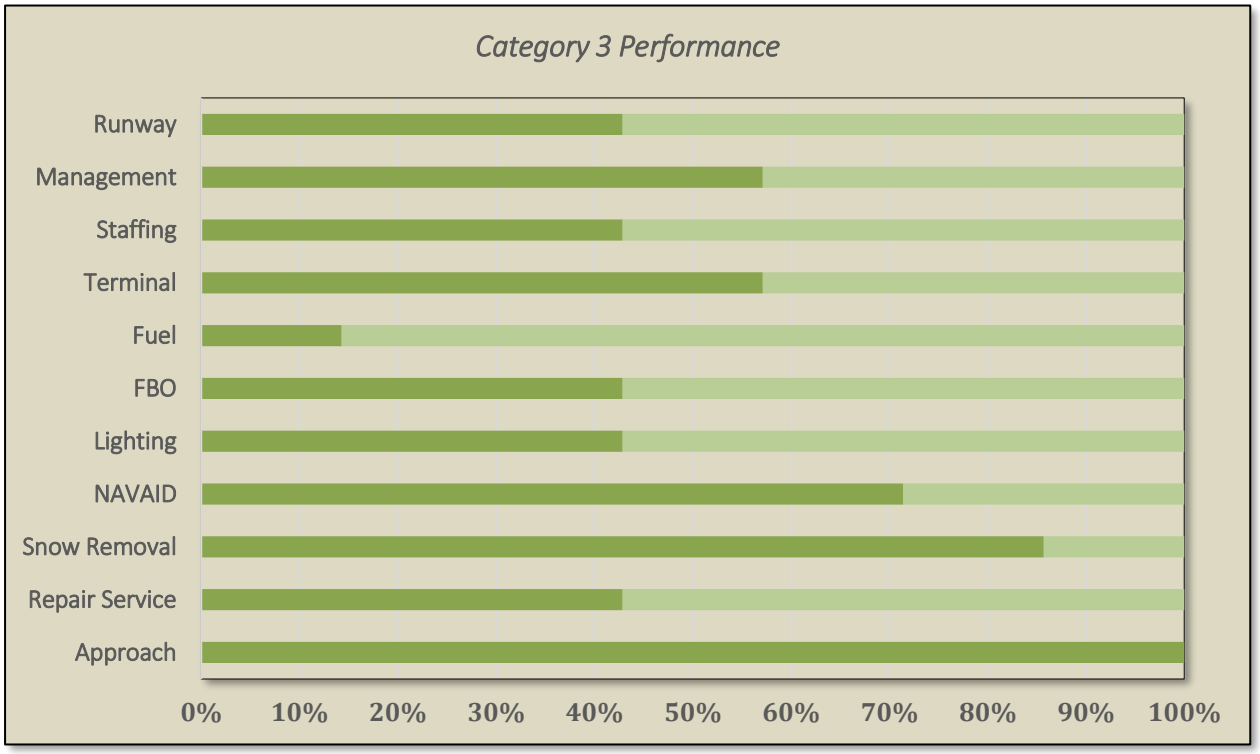
Airport	Facility & Service Requirement						
	Runway	Fuel	Management	Staffing	FBO	NAVAID	Approach
Deerfield Valley Regional	x	x	x	x	x	✓	✓
Middlebury State	x	✓	✓	✓	x	x	x
Shelburne	x	x	✓	✓	✓	x	x
Warren-Sugarbush	x	✓	✓	✓	✓	x	x



No VASP airports in Category 2 meet the minimum requirements for primary runway length (≥4,000 feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. 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 Airport Performance

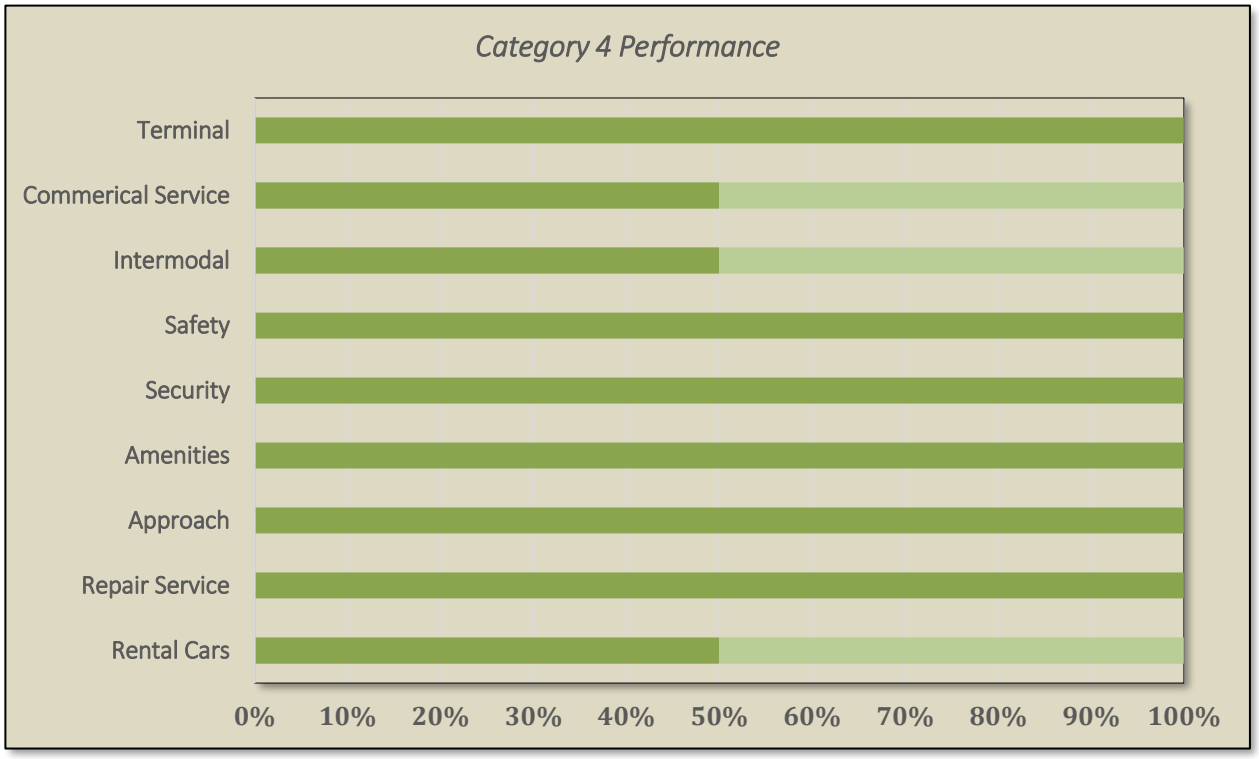
Airport	Facility & Service Requirement										
	Runway	Management	Staffing	Terminal	Fuel	FBO	Lighting	NAVAID	Snow Removal	Repair Service	Approach
Caledonia County State	x	✓	✓	✓	✓	✓	✓	✓	✓	x	✓
Edward F. Knapp State	✓	✓	✓	✓	x	✓	✓	✓	✓	✓	✓
Franklin County State	x	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓
Hartness State	✓	✓	✓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



Many of the minimum facility and service objectives are met by VASP airports in Category 3, including: airport management and operations staffing; airfield lighting; rotating beacons; snow removal equipment; and GPS instrument approaches with vertical guidance. A 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 ≥ 5,000 feet.

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



Burlington International meets all minimum facility and service objectives for Category 4 Airports. 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.

Facility and Service Performance Analysis Summary

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

VASP Category 1 Airports: All system airports in Category 1 meet the runway requirement (≥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 VASP Category 1 Airports are basic shelter facilities and 100LL fuel services.

VASP Category 2 Airports: No VASP airports in Category 2 meet the minimum requirements for primary runway length (≥4,000 feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. The primary areas of need for VASP 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.

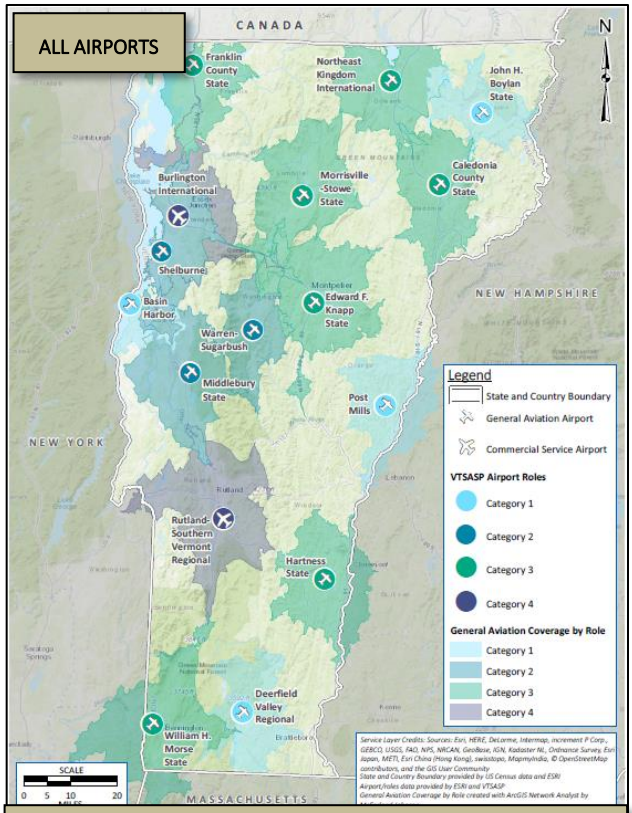
VASP Category 3 Airports: As discussed, system airports in Category 3 meet many of the minimum facility and service objectives. However, as a group, the performance and impact of these facilities is weakened due to several airports not meeting the minimum runway length requirement (≥5,000 feet). The areas of primary need for Category 3 airports are 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.

VASP Category 4 Airports: For the VASP, 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 are also further detailed 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.

Importantly, for VASP Category 2 and 3 airports, not meeting VASP minimum facility and service objectives alone is not sufficient justification for award of AIP funding for runway extensions. Further justification must be documented in an airport master plan process and in collaboration with the FAA.

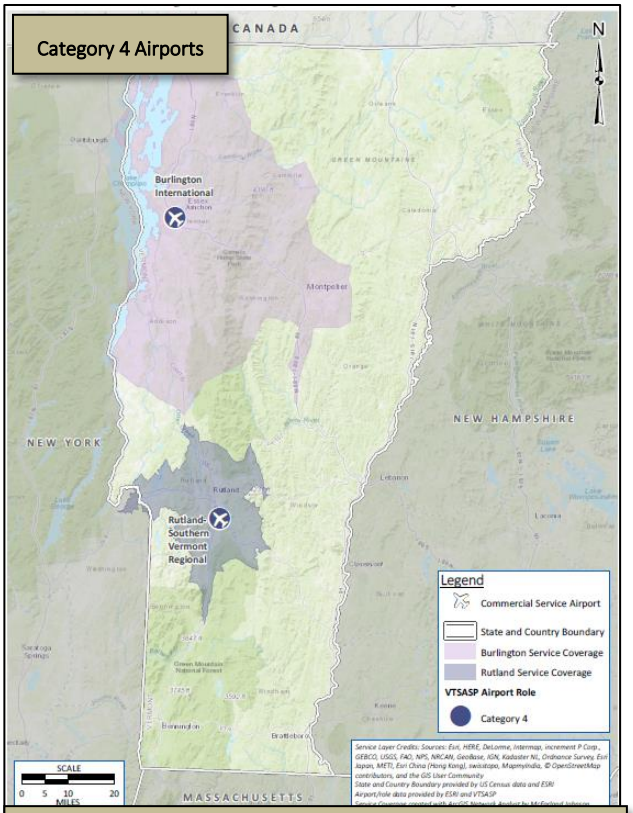
AIRPORT SYSTEM GEOGRAPHIC PERFORMANCE

Airport system geographic performance consider geographic areas of the state that are proximate to system airports as a measure of the area each airport – and each VASP Airport Category – serves. Drive times are a commonly used metric used that depicts how long it would take an airport user to reach an airport in one of the VASP categories.



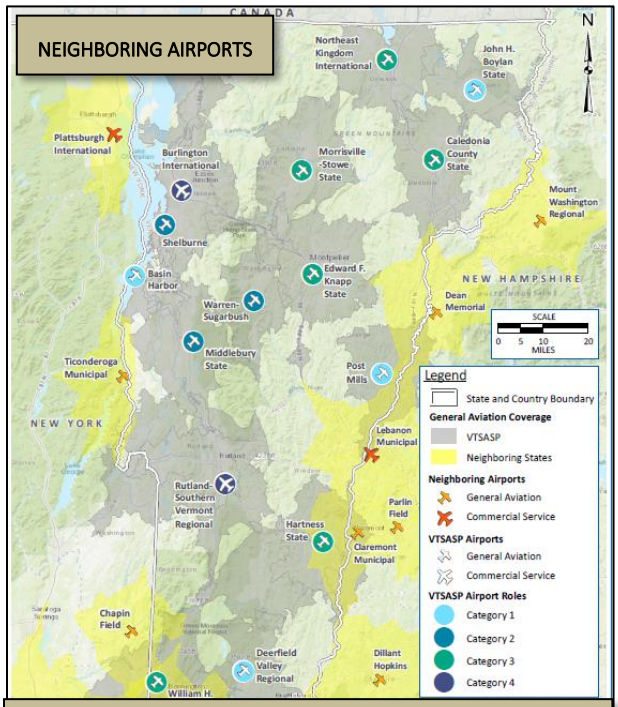
Geographic and Population Coverage: 57% and 93%, Respectively

Coverage for 44 of 50 Employment Centers



Geographic and Population Coverage: 11% and 42%, Respectively

Coverage for 23 of 50 Employment Centers

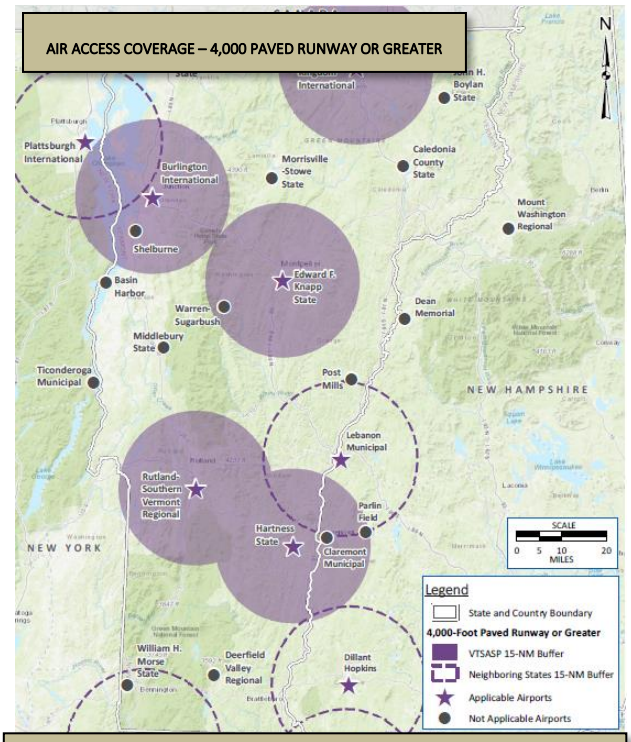


Geographic and Population Coverage: 10% and 13%, Respectively

Coverage for 4 of 50 Employment Centers

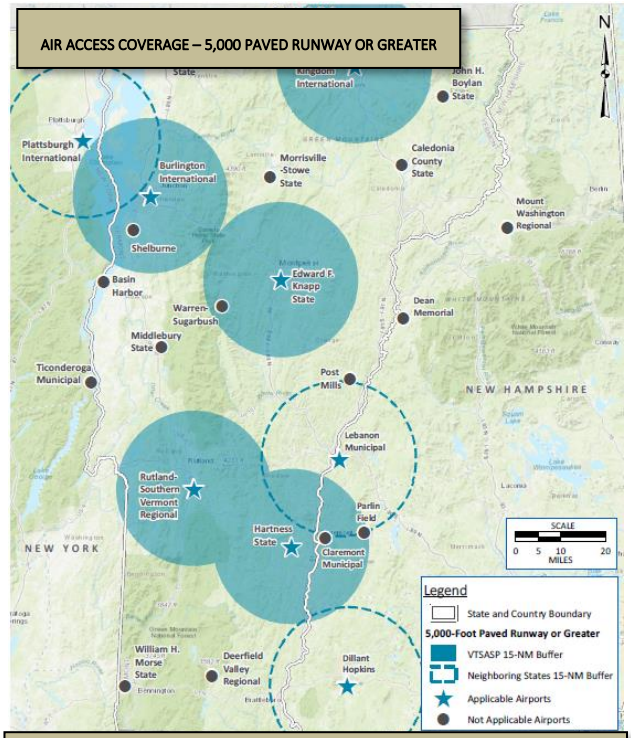
GEOGRAPHIC MARKETS

The VASP evaluated the effectiveness of system airports in serving the various geographic regions of the state. Geographic service areas were defined by 30-minute drive times for Category 1-3 airports and 60-minute drive times for Category 4 airports. The 30 and 60-minute drive times were applied to general aviation and primary airports respectively using Geographic Information Systems (GIS) software. Population and VT top 50 employers were identified within these market areas. The result is a quantifiable measure of the people and businesses that are served by the system as a whole. Additional analysis also identified general and primary airports in neighboring states to identify the geographic and population coverage these facilities provide.



Geographic and Population Coverage: 42% and 57%, Respectively

Coverage for 31 of 50 Employment Centers



Geographic and Population Coverage: 42% and 57%, Respectively

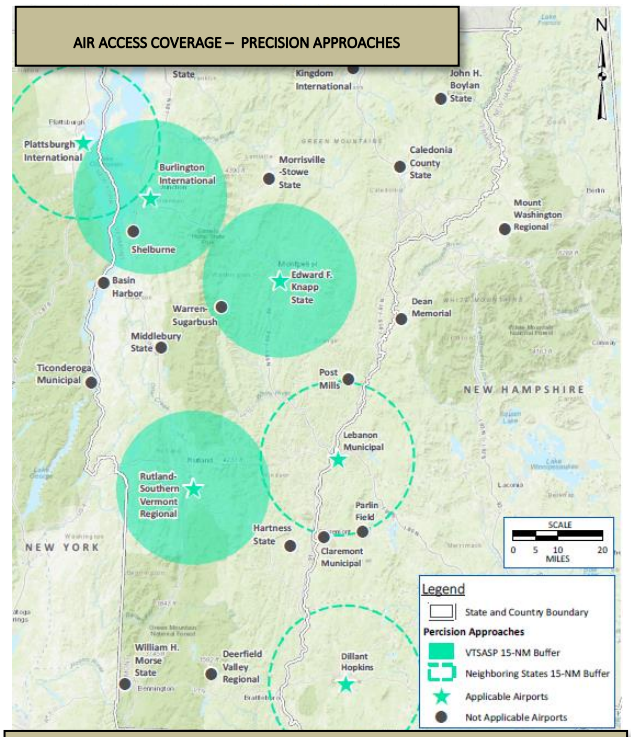
Coverage for 31 of 50 Employment Centers

DEFINING THE GAPS

Accessibility to airport infrastructure as required by business users of the state's airport system was analyzed. Seven components of airport infrastructure and service levels were selected as critical features for these users. These featured were deemed necessary for higher levels of aviation activity and air access. These seven features are:

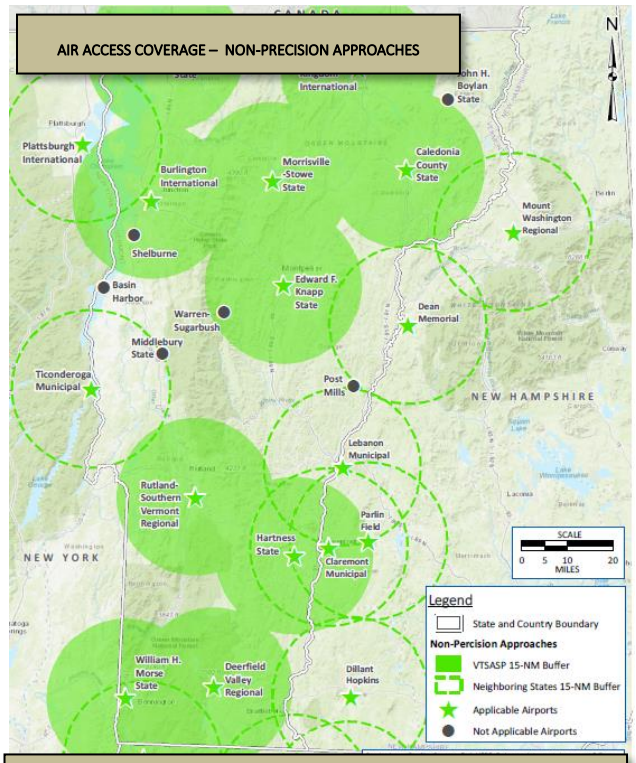
- Runways of 4,000' or greater
- Runways of 5,000' or greater
- Airports with Precision Approaches
- Airports with Non-Precision Approaches
- On-Site Weather Reporting Systems
- AvGas/100LL Fuel Service
- Jet-A Fuel Service

The evaluation of each component included the geographic area, population and any top 50 employment centers served to understand where gaps exist within the system and to what extent.



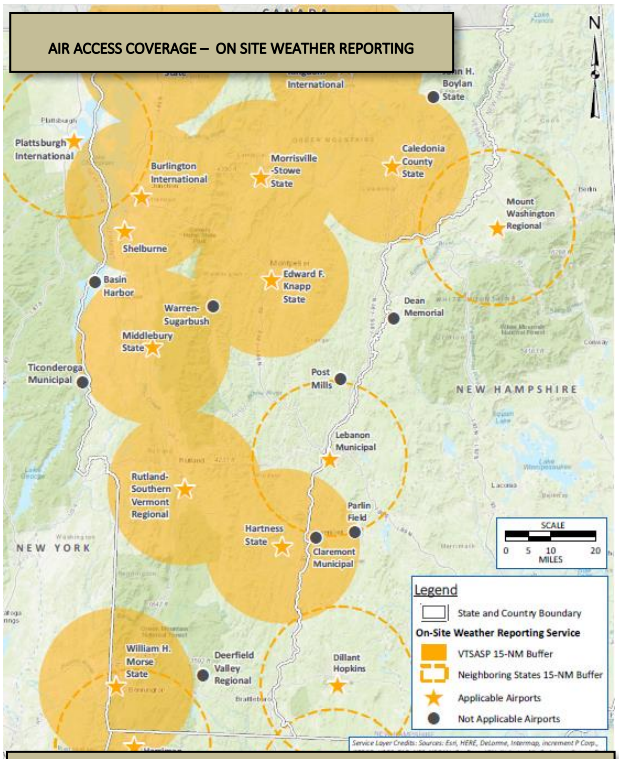
Geographic and Population Coverage: 27% and 46%, Respectively

Coverage for 29 of 50 Employment Centers



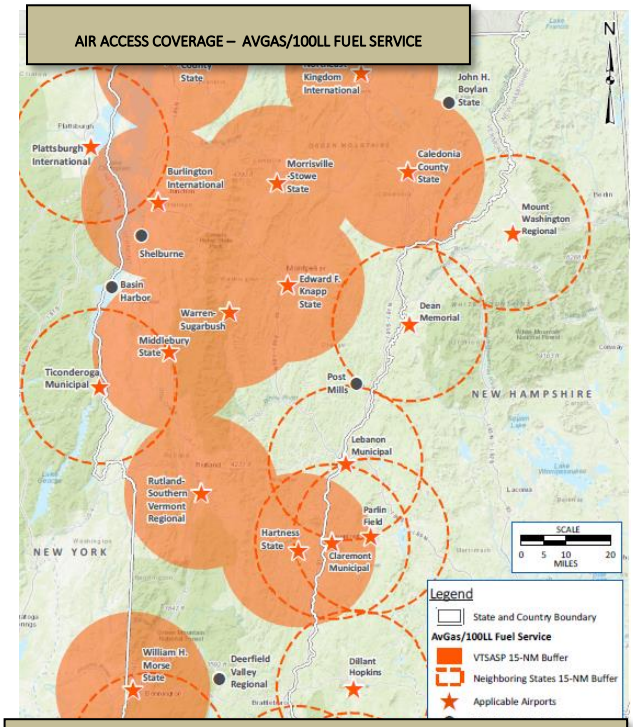
Geographic and Population Coverage: 70% and 75%, Respectively

Coverage for 44 of 50 Employment Centers



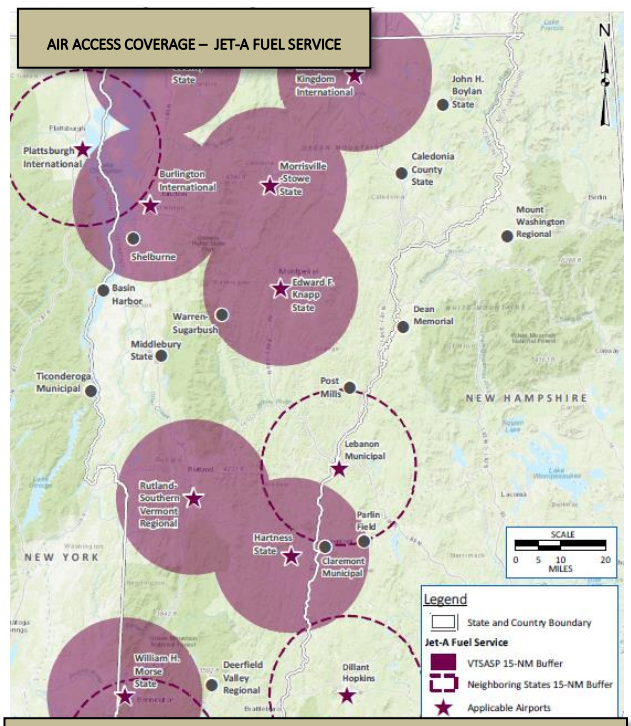
Geographic and Population Coverage: 73% and 75%, Respectively

Coverage for 44 of 50 Employment Centers



Geographic and Population Coverage: 73% and 79%, Respectively

Coverage for 43 of 50 Employment Centers



Geographic and Population Coverage: 57% and 69%, Respectively

Coverage for 39 of 50 Employment Centers

FORECASTS

Projections of future aviation activity in Vermont were completed as part of the VASP. The aviation forecasts reviewed the FAA Aerospace Forecast and Terminal Area Forecast to provide data on based aircraft and aircraft operations at each VASP airport for the purpose of identifying future facility requirements. The forecasts used historical activity information collected for each airport and identified trends within that data. Growth factors developed by the FAA, which incorporate aviation trends and other regional and national data, were applied to the historical data.

FAA Aerospace Fleet Mix Forecast

Forecast Active GA and Air Taxi Aircraft Growth Rates 2016-2037	
Single Engine Piston	-0.9%
Multi Engine Piston	-0.5%
Turbo-Prop	1.4%
Turbo-Jet	2.3%
Rotorcraft	1.6%
Experimental	1.0%
Sport Aircraft	4.1%
Total GA Fleet	0.1%

Considering these FAA national forecast growth rates, the FAA rates were applied to the 2016 based aircraft numbers and projected out to 2037. A fleet mix breakdown was performed using the most recent available 5010 data. The following are percentage of total based aircraft that can reasonably be estimated for each category:

- Piston-powered Fleet (78%)
- Turbo-Jet Fleet (3%)
- Rotorcraft Fleet (1%)
- All Others (18%)

The FAA growth rates applied to the Vermont based aircraft fleet yield the following results for the 5, 10, and 20-year periods. As can be seen in the majority of Vermont's fleet is comprised of piston engine aircraft will decline significantly. If the FAA Aerospace Forecast proves accurate, much of the decline in single engine piston aircraft will be made up for in experimental and light sport aircraft throughout the planning period, with a slight increase in turbine engine aircraft.

Forecast Vermont Aircraft Fleet Mix

Piston	396	378	360	325
Multiengine Piston	21	20	19	17
Turbo-Jet	17	19	21	25
Rotorcraft	4	4	5	5
All Others (gliders, ultralights and light sport)	94	118	142	190
Totals	532	539	547	562

FUTURE PERFORMANCE AND RECOMMENDATIONS

VASP Top Priority Improvements

Airport	Projects to Improve Future Performance
Basin Harbor	• Basic Terminal Building/Shelter
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Extend Runway to 4,000' (Minimum Objective)
Deerfield Valley Regional[1/]	• Full-Time Airport Manager On-Site (Seasonal OK)
Edward F. Knapp State	• N/A
Franklin County State	• Extend Runway to 4,000' (Minimum Objective)
Hartness State	• N/A
John H. Boylan State	• Basic Terminal Building/Shelter
Middlebury State	• Non-Precision Approach Capability
Morrisville-Stowe State	• Extend Runway to 4,000' (Minimum Objective)
Northeast Kingdom International	• Precision Approach Capability
Post Mills[1/]	• Basic Terminal Building/Shelter
Rutland-Southern Vermont Regional	• N/A
Shelburne[1/]	• Non-Precision Approach Capability
Warren-Sugarbush[1/]	• Non-Precision Approach Capability
William H. Morse State	• Extend Runway to 4,000' (Minimum Objective)

[1/]*Privately owned*

VASP Mid-Term Priority Improvements

Airport	Projects to Improve Future Performance
Basin Harbor	• N/A
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Aircraft/Avionics Maintenance Services On-Site • Full-Time Airport Manager On-Site • Full-Time Operations Staff On-Site • Jet-A Self Service Aviation Fuel on Site • Full Service FBO On-Site Full-Time
Deerfield Valley Regional[1/]	• 100LL Self-Service Aviation Fuel on Site • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Part-Time Operations Staff On-Site or Contracted • GPS Instrument Approach Procedure
Edward F. Knapp State	• Self Service Capability for Aviation Fuel on Site
Franklin County State	• N/A
Hartness State	• N/A
John H. Boylan State	• MoGas or 100LL On-Site
Middlebury State	• GPS Instrument Approach Procedure • Full-Time Airport Manager On-Site (Seasonal OK) • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock
Morrisville-Stowe State	• N/A
Northeast Kingdom International	• N/A
Post Mills[1/]	• MoGas or 100LL On-Site
Rutland-Southern Vermont Regional	• N/A
Shelburne[1/]	• Full-Time Airport Manager On-Site (Seasonal OK) • Part-Time Operations Staff On-Site or Contracted • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock • 100LL Self-Service Aviation Fuel on Site
Warren-Sugarbush[1/]	• GPS Instrument Approach Procedure • 100LL Self-Service Aviation Fuel on Site • Lighted Windsock
William H. Morse State	• Full-Time Operations Staff On-Site • Aircraft /Avionics Maintenance Services On-Site

[1/]*Privately owned.*

VASP Long-Term/Ultimate Improvements

Airport	Projects to Improve Future Performance
Basin Harbor	• MoGas or 100LL On-Site
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Terminal Building with Pilot and Visitor Amenities • Runway and Taxiway Edge Lighting • Extend Runway 5000' (Recommended Objective)
Deerfield Valley Regional[1/]	• Extend Runway to 5000' (Recommended Objective)
Edward F. Knapp State	• N/A
Franklin County State	• Terminal Building with Pilot and Visitor Amenities • Extend Runway to 5000' (Recommended Objective)
Hartness State	• N/A
John H. Boylan State	• N/A
Middlebury State	• Extend Runway to 5000' (Recommended Objective)
Morrisville-Stowe State	• Runway and Taxiway Edge Lighting • Rotating Airport Beacon • Own/Operate Snow Removal Equipment • Extend Runway to 5000' (Recommended Objective)
Northeast Kingdom International	• N/A
Post Mills[1/]	• N/A
Rutland-Southern Vermont Regional	• Intermodal Transportation Connections at/near Site • ARFF Capability • Precision Approach Capability • ATCT • Improvements to Network/Legacy Airline Service
Shelburne[1/]	• Extend Runway to 5000' (Recommended Objective)
Warren-Sugarbush[1/]	• Extend Runway to 5000' (Recommended Objective)
William H. Morse State	• Terminal Building with Pilot and Visitor Amenities • Runway and Taxiway Edge Lighting • Extend Runway to 5000' (Recommended Objective)

[1/]*Privately owned.*

POLICY DEVELOPMENT

The recommendations outlined below are necessary to maintain, sustain and grow VASP airports over a 20-year planning period

Emergency and Disaster Response/Recovery Recommendations

- Review local and state emergency plans and hazard mitigation plans to ensure they incorporate response and training requirements for longer VASP airport runways and trends in aircraft type (State and Local Agencies)

Land Use and Environmental Recommendations

- Continue to work with local governments and Regional Planning Commissions to promote best practices in land use planning around airports (FBOs, Airport Sponsors)
- Incorporate airspace protection and other critical land use compatibility tools in relevant statutes (State Agencies)
- Continue to provide technical assistance to airport developers with permitting requirements – Cross-referenced with economic development strategy (State Agencies)
- Continue to work on airport master permitting to facilitate development of airport infrastructure – Cross-referenced with economic development strategy (State Agencies)
- Coordinate with power distribution utilities to expand appropriate power transmission lines to support electric aircraft development – Cross-referenced with economic development strategy (Airport Sponsors)
- Install L2 and DCFC stations to support electric vehicles used for airport operations and private and commercial vehicles that access airports (Airport Sponsors)
- Expand solar power installations at airports and continue to improve the energy efficiency of airport buildings and facilities (Airport Sponsors)

Airport Safety Recommendations

- Continuously evaluate the status of RSAs and RPZs and develop action plans to remedy any deficiencies (Airport Sponsors)
- Continuously evaluate the status obstructions to airport approaches and develop action plans to remedy any deficiencies (Airport Sponsors)

Aircraft Operating Fee Recommendations

- Evaluate the feasibility of aligning aircraft fees and taxes more closely with those of neighboring states (Aviation Advisory Council, Airport Sponsors)

Transportation Recommendations

- Maintain and disseminate ground transportation and interconnectivity services information at all VASP airports, including lists of available services, costs and contact information (FBOs, Airport Sponsors)
- Market airport travel trends to ground transportation providers to encourage the provision of services at airports (FBOs, Airport Sponsors)

Economic Development and Marketing Recommendations

- Prioritize ACT 108 report economic development recommendations for implementation (Aviation Advisory Council, FBOs, Airport Sponsors)
- Define the economic development implementation roles of state and local agencies, fixed-based operators, and airport users (Aviation Advisory Council, FBOs, Airport Sponsors)
- Continue to work on airport master permitting to facilitate development of airport infrastructure – Cross-referenced with land use & environmental linkages strategy (State Agencies)
- Coordinate with power distribution utilities to expand appropriate power transmission lines to support electric aircraft development – Cross-referenced with land use & environmental linkages strategy (Airport Sponsors)
- Define the marketing implementation roles of airport stakeholders (Aviation Advisory Council, FBOs, Airport Sponsors

Aviation Education Recommendations

- Support the education efforts of FBOs and flying organizations with funding, including outreach efforts and fly-in events (FBOs, Flying Organizations, State Agencies)
- Foster partnerships with colleges offering programs in flights operations and aircraft maintenance (FBOs, Flying Organizations, State Agencies)

Financial Sustainability Recommendations

- Evaluate financial sustainability when reviewing proposed capital projects as part of the airport master planning process (FBOs, Airport Sponsors)
- Review leases during the renewal period to ensure lease rates for state-owned airports are consistent with area values, cost of maintenance, the availability of fuel, and the characteristics of airport facilities (FBOs, VTrans)
- Continually seeks to lower airport operating costs by consolidating operations and maintenance activities where possible and utilizing appropriate technologies (FBOs, Airport Sponsors)

Funding Source Recommendations

- Apply for NBRC, EDA, and USDA funding to implement needed projects that fall outside the scope of FAA funding priorities (State Agencies with support from FBOs)
- Explore SCORE.org business network programs and tool to develop financing ideas of airport projects (FBOs, Private Developers)

1. Introduction

1.1. System Plan Background

The Vermont Airport System Plan (VASP) is the Vermont's long range 20-year plan for developing and maintaining the State's 16 public-use airports. The VASP is updated every ten years and is required for eligible airports to receive federal aviation funding. This Plan will update the 2007 Airport System and Policy Plan, consistent with Federal Aviation Administration (FAA) planning guidance. The major goal of the VASP is to provide a framework that supports informed decision-making on public-use airports. This will ensure that airport development is responsive to the needs of users, nearby residents and businesses, and contribute to the nation's airport system.

Airport system plans examine public-use airports on a statewide level for their integration into the state and nation's airport systems. As such, they provide high-level assessments and evaluations of aviation needs, and recommended actions to guide the development of more detailed individual airport master plans.

1.1.1. Airports in Vermont

Vermont's public-use airport system consists of 16 airports, 10 of which are state-owned, 1 municipally-owned, and 5 which are privately-owned (**Figure 1-1**). Twelve public-use airports are part of the National Plan of Integrated Airport Systems (NPIAS) (**Figure 1-2**). The NPIAS consists of a network of approximately 3,400 existing and proposed airports that are significant to national air transportation and thus eligible to receive federal funding under the Airport Improvement Program (AIP). In addition, two airports (Burlington International Airport and Rutland-Southern Vermont Regional Airport) are classified by the FAA as Commercial Service Airports (publicly-owned airports that have at least 2,500 passenger boardings each calendar year and receive scheduled passenger service) while the other fourteen are classified as General Aviation Airports (public-use airports that do not have scheduled service or have less than 2,500 annual passenger boardings).

Beyond their national significance and designation, Vermont's public-use airports are a critical component of local and regional economies, as well as the State's economy, and used for a variety of purposes, including passenger transportation, recreational flying, on-airport employment, education and training, medical flights, military use, and disaster response activities.

Transportation services are important at all of the State's public -use airports. In calendar year 2019, 687,436 passengers departed or landed at Burlington International Airport while 5,488 used Rutland-Southern Vermont Regional Airport. Combined, the state's public-use commercial service and general aviation airports record 204,351 annual aircraft operations and are home to 427 based general aviation aircraft. When employers and businesses consider locating or expanding their operations in Vermont, proximity to commercial service and general aviation airports are often among the more important factors they consider. The diversity and geographic distribution of Vermont's airports are also important to support tourism, one of Vermont's largest industries with a total economic impact estimated at

Figure 1-1: Public Use Airports in Vermont

Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 1-1 VT Pub Use.mxd

Figure 1-2: NPIAS Airports in Vermont

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$3 billion annually. Critical personal and business services, such as next day mail/package delivery, also depend on Vermont's airports.

Vermont's airports also support essential services, such as military flights, emergency medical flights, and disaster response. During Tropical Storm Irene, as highways and railways sustained damage and cut off substantial parts of the State from essential services and supplies, Vermont's airports served as staging sites and communication centers that coordinate logistics among emergency response teams, first responders, the National Guard, and other entities participating in disaster response.

Like many modes of transportation, funding levels do not cover all airport needs. Airports require both capital investments to maintain and expand infrastructure and undertake safety projects, as well as operating funding to maintain the infrastructure. As part of this Plan Update, the State's airport projects prioritization system will be evaluated to determine whether any changes are needed to align program and project outcomes with airport system goals.

1.1.2. Private Airports and Aviation Facilities

In addition to public-use airports, there are over 70 other small privately-owned, private-use airports in Vermont. These airports consist of the following types of facilities:

- Private Airports and Airstrips (Private Use) – Private-use airports often have the same types of facilities to support basic flying. These types of airports are not federally-supported, and are not eligible for federal funding. Private airstrips consist of turf, gravel or paved runways and are generally day-use only.

- Heliports – There are 20 heliports in Vermont which are used for personal purposes, military use, or by emergency medical evacuation operators. Many of the larger hospitals (i.e. Dartmouth-Hitchcock Advanced Response Team, Rutland Regional Medical Center and the University of Vermont Medical Center) have certified trauma units and include helipads.
- Seaplane Bases – Vermont has many lakes and large ponds that can accommodate small single engine aircraft that are equipped with floats. Five seaplane bases are located around the state, several of which are located around Lake Champlain including Middle Harbor and Northern Lights Airport. Access from the lake to land is typically provided by a special use dock.

While private-use airports are not included in the VASP, their facilities and users contribute to the overall value and performance of aviation in Vermont.

1.2. VASP Plan Process

The VASP was developed consistent with FAA Circular # 50/5070-7 (*The Airport System Planning Process*), which provides guidance on how to conduct statewide airport planning.

There are two core components to this Plan:

- Airport System Component – a data-driven technical evaluation of current and future needs, which culminates with a recommended development plan that identifies a prioritized, strategic approach for developing facilities at system airports over the 20-year planning period.

- Policy Component - the identification and analysis of policy-related recommendations that can improve the performance of Vermont's airport system and allow it to better meet the needs of system users, residents, and businesses.

1.2.1. System Component

The System component of the VASP consists of compiling inventories of various airport characteristics and evaluating current and future system needs based on established facility and service objectives. Sequentially, the process is detailed graphically in **Figure 1-3**, and descriptively just below:

Figure 1-3: VASP System Plan Development Process

Source: McFarland Johnson, 2017.

- Facility and Service Objectives – The initial task in the development of a system plan is establishing the framework for the desired airport system in terms of facilities and services provided. Establishing facility and service objectives will serve as the benchmark to measure the effectiveness of the current and future system.

- Inventory - To establish the baseline for the subsequent analysis and recommendations, a comprehensive system-wide inventory of system airports and aviation assets is undertaken. The inventory analysis focused on the elements identified in the facility and service objectives as well as collecting data needed for the analysis on airport economic benefits.

- Current System Performance – Inventory data is measured against the facility and service objectives, which serve as minimum requirements. The analysis identifies the airports that do not meet the desired objectives, and places airports into categories that reflect existing conditions and each airport's role in the statewide system. The analysis provides a quantitative measure of how the system is performing based on the established objectives, including geographic service areas for each airport.

- Forecast – The forecasts developed as part of the system plan focus on the bigger picture, state-level indicators of existing aviation activity such as the number of based aircraft and overall socioeconomic conditions. These indicators inform the development of realistic forecasts of future activity at public-use airports.

- Future System Performance - The deficiencies identified in the current system performance are combined with the forecast for an analysis of potential changes to the airport system. Proposed changes in the Vermont airport system are reevaluated to demonstrate how the system will perform against the same desired objectives in the future.

- System Plan Recommendations - Proposed system changes to determine the future system performance will be combined with system wide policy guidance and operational strategies to summarize the recommendations for the VASP.

1.2.2. Policy Component

The Policy component of the VASP examines airports in the broader context of state goals and investigates current and likely future issues which affect Vermont's public-use airport system. This assessment of policy issues will guide the development of state airport system goals and strategies to meet future airport needs.

Some of the policy issues to be addressed include:

- Aviation's Integration with Other Transportation Modes
  - Passenger interlining.
  - Freight needs.

- Land Use-Built Environment Linkages
  - Growth of airports and impacts to surrounding communities and environments.
  - Protecting airports from encroachment from incompatible land uses via zoning.
  - Understanding limits of airport growth with surrounding built-up areas.

- Economic Development & Marketing
  - Economic development and marketing needs in order to grow on-airport activity.

- Financial Sustainability
  - Budget impacts of capital investments, operations and maintenance

  - Private sector involvement in financing airport improvements.

- Project Prioritization
  - How to address FAA requirements / priority focus areas with other priorities, such as facilities required for airport growth.

- State and Federal Policies Affecting Aviation
  - Funding priorities
  - Permitting
  - Public-Private Partnerships

- Technological Developments
  - Preparing for evolving technologies such as Next Generation Aircraft System (NextGen)
  - Supporting emerging technologies

1.3. Economic Benefits Study

As a companion to the VSAP, an Economic Benefits Study was conducted to quantify the economic impact of Vermont's public-use airports. Airport inventory data and additional information collected for on-airport employment and regional spending and economic activity trends was used to formulate an estimate of the economic benefit of aviation in Vermont.

1.4. Stakeholder and Public Participation

Throughout the planning process, a collaborative effort was emphasized to obtain input on findings, policy issues, and recommendations. Public outreach consisted of a series of regional public input meetings throughout the planning process, outreach with airport stakeholders, and working with the Vermont Aviation Advisory Council (VAAC).

Regional input meetings provided an opportunity for interested parties to learn more about the System Plan, aviation in general, and allowed for input throughout the different phases of the VASP's development. Information on regional input meetings and presentation materials can be found at: http://vtrans.vermont.gov/aviation/vermont-airport-system-plan

The focus of airport stakeholder outreach was to collect information on airport facilities and aviation activity patterns. In addition, the visits provide an opportunity to gain a firsthand understanding of the issues and needs that are specific to each airport being analyzed as part of the VASP.

The VAAC is an executive-appointed Council tasked with evaluating policy and making aviation recommendations to the Agency of Transportation (VTrans). Its members include aviation stakeholders from across the state with a broad range of knowledge and experience in airports, aviation, and other statewide issues impacting the state airport system. VAAC meetings were held through the course of the planning process to help guide the development of the VASP.

1.4.1. Review of Aviation Vision, Mission, and Goals

A key task of the outreach component of the VASP was to review, and update as needed, the Aviation vision, mission, and goals identified in the 2007 Airport System & Policy Plan, as detailed below:

Vision (from 2007 Plan)

"Vermont's airport system will be accessible, safe and secure, meeting the needs of its business, users, and surrounding communities, including implementing new technologies to support the future system. The airport system will be preserved and enhanced, while meeting Federal and State guidance and promoting responsible environmental stewardship and land use compatibility. Vermont's airports will be operated as business-oriented facilities focusing on creating opportunities for a return on the investment and will provide intermodal linkages to national transportation systems."

Mission (from 2007 Plan)

"The Vermont Agency of Transportation's aviation mission is to support, maintain, and enhance the 10 State-owned airports. As the owner/operator of 10 State-owned airports, VTrans promotes efficient and effective operation of its airports to assure safe, secure, and reliable air transportation of goods and people, while being environmentally responsible, cost-effective and supportive of Vermont's economy and recreational activities. Emergency services, aviation education, financial responsibility, and promotion of compatible land use are part of the mission for VTrans, as is playing a supportive role to all airports and aviation statewide".

State Aviation Goals (from 2007 Plan)

Table 1-1 lists the purpose and goals from the 2007 VASP.

Table 1-1: 2007 VASP Purpose and Goals

Purpose and Goals
• Provide a system of airports that is accessible for people and goods from both the ground and the air throughout the State.
• Provide intermodal ground access opportunities and/or services such as rental car, taxi, and other modes of transportation.
• Preserve and enhance Vermont's existing airport system's infrastructure investment through maintenance and rehabilitation to meet future growth and demand as well as providing new infrastructure to meet future needs in support of the national air transportation system when needed.
• Plan for future airport development and protect public investment in airports through promotion of compatible land use in the vicinity of airports.

- Provide a safe and secure system of airports that meets State and Federal guidelines, including routine inspections of airports.
- Seek adequate and stable funding, including Federal Aviation Administration (FAA) assistance, and assure appropriate staffing to support the State Aviation Vision and Goals.
- Make timely, sound infrastructure investments derived from airport master plans and based on priorities that are determined through coordination with Vermont's aviation stakeholders, including use of the Vermont Airport Capital Facilities Program.
- Maintain commercial air service at Rutland-Southern Vermont Regional Airport and support its development elsewhere in the State, as well as encourage additional commercial and cargo services where appropriate.
- Maintain an up-to-date integrated database of air and landside facilities including capital plans and improvements, leaseholds, contacts, relevant zoning as well as the system's performance measures.
- Strive to generate appropriate revenues from the operation of the State-owned airports in support of their continued operation and expansion utilizing a business-oriented approach.

Chapter 7 of this Plan presents update goals for the VASP.

2. System Parameters

2.1. Introduction

As part of a statewide air transportation system, each airport performs at varying levels based on a variety factors. The primary factors that affect an airport's ability to meet demand are the facility's infrastructure, service offerings, and location. Together, each system airport in the state of Vermont contributes to a functioning system within a regional and national context. It is from this high-level perspective that this VASP addresses system-wide performance Vermont's public-use airports.

To evaluate VASP airports performance, the system planning process requires that performance parameters be objective and impartial to the functioning of the current system. This means that the selection and development of performance parameters is based upon the State's vision and goals for their airport system – an exercise conducted prior to collection and documentation of airport data in the inventory process, and the evaluation of whether system airports meet such standards. In this way, the performance parameters in the VASP chart the course for the future of the statewide airport system. The final VASP presents the research, analysis, and framework of minimum facility infrastructure and service offerings standard for individual airports to adequately meet demand as part of the statewide system.

This Chapter provides an overview of the current Vermont airport system, defines the parameters that will be utilized to measure the current system's performance and identifies each airport's category and role. Each system airport role is a snapshot of conditions at this time and serves as the baseline starting point for the system planning process.

2.2. Airport Categories

All public-use airports provide important access to their respective region, whether that access is utilized for recreation, business, or other purposes such as emergency medical or relief purposes. Recreational purposes include individual use for vacation travel, sightseeing, or to access second homes. Business uses include visits to satellite office locations, manufacturing operations, clients, and industry partners.

To reflect the various levels of airports in the Vermont airport system, it follows that each airport has a role in the system, which can be categorized based on facility infrastructure and services offered. Defining these categories aids the system planning process by providing a benchmark of minimum facilities and services that enable each airport to meet the current and future demand of users that rely on them.

For the VASP, airport categories are defined as follows:

- **Category 1 Airports:** Category 1 Airports are those facilities that provide a basic level of facilities and services that are best suited to serve single engine piston and light twin engine aircraft. In Vermont, these airports may close during winter months or be attended for

irregular hours, provide air access to vacation destinations such as ski resorts and golf courses, or communities that do not benefit from a nearby publicly-owned airport. Some of these airports have runways that are unpaved and services vary based on the discretion of the owner.

- **Category 2 Airports:** Category 2 Airports offer a higher level of facilities and services than Category 1 Airports, support more operations as access points for more active operators in their host community and surrounding areas. Category 2 Airports typically have equipment that enhances safety of use during inclement weather, and complimentary facilities and services that may be able to accommodate smaller jet aircraft during favorable conditions.

- **Category 3 Airports:** Category 3 Airports are facilities that can accommodate jet activity during a broader range of weather conditions, and serve as regional gateways for activities such as corporate aviation, charter services and small cargo-feeder operations. These airports generally offer a greater variety of facilities and services than Category 2 Airports that can service a more diverse base of regular operators and aircraft.

- **Category 4 Airports:** Category 4 Airports are those facilities with the most robust compliment of facilities, equipment, and services that can accommodate the full-range of aircraft in the active fleet – from small, single engine piston aircraft to passenger aircraft and airlines that operate them. Category 4 Airports offer 24-hour access during all weather conditions.

As described, the VASP airport categories progress from basic to more sophisticated, comprehensive, and robust.

The next section further defines these airport categories for the VASP by detailing a distinct set of minimum and recommended facility and service objectives for each category of airports. Also included for each airport category are recommended facilities and services.

2.2.1. Other Regional and National System Plans

The FAA completed a study of general aviation (GA) airports in 2012 that focused on the varied roles that GA airports serve. The FAA's *General Aviation Airports: A National Asset (ASSET)* produced four categories focused primarily on based aircraft and activity levels. ASSET categories and descriptions are:

- **Basic:** Moderate to low levels of activity.
- **Local:** Moderate levels of activity with some multi-engine propeller aircraft.
- **Regional:** High levels of activity with some jets and multi-engine propeller aircraft.
- **National:** Very high levels of activity with many jets and multi-engine propeller aircraft.
- **Unclassified:** Provides access to the airport system.

The VASP categories align with these ASSET categories and provide an increased level of detail that reflects the general characteristics and nuances of GA activity in Vermont.

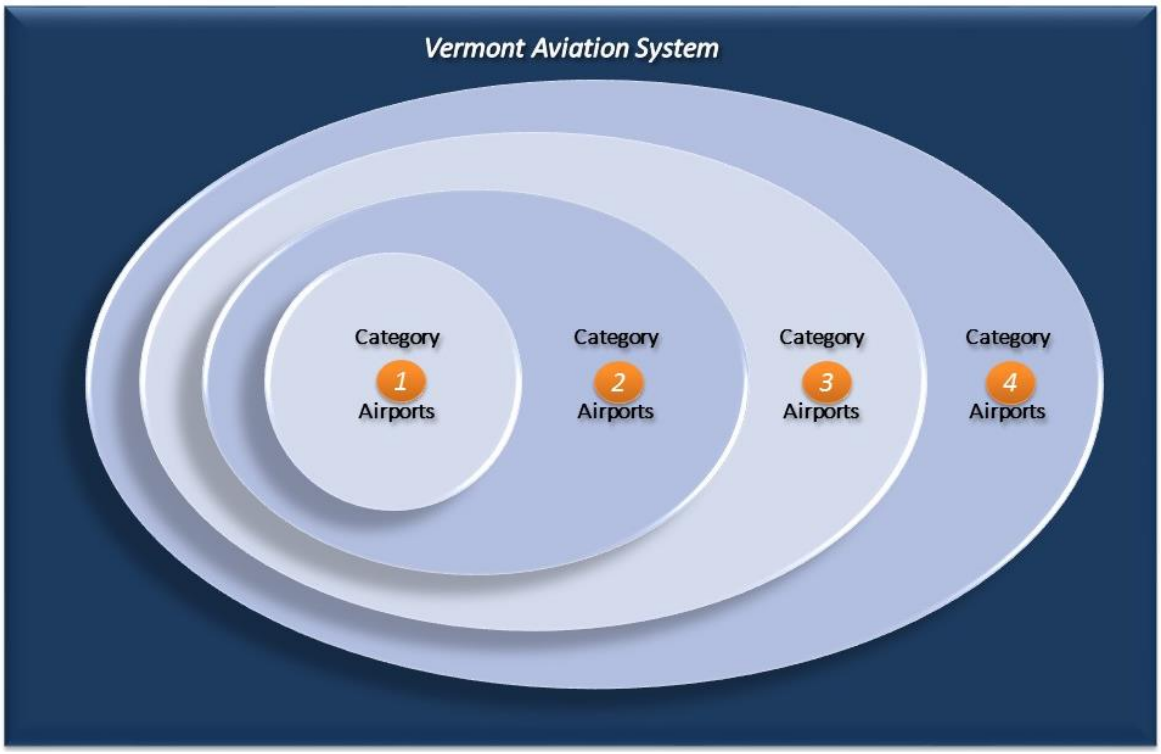
In addition to ASSET, the VASP categories are also consistent with those defined by the FAA for Burlington International Airport in the New England Regional Airport System Plan (NERASP). The focus of NERASP is scheduled passenger markets for domestic routes and underscores the important role that Burlington International Airport plays in serving the region.

2.3. Facility and Service Objectives

This section presents minimum and recommended facility and service objectives for each category of system airport. The minimums serve as the primary factors for determining the category and role for each airport in the Vermont airport system. Due to funding, local conditions, environmental, or other constraints, not all airports will be capable of meeting the minimum or recommended facility and service objectives. These constraints will be identified in master plans for each of the individual airports.

The design of minimum and recommended facility and service objectives for each VASP category of airport is cumulative. This means that as VASP categories progress from basic to comprehensive, the minimum and recommended facility and service objectives become more robust. The result of this design for the Vermont airport system is that system airports must meet all minimums to be placed into a category. Therefore, each subsequent airport category includes the "lower-order" minimums from the previous airport category. This design is illustrated in **Figure 2-1**.

Figure 2-1: Vermont Airport System Design



Source: McFarland Johnson, Inc. 2017.

2.3.1. Minimum and Recommended Facility and Service Objectives

As illustrated in **Figure 2-1**, Category 4 Airports in Vermont have in place all minimum and recommended facility and service objectives defined in the previous section, with Category 3 Airports offering all minimum facility and service objectives of lower category airports, and so on.

Facility and service objectives established as part of this system plan update represent broad-system wide goals for the state's integrated network of airports, and not the airport-specific demands or constraints as these are addressed as part of an airport master plan process. It is anticipated that some airports will have additional needs based on local market driven demands that are not captured as part of the broad system planning approach. In a similar fashion, constraints such as topography and environmental challenges are not identified on an airport by airport basis and may result in some objectives being financially infeasible or unrealistic to achieve. All projects, both system plan and master plan driven are subject to FAA funding priorities, which will ultimately affect the implementation timeline.

Tables 2-1 presents minimum and recommended facility and service objectives for the Category 1 Airports in the Vermont airport system.

Table 2-1: VASP – Category 1 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway Length (≤ 2,500') - Paved or Turf	Primary Runway (≥4,000') - Paved
Part-Time Airport Manager on Site (Seasonal OK)	Full-Time Airport Manager on Site (Seasonal OK)
Mogas or 100LL Fuel on Site	100LL Self-Service Aviation Fuel on Site
Basic Terminal Building/Shelter	Part-time Operations Staff on Site or Contracted
	Single-Service SASO or Full-service FBO on Site at Least Part-Time
	Lighted Windsock
	GPS Instrument Approach Procedure

Table 2-2 presents minimum and recommended facility and service objectives for the Category 2 Airports in the Vermont airport system.

Table 2-2: VASP – Category 2 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway (≥4,000') – Paved	Primary Runway (≥5,000')
100LL Self-Service Aviation Fuel on Site	100LL AND Jet-A Self-Service Aviation Fuel on Site
Full-Time Airport Manager on Site (Seasonal OK)	Full-Time Airport Manager on Site
Part-time Operations Staff on Site or Contracted	Full-Time Operations Staff on Site
Single-Service SASO or Full-service FBO on Site at Least Part-Time	One Full-Service FBO on Site Full-Time
Lighted Windsock	Runway and Taxiway Edge Lights
GPS Instrument Approach Procedure	GPS Instrument Approach Procedure with Vertical Guidance
	Terminal Building with Pilot and Visitor Amenities
	Own/Operate Snow-Removal Equipment
	Aircraft/Avionics Maintenance Services on Site
	Rotating Airport Beacon

Table 2-3 presents minimum and recommended facility and service objectives for the Category 3 Airports in the Vermont airport system.

Table 2-3: VASP – Category 3 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Primary Runway (≥5,000')	On Site Concessions or Restaurant
Full-Time Airport Manager on Site	Precision Instrument Approach (ILS /CAT I)
Full-Time Operations Staff on Site	Rental Cars
Terminal Building with Pilot and Visitor Amenities	No system-wide recommended Facilities & Service Objectives related to Scheduled Passenger Service.
100LL AND Jet-A Self-Service Aviation Fuel on Site	
One Full-Service FBO on Site Full-Time	
Runway and Taxiway Edge Lights	
Rotating Airport Beacon	
Own/Operate Snow-Removal Equipment	
Aircraft/Avionics Maintenance Services on Site	
GPS Instrument Approach Procedure with Vertical Guidance	

Table 2-4 presents minimum and recommended facility and service objectives for the Category 4 Airports in the Vermont airport system.

Table 2-4: VASP – Category 4 Airports

Minimum Facility & Service Standard	Recommended Facilities & Services
Terminal Building - Full-Time Passenger and/or Cargo Handling Capabilities (TSA, Customs, etc.)	There are no system-wide recommended Facilities & Service Objectives for Category 4 Airports. Most appropriate for Airport Master Plans to address requirements based on passenger service demand.
Scheduled Air Passenger/Cargo Service	
Intermodal Transportation Connections at/near Site	
On Site Concessions or Restaurant	
Airport Security Measures (SIDA, Badging, Staff etc.)	
Aircraft Rescue and Firefighting (ARFF)	
Precision Instrument Approach (ILS/CAT I)	
Aircraft/Avionics Maintenance Services on Site	
Rental Cars	

2.4. Geographic Performance Metrics

A series of metrics were established to evaluate the performance of the existing Vermont airport system. In airport system planning, a common metric for evaluating a performance is geography, or geographic coverage. In this regard, each airport in a system has a primary geographic service area that attracts users (i.e., pilots, passengers, aircraft owners, businesses, etc.) located in proximity to each airport. Geographic service areas for airports can be defined by automobile drive times and nautical miles. For the VASP, both drive times and nautical mile service areas were utilized.

For the VASP, geographic service areas were determined for airports based on ground access and air access, and represent each individual airport's "coverage" area. Ground access and air access geographic service – or coverage – areas are described in more detail as follows:

- **Ground Access:** The geographic service area for ground access identifies the area within which the airport is likely to be most effective in serving local user demand at the airport. A 30-minute drive time is used for each VTASP airport. The 30-minute drive time is consistent with guidance from the FAA used to evaluate a general aviation airport's eligibility for inclusion in the NPIAS per *FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems (NPIAS)*.

  Burlington International is considered to also have a 60-minute drive time geographic service area for scheduled passenger service, which reflects an industry standard average drive-time distance most passengers would be willing to make to utilize commercial airline services. In this way, the VASP evaluates the performance of Burlington International for general aviation operators and users, as well as the passenger service market.

  Importantly, a distinction is made between scheduled passenger services offered at Burlington International Airport and Rutland-Southern Vermont Regional Airport. While Rutland does offer scheduled passenger service, direct non-stop flights are limited to

Boston Logan International. Burlington International connects Vermont to cities across the U.S. with non-stop flights and more connecting opportunities to reach international destinations. Therefore, Rutland-Southern Vermont Regional is not considered to have a 60-minute drive time geographic service area.

The performance metrics utilized in the analysis of ground access coverage areas are:

- Land Area
- Population
- Employment Centers

- Air Access: The geographic service area for air access is determined using nautical mile distance from each airport, and is used to evaluate individual airport coverage and system-wide coverage for specific infrastructure, equipment, and services that are important for aircraft flying to a Vermont airport system airport whether it is intended or unintended (diversion/emergency).

  For the VASP, a 15-nautical mile distance surrounding each airport was identified and analyzed for each airport and certain airport infrastructure, equipment, and services applicable to airborne aircraft where 30-minute drive time may not be the most accurate assessment (i.e. automated weather reporting systems).

  The performance metrics utilized in the analysis of air access coverage measure land area, population, and employment center coverage by Vermont airport system airports with the following infrastructure, equipment, and service features:

  - Airports with a primary runway length ≥ 4,000-feet
  - Airports with a primary runway length ≥ 5,000-feet
  - Airports with precision instrument approaches
  - Airports with non-precision instrument approaches
  - Airports with on-site weather reporting service/equipment
  - Airports with AvGas (100LL) fueling services
  - Airports with Jet A fueling services

It is important to note that the actual service area for every airport is not limited to the geographic service area shown. The VASP utilizes ground access and air access geographic service area coverage – whether drive-times or nautical miles - to facilitate an objective evaluation of performance. Airport use is at the discretion of the pilot in command and can be based on a variety of factors such as fuel prices, tie-down fees, familiarity, weather conditions, ground transportation, or general preferences.

2.5. Summary

As described in the introduction of this Chapter, each airport in the Vermont airport system performs at varying levels based on a variety factors. The primary factors that affect an airport's ability to meet demand are the facility's infrastructure, service offerings, and location.

Chapter 3, *Inventory,* presents data collected for the VASP that serves as the foundation of all analysis performed, and presented in Chapter 4, *Current System Performance*. Based on the analysis of system coverage, and the ability of system airports to meet minimum facility objectives both currently and under future demand conditions, recommendations will be presented that can enhance and sustain a viable Vermont airport system for the long term.

Importantly, statewide recommendations do not diminish the need for individual airport planning efforts. Local airport planning efforts such as airport master plans, environmental assessments, and/or development plans are crucial for determining airport-specific facility needs for each system airport. This VASP can, however, assist in validating elements of those plans and highlighting facility needs at a system level.

3. Inventory

3.1. INTRODUCTION

There are 16 public-use airport facilities currently identified as part of the Vermont Airport System Plan (VASP). According to the Federal Aviation Administration's (FAA) Airport Master Records (form 5010), as of January 2017, there are 86 airports and other landing facilities in Vermont. These include all public-use and privately-owned/private-use landing fields, heliports, and seaplane bases. The VASP on the 16 public-use airports.

Additionally, the VASP notes 12 Vermont airports included in the National Plan of Integrated Airport Systems (NPIAS) for the 2017-2021 period. The FAA updates the NPIAS every two years to identify existing and proposed airports that are significant to national air transportation and thus eligible to receive federal grants under the Airport Improvement Program (AIP).

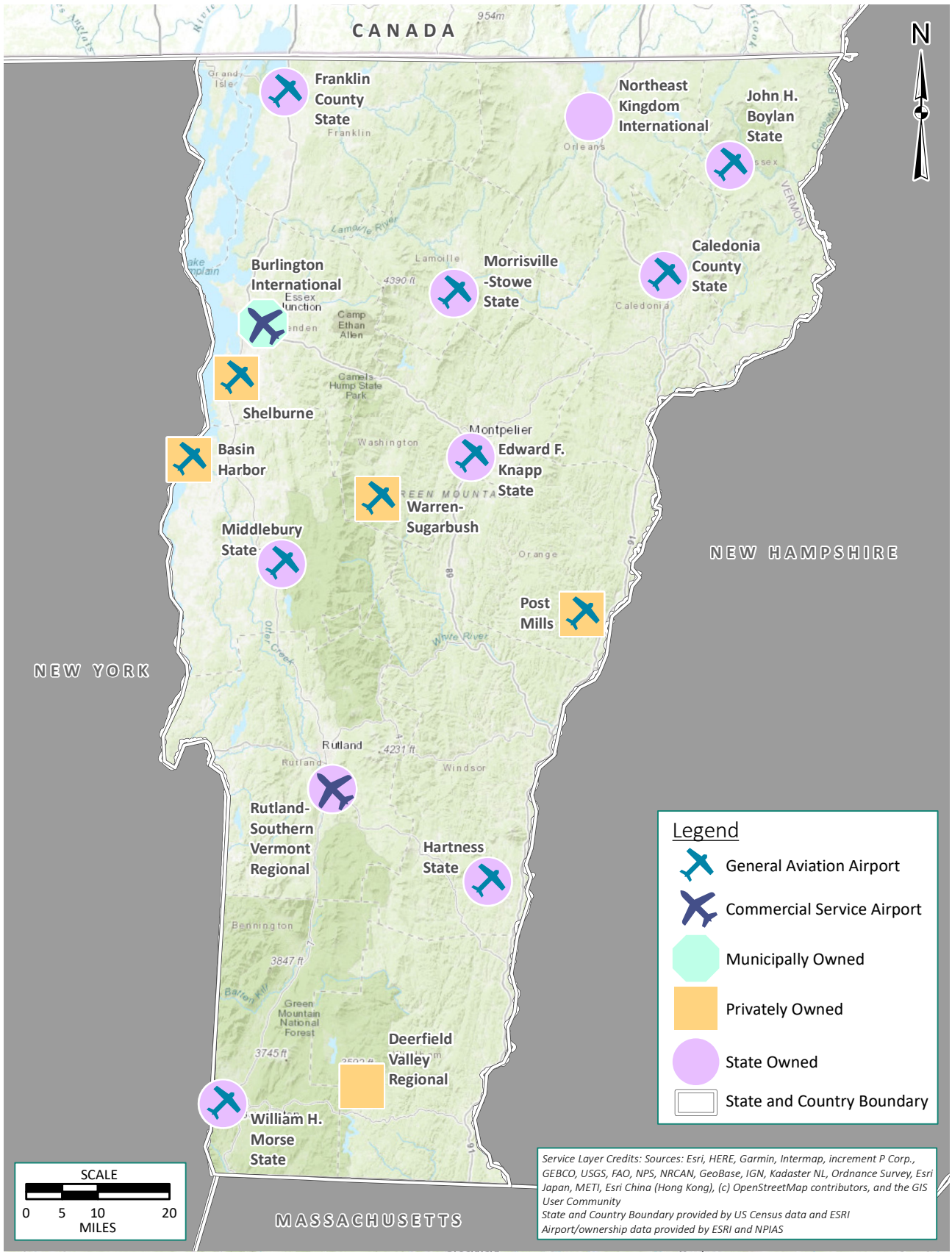
This chapter presents a summary of the inventory process and the data collected for the VASP. This data serves as the foundation for analyses performed and presented in subsequent chapters. The data informs objective analyses performed to examine the current state of VASP airports and identify areas of deficiency where improvements may be warranted. The VASP concludes with a recommended plan for infrastructure projects, priorities, and policy strategies that can ensure that Vermont system airports meet current and projected levels of aviation demand.

3.2. SUMMARY OF EXISTING SYSTEM

Figure 3-1 displays VASP airports and indicates type of airport and ownership. Airport types are general aviation (GA) and commercial service (CS), and ownership is identified as municipally owned, privately owned, and State-owned.

Figure 3-2 displays the system airports by NPIAS status.

Figure 3-1: Existing System



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 3-1 VT Existing System.mxd

Figure 3-2: NPIAS Airports

Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 3-2 VT NPIAS Airports.mxd

3.2.1. Snapshot of Existing System Airports

This section provides a brief summary of each public-use airport in the state's Airport system. The descriptions present the character of the airports and the areas the airport serve, as well as any unique activities associated with the facilities. Accompanying each airport description is a table listing the airport's critical attributes.

State-Owned Airports

Caledonia County State Airport (CDA)

Source: Vermont Agency of Transportation

Caledonia County Airport is located 3 miles north-northwest of the village of Lyndonville in the Northeast Kingdom. The Airport has a 3,302 feet by 60 feet paved runway designated as Runway 2-20. It has a single RNAV (GPS) (Area Navigation using Global Positioning System) approach to Runway 2. Per the Airport's 5010 record, there are 18 single-engine based aircraft. CDA is included in the NPIAS and as such, is eligible for federal funding through the AIP.

Caledonia County Airport sits atop Lyndonville's Pudding Hill, situated not far from Burke Mountain and an extensive hiking and biking system at Kingdom trails. The local Experimental Aircraft Association (EAA) chapter hosts multiple events each year, bringing in members of the community and sharing their love for Aviation with the locals. They host monthly meetings with presentations ranging from runway safety to how to change your oil.

The Airport ALP (Airport Layout Plan) was last updated in March 2003 and prior to that in 2000. The Airport was also part of a state funded project to provide some of the details that might be included in a full airport master plan project.

Caledonia County State Airport (CDA)	
Location	Lyndonville
VTrans Airport Category	Local Service
Primary Runway Length/Width (feet)	3,302/60
Taxiway Type	Non-standard midfield entrance and exit taxiway with a partial parallel taxiway
ATCT (air traffic control tower)	No
IAP (instrument approach procedure)	RNAV (GPS) Runway 2
Terminal/Admin. Building	Yes
Fuel	100LL (self-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	None
Visual Approach Aids	REIL Runway 2 (runway end identifier lights)
Lighting	MIRL, MITL (medium intensity runway lighting) (medium intensity taxiway lighting)
Fencing	Perimeter
Services	Fuel, transient storage

Edward F. Knapp State Airport (MPV)

Source: Vermont Agency of Transportation

Edward F. Knapp State Airport is located about 35 miles from Burlington International and midway between the Cities of Barre and Montpelier. The Airport once supported commercial service with regional carriers. The Airport is included in the NPIAS.

The Airport has two runways, 5-23 and 17-35, however in the winter months, Runway 5-23 remains closed and is not maintained for use. The Airport has a 4,680-square foot terminal building with offices and space for a restaurant. Vermont Flying Service is the Airport's FBO.

Knapp State Airport looks over Vermont's state capital from its perch in Berlin. Boasting a 5,000 foot runway, Montpelier Airport sees regular jet traffic and accommodates a scheduled daily freight service operated by Wiggins airways. From Jets to helicopters to piper cubs to experimental aircraft, Knapp Airport is home to just about every category aircraft. Regular meetings of the Civil Air Patrol take place in the terminal building that was once the home of Sanbel's restaurant.

Per the most recent 5010 record data, the Airport has 50 single-engine based aircraft, two multi-engine aircraft and one helicopter.

The ALP was last updated in March, 2005 and the most recent revision to the airport master plan was in 2000.

Edward F. Knapp State Airport (MPV)	
Location	Berlin
VTrans Airport Category	National Service
Primary Runway Length/Width (feet)	5,002/100
Crosswind Runway Length/Width (feet)	3,000/75
Taxiway Type	Non-standard full parallel taxiway
ATCT (air traffic control tower)	No
IAP (instrument approach procedure)	ILS Runway 17 (instrument landing system), RNAV Runway 17, RNAV Runway 35, VOR Runway 35 (very high frequency omnidirectional range)
Terminal/Admin. Building	Yes
Fuel	100LL, Jet-A (full service)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	MALSR Runway 17 (medium intensity approach light system)
Visual Approach Aids	REIL Runway 17/35, PAPI Runway 17 (precision approach path indicator)
Lighting	MIRL, MITL
Fencing	Perimeter (partial)
Services	Fuel, transient storage, major powerplant and airframe repairs, aircraft rental and instruction

Franklin County State Airport (FSO)

Source: Vermont Agency of Transportation

Franklin County State Airport is adjacent to the northern portion of Lake Champlain, just under 5½ miles from the Canadian border. It is included in the NPIAS. The Airport's single runway, Runway 1-19 is 3,000 feet long by 60 feet wide and listed in good condition as of the last inspection. Approaches include RNAV (GPS) approaches in both directions with minimums as low as 512 feet and 1 statute mile visibility (Runway 1). There is also a VOR/DME approach to Runway 19.

Based aircraft include 85 single-engine aircraft, 2 multi-engine, and one jet. The current FBO is Border Air and they provide both 100LL and Jet A via self-serve fuel tank systems.

Franklin County Airport is one of Vermont's busiest General Aviation communities. They are a full service airport offering fuel, maintenance, an onsite paint shop, flight instruction and more. They are home to a flying club, with multiple instructors ready to teach from Private all the way through Multi-engine and CFI. There is an active EAA chapter which supports local youth learning to fly through a variety of sponsorships and mentor programs. A skydiving club is located at the field and Franklin County is welcoming and all-inclusive to all types of activity.

Four days of each year, a large portion of the eastern section of the Airport is leased to Franklin County Field Days, Inc. for shows and events. Notable performances have included the Grateful Dead and Phish, among others.

In November 2006, the ALP was updated to reflect recent changes while the Airport participated in a limited, state funded project to provide basic airport information in an airport master plan style.

Franklin County State Airport (FSO)	
Location	Swanton
VTrans Airport Category	Local Service
Primary Runway Length/Width (feet)	3,000/60
Taxiway Type	Stub taxiway, taxilane
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	RNAV (GPS) Runways 1/19
Terminal/Admin. Building	Yes
Fuel	100LL, Jet-A (SS)
Weather Reporting	AWOS-3
Paved Aircraft Parking	Yes
Hangars	Box hangars
ALS (approach lighting system)	None
Visual Approach Aids	REIL Runway 1/19, PAPI Runway 1
Lighting	MIRL, MITL
Fencing	Perimeter (partial)
Services	Fuel, FBO, courtesy vehicle, , rental and instruction, transient storage, radiant/hangar deicing, avionic, airframe, and powerplant repairs

Hartness State Airport (VSF)

Source: Vermont Agency of Transportation

Hartness State Airport is a NPIAS airport located in the southeast portion of Vermont, approximately 5½ miles from the New Hampshire border, and just three miles northwest of the central business district of Springfield, Vermont.

The Airport has two runways. Runway 5-23 is 5,501 feet long by 100 feet wide and constructed of asphalt in good condition. Runway 5 is served by an RNAV (GPS) approach with minimums down to 1,560 feet and 1¼ statute mile visibility in addition to a LOC/DME (localizer approach with distance measuring equipment) approach with similar minimums. Runway 11-29 is 3,000 feet by 75 feet of asphalt listed in excellent condition.

Hartness State Airport is home to the oldest Soaring Club in the US. It offers many summer flying events such as Ace Camp, CAP Glider Camp, Aerobatic competitions as well as many others. VSF was also the first airport in the Lindbergh event and visit to Vermont in 1927. A wide variety of based aircraft such as ultralight, powered parachutes, light sport, helicopters, antiques, warbirds, jet aircraft, seaplanes and gliders can be found at the Airport. The Airport is situated on land donated by Governor Hartness (who was one of the first licensed pilots) in 1919.

The Airport's terminal building is approximately 2,000 square feet and is located adjacent to the main ramp. Both Jet A and 100LL are sold at the airport with 100LL available 24/7 through a self-serve system and Jet A through Vermont Agency of Transportation (VTrans) employees during normal business hours. Based aircraft include 19 single-engine aircraft and eight gliders.

Both the ALP and airport master plan were updated in 2014.

Hartness State Airport (VSF)	
Location	North Springfield
VTrans Airport Category	Regional Service
Primary Runway Length/Width (feet)	5,501/100
Crosswind Runway Length/Width (feet)	3,000/75
Taxiway Type	Single entrance/exit taxiway for each runway
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	RNAV (GPS) Runway 5, LOC/DME Runway 5 (localizer only approach)
Terminal/Admin. Building	Yes
Fuel	100LL, Jet-A (self-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	None
Visual Approach Aids	VASI, REIL Runway 5
Lighting	MIRL, MITL
Fencing	Perimeter
Services	Fuel, aircraft rides, rental and instruction, transient storage, charter, banner towing, major airframe and powerplant repairs

John H. Boylan State Airport (5B1)

At 15½ miles from the Canadian border and approximately 10 miles from the New Hampshire Border, John H. Boylan is Vermont's northeastern most public-use airport. Its turf runway is 2,650 feet long by 120 feet wide and listed in good condition. The most recent inspection information indicates there are three single-engine aircraft and two ultralights based at the Airport.

Source: Vermont Agency of Transportation

John H. Boylan State Airport is Vermont's only state owned turf airport. Home to several experimental and tailwheel aircraft, Island Pond's airport often sees weekend gatherings of local tailwheel pilots and back country flying associations.

John H. Boylan State Airport is not included in the NPIAS. The ALP was updated, and an abbreviated airport master plan were completed in 2003.

John H. Boylan State Airport (5B1)	
Location	Brighton
VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	2,650/120
Taxiway Type	None
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	No
Fuel	None
Weather Reporting	None
Paved Aircraft Parking	Yes
Hangars	Box hangars
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	None
Services	Transient storage

Middlebury State Airport (6B0)

Source: Vermont Agency of Transportation

Located just south of Lake Champlain, Middlebury State Airport has a single paved runway designated as Runway 1-19 which is listed in good condition. It is 2,500 feet long by 50 feet wide with no lighting or navigational aids. 6B0 is included in the NPIAS.

There is a small office/terminal building which is owned by the State of Vermont for arriving and departing passengers. 100LL aviation fuel is available through a self-serve fuel farm located between the SRE building and the tie-down apron.

There are 32 single-engine, 1 multi-engine and 2 jets based at the airport on tie-downs and inside hangars of various sizes.

In 2000, the Airport was included in the aforementioned state funded project to provide airport details, and the ALP was last updated in July of 2005.

Middlebury State Airport (6B0)	
Location	Middlebury
VTrans Airport Category	Local Service
Primary Runway Length/Width (feet)	2,500/50
Taxiway Type	Non-standard parallel taxiway
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	Yes
Fuel	100LL (self-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	Perimeter
Services	Fuel, transient tie-downs, parachute jumping, major airframe and powerplant repairs

Morrisville-Stowe State Airport (MVL)

Source: Vermont Agency of Transportation

Located in the north-central portion of Vermont, Morrisville-Stowe State Airport is six miles north of Vermont's capital, the town of Stowe and approximately 30 miles east of the central business district of Burlington. It is included in the NPIAS and eligible for federal funding. Its single runway is 3,700 feet long by 75 feet wide and is paved with a rating of excellent condition. Both runway ends are equipped with a REIL (runway end identifier lights) and Runway 19 has a PAPI (precision approach path indicator). Additionally, the runway has high intensity edge lights and there are two RNAV (GPS) approaches to Runway 19 with minimums down to 1,270 feet and 1⅝ statute miles visibility. There are two stub taxiways providing access to the tie-downs, hangars and terminal building.

Morrisville-Stowe State Airport is the airport of choice for visitors to the Stowe area. Located just 15 minutes from Stowe Ski area, the airport makes it practical and convenient to take advantage of weekend ski trips, fall foliage festivals and summers on the golf course. In the winter, scheduled charter service is often offered between New York City's White Plains Airport and Morrisville-Stowe turning a 6-hour drive into a quick hour-long flight.

Stowe Aviation is the Airport FBO. They provide maintenance, charter and flight training as well as fuel sales. Scheduled charter service is provided by Tradewinds Aviation to White Plains, New York on certain days of the week.

Per the Airport survey data, there are 25 single aircraft and three multi-engine aircraft as well as six gliders/ultralights based at the Airport. The Airport is in the final stages of completing a master plan update and environmental assessment.

Morrisville-Stowe State Airport (MVL)	
Location	Morrisville
VTrans Airport Category	Regional Service
Primary Runway Length/Width (feet)	3,700/75
Taxiway Type	Dual stub taxiway
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	Two RNAV (GPS) approaches to Runway 19, RNAV (GPS) circling approach to Runway 1
Terminal/Admin. Building	Yes
Fuel	100LL, Jet-A (self-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	None
Visual Approach Aids	PAPI Runway 19
Lighting	HIRL, HITL, REILs
Fencing	Perimeter (partial)
Services	Fuel, transient storage, FBO, based flight instruction, deicing, airframe, power plant, and avionics repair, glider towing,

Northeast Kingdom International Airport (EFK)

At just under nine miles from the Canadian border, and approximately three miles south of the town of Newport, lies Northeast Kingdom International Airport. It has two intersecting runways. Runway 18-36 is the primary runway, which measures 5,000 feet long by 100 feet wide. Runway 18-36 has a 4-box PAPI (precision approach path indicator) on both ends and a non-precision approach to Runway 36 with minimums down to 1,340 feet and one statute mile visibility. It has medium intensity edge lights. The Airport recently completed a 1,000-foot extension to the runway.

The crosswind runway, Runway 5-23 is 3,996 feet long by 100 feet wide with limited taxiway access. There is a single connecting taxiway toward the northeast end of the runway.

Source: Vermont Agency of Transportation

Lakeview Aviation is the Airport FBO and Airport manager, and also provides maintenance, aircraft rentals and instruction, aircraft storage and fuel sales. They lease the 1,250-square foot terminal building which also serves the flying public. There are 19 single-engine and one multi-engine aircraft according to the most recent 2010 data.

Northeast Kingdom International Airport provides direct access to Vermont's Northeast Kingdom and Québec's Eastern Townships. The airport offers a variety of services including fueling, maintenance with a specialty in aircraft interiors, flight instruction, scenic flights and more. NKI sits on the shores of Lake Memphremagog and offers access to short-trip access to Jay Peak Resort.

Northeast Kingdom International Airport is included in the NPIAS and underwent a master plan update as well as an update to the ALP in 2013.

Northeast Kingdom International Airport (EFK)	
Location	Coventry
VTrans Airport Category	Local Service
Primary Runway Length/Width (feet)	5,000/100
Crosswind Runway Length/Width	3,996/100
Taxiway Type	Partial parallel taxiway
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	RNAV (GPS) Runway 16
Terminal/Admin. Building	Yes
Fuel	100LL (self-serve), Jet-A (full-serve)
Weather Reporting	AWOS-3
Paved Aircraft Parking	Yes
Hangars	T-hangars, box hangars
ALS (approach lighting system)	None
Visual Approach Aids	PAPI Runway 19
Lighting	MIRL, MITL
Fencing	Perimeter (partial)
Services	Fuel, transient storage, avionics service and repair, glider towing, banner towing major airframe and powerplant repairs

Rutland-Southern Vermont Regional Airport (RUT)

Source: Vermont Agency of Transportation

Rutland-Southern Vermont Regional Airport is located approximately 15½ miles from Vermont's western border and approximately five miles south of Rutland, Vermont's second largest city. The Airport has two intersecting runways. Runway 1-19 is the primary runway and is 5,303 feet long by 100 feet wide. It has REILs on the approach end of Runway 1 and a MALSR (medium intensity approach lighting system with runway alignment indicator lights) for Runway 19. It has grooved asphalt listed in good condition as well as medium intensity edge lights. Runway 19 is equipped with an instrument landing system (ILS) with several approaches and minimums as low as 493 feet and 1¼ statute miles visibility. Rutland Airport is included in the NPIAS and is an FAR Part 139 certificated facility.

Runway 13-31 is the crosswind runway at 3,170 feet long by 75 feet wide. It has medium intensity edge lights as well as a 2-box PAPI for Runway 13.

On-Airport companies include the FBO, Columbia Air Services, which offers a full range of FBO services, the Hangar Café, a restaurant, and Cape Air offers scheduled daily service to Boston Logan International. There are also multiple aircraft repair options at the Airport. According to the Airport's 5010 record, there are 29 single-engine aircraft and one ultralight aircraft based at the Airport. Both the ALP and the airport master plan were updated in 2009. Finally, scheduled passenger service is provided by Cape Air under the Essential Air Service Program.

Rutland-Southern Vermont Regional Airport (RUT)	
Location	North Clarendon
VTrans Airport Category	National Service
Primary Runway Length/Width (feet)	5,303/100
Crosswind Runway Length/Width	3,170/75
Taxiway Type	Partial parallel, non-standard taxiway for Runway 18-36, partial parallel for Runway 13-31
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	ILS or LOC Runway 19, RNAV (GPS) Runway 1 and 19, VOR/DME Runway 1
Terminal/Admin. Building	Yes
Fuel	100LL (self-serve, full-serve), Jet-A (self-serve, full-serve)
Weather Reporting	AWOS-3
Paved Aircraft Parking	Yes
Hangars	Box hangars, T-hangars
ALS (approach lighting system)	MALSR Runway 19
Visual Approach Aids	PAPI Runways 1-19 and 13, REIL Runway 13
Lighting	MIRL Runway 18-36
Fencing	Perimeter
Services	Fuel, transient storage, aircraft sales instruction and rental, major airframe and powerplant repairs

William H. Morse State Airport (DDH)

Source: Vermont Agency of Transportation

William H. Morse State is the south westernmost public-use airport in Vermont. It is located approximately 1½ miles from the state border with New York to the west, 10 miles from Massachusetts to the south and 3 miles from the central business district of Bennington to the east. The single Runway 13-31 is 3,704 feet long by 75 feet wide. It is paved asphalt listed in fair condition. Both runway ends have a 4-box PAPI and REILs. Two midfield stub taxiways provide access to and from the runway from the ramps and hangars. Additional features at the Airport include a terminal that is approximately 550 square-feet, a community hangar that is 5,400 square-feet, and a transient hangar that is 1,600 square-feet. There are underground storage tanks for both 100LL and Jet A. The most recent Airport survey data indicates 30 single-engine, two multi-engine, two helicopter and six ultralight aircraft are based at the Airport. The Airport is included in the NPIAS.

Nestled in the southwest corner of Vermont, the W.H. Morse State Airport offers fueling, maintenance, avionics service, hangar storage, flight instruction and commercial space for lease/purchase. These services are all offered all in a strategically located setting only 45 minutes from Albany, New York and the Berkshires, and in close proximity to the region's tourism areas.

The Airport was formerly managed by the FBO AirNow, which operated a charter freight business, however AirNow ceased operations in 2011[1]. Hildt Aviation provides maintenance services for aircraft.

The airport master plan and ALP were updated in 2014.

[1] Goswami, Neal P., (2011. February 24). AirNow takes last flight; closes today. *Bennington Banner.* Retrieved from http://www.benningtonbanner.com/stories/airnow-takes-last-flight-closes-today,236873

William H. Morse State Airport (DDH)	
Location	North Clarendon
VTrans Airport Category	Regional Service
Primary Runway Length/Width (feet)	3,704/75
Taxiway Type	Partial parallel
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	RNAV (GPS) Runway 13, VOR Runway 31
Terminal/Admin. Building	Yes
Fuel	100LL (self-serve), Jet-A (self-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	Box hangars, T-hangars
ALS (approach lighting system)	No
Visual Approach Aids	PAPI, REIL Runways 13-31
Lighting	HIRL/MITL
Fencing	Perimeter
Services	Fuel, transient storage, FBO, courtesy vehicle, based flight instruction, airframe, power plant, and avionics repair, radiant/ hangar deicing, skydiving

Privately-Owned, Public-Use Airports

Basin Harbor Airport (B06)

Basin Harbor Airport is Vermont's westernmost public-use airport and is owned by Beach Properties, Inc. It is located on the southern shore of Lake Champlain and has a 3,000 feet long by 90 feet wide turf runway listed in good condition. There are no services listed or based aircraft reported for the Airport, which is open seasonally and closes during winter months. There are no published instrument procedures at the Airport. Basin Harbor Airport is not included in the NPIAS.

Source: Vermont Agency of Transportation

Basin Harbor Airport (B06)	
Location	Vergennes
VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	3,000/90
Taxiway Type	N/A
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	No
Fuel	None
Weather Reporting	None
Paved Aircraft Parking	None
Hangars	None
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	None
Services	None

Deerfield Valley Regional Airport (4V8)

Owned by Deerfield Valley Regional Airport, LLC, and located in the southern tier of Vermont, Deerfield Valley (formerly Mount Snow) is directly adjacent to Mount Snow and local golf courses. Runway 1-19 is 2,650 feet long by 75 feet wide and listed in excellent condition. There is a single RNAV (GPS) approach to Runway 1 with minimums down to 3,140 feet and 1¼ statute miles visibility. Deerfield Valley Regional Airport is not included in the NPIAS.

Source: Vermont Agency of Transportation

Deerfield Valley Regional Airport (4V8)	
Location	West Dover
VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	2,560/75
Taxiway Type	Dual midfield stub taxiways
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	RNAV (GPS) Runway 1
Terminal/Admin. Building	Yes
Fuel	N/A
Weather Reporting	None
Paved Aircraft Parking	Yes
Hangars	Box hangars
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	MIRL
Fencing	None
Services	Transient aircraft storage

Post Mills Airport (2B9)

Post Mills Airport is privately owned and is located on the east border of Vermont, adjacent to Lake Fairlee. The turf runway is 2,900 feet long by 80 feet wide. According to the VTrans website, services available include sailplane and hot air balloon rides as well as hangar space and tie-downs. The Airport hosts an annual hot air balloon festival with a pancake breakfast. It is included in the NPIAS.

Source: Vermont Agency of Transportation

Post Mills Airport (2B9)	
Location	Post Mills
VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	2,560/75
Taxiway Type	N/A
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	No
Fuel	N/A
Weather Reporting	None
Paved Aircraft Parking	No
Hangars	Box hangars, T-hangars
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	None
Services	Transient aircraft storage, minor airframe and powerplant repairs, balloon repairs, sales and scenic flights, aircraft charter, aircraft sales and instruction, glider and banner towing

Shelburne Airport (VT8)

Source: Vermont Agency of Transportation

Shelburne Airport is also located very near the shores of Lake Champlain. The Airport owner apparently passed away in 2015 and it appears the Airport is for sale.

Shelburne's runway is 3,077 feet long by 60 feet wide and is turf listed in excellent condition. Services offered at the Airport have included aircraft maintenance and flight instruction. Shelburne is not included in the NPIAS.

Shelburne Airport (VT8)	
Location	Shelburne
VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	3,077/60
Taxiway Type	N/A
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	No
Fuel	Mogas (full-serve)
Weather Reporting	None
Paved Aircraft Parking	No
Hangars	Box hangars, T-hangars
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	None
Services	Transient aircraft storage, major airframe and powerplant repairs, aircraft rental and instruction

Warren-Sugarbush Airport (0B7)

Warren-Sugarbush Airport is centrally located in Vermont, approximately 3½ miles from Sugarbush Ski Resort. Runway 4-22 is 2,575 feet long by 30 feet wide, paved and listed in excellent condition. There are two stub taxiways, one accessing a hangar, and the other to a grass tie-down area.

Source: Vermont Agency of Transportation

Warren-Sugarbush Airport is a premier soaring center, internationally recognized for its location, facilities, staff and soaring conditions. The airport is a privately-owned, public use airport that is open from May through October, and provides AvGas (100LL) fuel sales, tie-downs and other services to based and visiting aircraft. The 150-member Sugarbush Soaring Association (SSA) provides flight instruction (over 1,000 operations), scenic rides and youth programs throughout the season. SSA is unique in that it offers premium glider training seven days a week throughout the open season. Depending on the weather, on any given day students could experience one of the three forms of soaring lift - thermal, ridge and mountain wave (or in some cases, all three). Private glider pilots and student pilots come from all over and spend time at Warren-Sugarbush, attracted by the soaring conditions and the availability of services offered at SSA. The airport has also attracted a large number homeowners and associated economic activity with some 27 homes linked to the airport, as well as partnerships with area restaurants and hotels.

Warren-Sugarbush Airport (0B7)	
Location	Warren

VTrans Airport Category	Specialty Service
Primary Runway Length/Width (feet)	2,575/30
Taxiway Type	N/A
ATCT (air traffic control tower)	No
IAP (instrument approach procedures)	None
Terminal/Admin. Building	No
Fuel	100LL (self-serve)
Weather Reporting	None
Paved Aircraft Parking	No
Hangars	Box hangars (private)
ALS (approach lighting system)	None
Visual Approach Aids	None
Lighting	None
Fencing	None
Services	Transient aircraft storage, aircraft rental and instruction, glider and banner towing

Non State-Owned, Public-Use Airports

Burlington International Airport (BTV)

Source: Vermont Agency of Transportation

As the largest public-use airport in the Vermont Airport system, Burlington International Airport offers a full complement of infrastructure, facilities, equipment, and services to accommodate scheduled commercial passenger service and the most demanding and sophisticated general aviation aircraft types and operators. BTV is a FAR Part 139 certificated airport. Domestic carriers American Airlines, Delta Air Lines, Frontier, JetBlue and United Airlines provide flights to major hubs in Atlanta, New York City, Washington D.C., Chicago, Detroit, Philadelphia, and Charlotte.

BTV also serves as home to 158th Fighter Wing of the Vermont Air National Guard (ANG) and the Army Aviation Support Facility of the Vermont Army National Guard (ARNG).

BTV's CIP (capital improvement program) as shown in a recently completed master plan focuses on incremental replacement of their aging passenger terminal and providing a modern, efficient facility to meet growing passenger demand. Other key areas include airfield geometry standardization property acquisitions, pavement rehabilitation and relocations, noise mitigation, and development of a new cargo area, among other projects.

Burlington International Airport (BTV)	
Location	Burlington
VTrans Airport Category	National Service
Primary Runway Length/Width (feet)	8,319/150
Crosswind Runway Length/Width	4,112/75
Taxiway Type	Partial parallel, Runway 15-33, full parallel for Runway 1-19
ATCT (air traffic control tower)	Yes
IAP (instrument approach procedures)	ILS or LOC Runway 15 and 33, RNAV (GPS) Runways 1, 15 and 33, VOR/DME Runway 1, HI-TACAN Runways 15 and 33
Terminal/Admin. Building	Yes
Fuel	100LL (full-serve), Jet-A (full-serve)
Weather Reporting	ASOS
Paved Aircraft Parking	Yes
Hangars	Box hangars, T-hangars
ALS (approach lighting system)	MALSR Runway 15, MALSF Runway 33
Visual Approach Aids	PAPI Runways 1-19 and 15-33
Lighting	MIRL, MITL
Fencing	Perimeter
Services	Fuel, transient storage, aircraft sales, charter instruction and rental, major airframe and powerplant repairs, avionics sales and service, oxygen, cargo and freight handling

3.2.2. Review of Previous System Plan

The previous Vermont Airport System Plan was completed in 2007 by Wilbur Smith Associates, Inc. Per the Executive Summary, most the funding for the plan was from the FAA with the intent of providing the Vermont Agency of Transportation and the airport sponsors with future development guidance for the 16 system airports. The primary objectives of the update were threefold:

- Identify and analyze aviation assets and needs of the State to assure that aviation performs the role needed for Vermont's economy and Citizens
- Provide continued guidance for development of a system of airports to meet the State's existing and future air transportation needs, identifying 5, 10 and 20-year projects and giving guidance to meet associated needs.
- Build consensus among public policy makers, airport sponsors and users so that the plan's recommendations can be more readily accomplished[2].

System airports were grouped into categories based on their service and activity levels, and other factors such as the type of approaches, runway length and economic impact, among others.

The Plan also details the goals of the Vermont Agency of Transportation in carrying out their mission. Per the Plan, their goals are:

- Provide a system of airports accessible for people and goods from both the ground and the air throughout the State.
- Provide intermodal ground access opportunities and/or services such as rental car, taxi, bus or bike.
- Preserve and enhance Vermont's existing airport system's infrastructure investment through maintenance and rehabilitation to meet future growth and demand as well as providing new infrastructure to meet future needs in support of the national air transportation system when needed.
- Plan for future airport development and protect public investment in airports through promotion of compatible land use in the vicinity of airports.
- Provide a safe and secure system of airports that meets state and federal guidelines, including routine inspections of airports through the 5010 Program.
- Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing to support the Agency's mission.
- Make timely, sound infrastructure investments derived from airport master plans and based on priorities that are determined through coordination with Vermont's aviation stakeholders, including use of the Vermont Airport Capital Facilities Program.
- Maintain commercial air service at Rutland State Airport and support its development elsewhere in the state, as well as encourage additional commercial and cargo services where appropriate.

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[2] Vermont Agency of Transportation. *Vermont Airport System and Policy Plan.* February 2007. Web. 28, September 2017

- Maintain an up-to-date integrated database of air and landside facilities including capital plans and improvements, leaseholds, contacts, relevant zoning as well as the system's performance measures.
- Strive to generate appropriate revenues from the operation of State-owned airports in support of their continued operation and expansion utilizing a business-oriented approach[3].

The Plan goes on to detail recommended aviation policies, many of which are still relevant today. They were:

1. Advocate for the promotion of aviation and airports, including education of youth and flight training to promote sustainability in Vermont's aviation industry.
2. Maintain all 10 State-owned airports in order to keep them open and safe.
3. Maintain adequate access to public-use commercial and general aviation airports for all areas of Vermont.
4. Promote generating appropriate revenues from the operation of State-owned airports utilizing a business-oriented approach.
5. Promote development of facilities at State-owned airports in response to demand including tie-down areas and hangars, including associated surface access and utilities either with State or private funding.
6. Implement an updated computerized Airport Management System such as Airport IQ consistent with the Strategic Enterprise Initiative that is based on achieving the performance targets set for the Airport system, with a high priority given to the matching of available federal funds.
7. Support federal passenger Essential Air Service subsidies at Rutland State Airport and continued growth of passenger service at Burlington International Airport and encourage new passenger service development such as charter and other services through marketing and promotion.
8. Promote compatible land use near airports.
9. Utilize an asset management approach to ensure appropriate maintenance and investment in existing airport assets.
10. Seek adequate and stable funding and resources from all available sources to support the State's goals, missions and policies.
11. Promote airports as economic generators and catalysts.
12. Promote establishment of a statewide airports council to provide a forum for Vermont's airport operators, both public and private, to discuss current issues, activities, and processes to assist in enhancing Vermont's airport system.
13. Evaluate and seek changes to plans and facilities to respond to new technology and aircraft fleets to accommodate future air transportation needs.
14. Encourage private use airports to consider transition to public use, if appropriate.

The 2007 plan began with an inventory of existing airports and their attributes, including activity levels, physical characteristics, location within the state and economic impact, among others.

[3] IBID

System airports were grouped into four general roles depending on the existing attributes. The roles included National Service Airports, Regional Service Airports, Local Service Airports and Specialty Airports.

A detailed forecast was then laid out for the planning period. It included population projections by county and employment projections. The forecast was broken down into general aviation forecasts for the bulk of the system airports and commercial service forecasts for Burlington International and Rutland State.

Next, the Plan delved into facility and service objectives where minimum standards were established for the four airport roles in the areas of function, activity, facilities/services and runway length. The standards for each role were further broken down into specific considerations including Airport Reference Code, approach types, ground communications, etc. Finally, benchmarks were established for each of the individual considerations for the airports in the system to work toward throughout the planning period.

The next chapter considered the future of the Airport system in Vermont. This chapter attempted to address future system performance in the context of airport accessibility, airport development and safety and security. Again, several benchmarks were established as to how the individual airports and the system as a whole might evolve in order to meet the state's air transportation needs.

The Plan concluded with the role, vision and mission of the Vermont Agency of Transportation as to how the individual airports, and the system could improve to meet future demand.

3.2.3. Inventory Process

The primary foundational element of any airport planning study is an inventory effort, which ensures that the most current and accurate information is considered during the conduct of the study. As such, an extensive and comprehensive data collection process was initiated to collect current relevant data for the VASP. Two types of data were collected from the airports: 1.) airport specific data such as airside and landside facilities, and 2.) economic data specific to the airports, tenants and airport users.

The process involved the following steps:

- A Comprehensive Airport Inventory and Data Survey to collect qualitative and quantitative data pertaining to infrastructure facilities at each airport, aeronautical services available, and activity characteristics.

- Collection of information from Vermont Agency of Transportation (VTRANS) such as Airport Master Plans, Airport Layout Plans, and Capital Improvement Programs.

The Airport Inventory and Data Survey provided the foundation of relevant data for system airports. Survey completion was performed by VTRANS staff for state-owned airports, and privately-owned airports were contacted directly to participate in the Survey. A copy of the airport Inventory and Data Survey is provided in Appendix A.

3.3. AIRPORT INVENTORY DATA

This section presents data collected for Vermont system airports via the inventory process previously described. Data for system airports is organized and presented in the following sections:

- General Airport Information
- Airside Facilities
- Landside Facilities and Services
- Airport Activity Data

3.3.1. General Airport Information

As previously stated, the Vermont Airport system is comprised of 16 public-use airports. Eleven airports are classified as General Aviation airports in the NPIAS. Burlington International is classified as a Primary Commercial Service Airport, and Rutland-Southern Vermont Regional is classified as a Regional airport. Three Vermont Airport system airports are not included in the current NPIAS. General airport information from the survey is presented in **Table 3-1.** Basin Harbor, Deerfield Valley Regional, Shelburne and John H. Boylan State Airports are not included in the current NPIAS, and as such are not eligible for AIP funding.

Table 3-1: VASP Airport General Information

Airport Name	Airport ID	Associated City	Ownership	NPIAS Status
Basin Harbor	B06	Vergennes	Private	N/A
Burlington International	BTV	Burlington	Public	Primary
Caledonia County State	CDA	Lyndonville	Public	General Aviation
Deerfield Valley Regional	4V8	West Dover	Private	N/A
Edward F. Knapp State	MPV	Barre/Montpelier	Public	General Aviation
Franklin County State	FSO	Highgate	Public	General Aviation
Hartness State	VSF	Springfield	Public	General Aviation
John H. Boylan State	5B1	Island Pond	Public	N/A
Middlebury State	6B0	Middlebury	Public	General Aviation
Morrisville-Stowe State	MVL	Morrisville	Public	General Aviation
Northeast Kingdom International	EFK	Newport	Public	General Aviation
Post Mills	2B9	Post Mills	Private	General Aviation
Rutland - Southern Vermont Regional	RUT	Rutland	Public	Reliever
Shelburne	VT8	Shelburne	Private	N/A
Warren-Sugarbush	0B7	Warren	Private	General Aviation
William H. Morse State	DDH	Bennington	Public	General Aviation

Source(s): Airport Master Record, 2017. FAA, NPIAS, 2017-2021.

3.3.2. Airside Facilities

This section presents and summarizes airside facility information collected for system airports. Airside facilities include runways, taxiways, associated visual and navigational aids, and the communication and weather reporting infrastructure utilized to support aircraft operations. This information for Vermont's Airport System is described in the following sections, and presented in **Table 3-2:** and **Table 3-3:**.

- Runway Information
- Runway Lighting
- Taxiway Coverage
- Approach Type
- Visual and Navigational Aids (NAVAIDS), Weather Reporting, and Communications

Runway Information

Runways are the most critical facilities on an airport because runway length, surface type, and width determines the types of aircraft that can safely operate at an airport. Other airport infrastructure facilities and services available are generally configured to support the most demanding types of aircraft that can operate there. In this way, the full complement of runway and associated facilities at an airport affect the type of aeronautical activity that can occur, driving decisions by aircraft owners and operators that exercise choices regarding which airports they will use.

As shown in Table 3-2:, five (5) of the system airports have a primary runway length greater than 5,000 feet. The longest runway in the system is at Burlington International, which boasts a primary runway length of more than 8,300 feet. For planning purposes, a runway length of 5,000 feet or greater is typically benchmarked as the minimum to accommodate sophisticated turbo-prop and jet aircraft most often in service by business/corporate operators.

The shortest paved runways at system airports are between 2,500 and 3,700 feet and are as follows:

- Caledonia County State (3,300 feet)
- Deerfield Valley Regional (2,650 feet)
- Franklin County State (3,000 feet)
- Middlebury State (2,500 feet)
- Morrisville-Stowe State (3,700 feet)
- Warren-Sugarbush (2,575 feet)
- William H. Morse State (3,704 feet).

Runways at Basin Harbor, John H. Boylan State, Post Mills, and Shelburne Airports are unpaved.

In terms of primary runway widths, four state-owned system airports offer primary runways of 100 feet, and Burlington International has a width of 150 feet. The remaining system airports have runway widths that range from 30 feet to 90 feet.

Five (5) system airports offer paved secondary, or crosswind runways (not shown in Table 3-2). These airports are: Burlington International (4,112 feet), Edward F. Knapp (3,000 feet), Hartness State (3,000 feet), Northeast Kingdom International (3,996 feet), and Rutland-Southern Vermont Regional (3,170 feet). Post Mills offers a turf crosswind runway of 2,300 feet in length.

Runway Lighting

Runway lighting provides the use of the airport at night or use during poor weather conditions. The types of runway lighting include High Intensity Runway Lighting (HIRL), Medium Intensity Runway Lighting (MIRL) Low Intensity Runway Lighting (LIRL), and Runway End Indicator Lighting (REIL). As shown in Table 3-2:, eight (8) state-owned airports employ MIRL and REIL. Burlington International offers HIRL, and Deerfield Valley offers MIRL. The remaining six (6) system airports do not have runway lighting.

Taxiway Type and Lighting

Table 3-2: also presents the type of taxiways in place for each system airport's primary runway. A full-length taxiway is a taxiway that spans the entire length of the primary runway. A partial-length taxiway spans only part of the length of its associated primary runway. Runways without a taxiway system may have a turnaround at one or both ends of the runway for aircraft to reverse direction and perform other operations off the runway. Additionally, stub taxiways are also shown for system airports without parallel taxiways. A stub taxiway is defined as one that connects a runway to a parallel taxiway or a runway or taxiway to an adjacent apron area. An airport's taxiway "coverage" contributes to the runway's capacity for accommodating higher volumes of aircraft operations, such that taxiway pavement is available to perform off-runway operations prior to take-off and after landing. In this way, parallel taxiways offer greater coverage than turnarounds and stubs.

As shown, three (3) system airports offer a full parallel taxiway, with Burlington International offering dual full parallel taxiways to serve the primary runway. Four (4) airports have a partial parallel taxiway, five (5) airports have turnarounds at runway ends, and four (4) airports have taxiway stubs connecting aprons with runways. The airports with unpaved, turf runways do not have designated taxiways. Airports with turnarounds only or stubs connecting to aprons require aircraft to back-taxi to either depart or taxi to the apron upon landing.

Burlington International is the only system airport with taxiway lighting (Medium Intensity Taxiway Lighting, MITL)

Approach Type

During periods of low visibility, pilots rely on NAVAIDS and instruments to operate aircraft to a point when a runway element is visually acquired. An instrument approach procedure is the means by which pilots perform such operations; however, not all airports offer an instrument approach. Therefore, operations at airports without an instrument approach have visual approaches. An approach is referred to as precision (used during the most restrictive visibility conditions), non-precision, or circling approach (used under the least restrictive conditions). Precision approaches have both lateral and vertical guidance equipment, while non-precision offer lateral guidance only.

As presented in Table 3-2:, three (3) of Vermont's system airports have precision instrument approach procedures and six (6) system airports have non-precision instrument approaches. The remaining seven (7) airports have visual approaches with no approach procedures. The primary approach systems in place for primary runways at system airports are Instrument Landing Systems (ILS) and non-precision approaches such as Area Navigation Global Positioning Systems (RNAV/GPS). For system planning purposes, the most important consideration for evaluating approach systems is the existence or lack of these systems - not the specific type of equipment installed.

Table 3-2: Primary Runway, Taxiway Facilities & Approach Facilities

Airport Name	Primary Runway		Runway Lighting	Taxiway Type / Lighting (Type/N)	Best Approach
	Length	Width			
Basin Harbor	3,000	90	N/A	N / N	Visual
Burlington International	8,319	150	HIGH / ALS	Full Parallel (Dual) / MITL	Precision
Caledonia County State	3,300	60	MED / REIL	Partial, Stubs / N	Non-Precision
Deerfield Valley Regional	2,650	75	MED	Stubs / N	Visual
Edward F. Knapp State	5,002	100	MED / REIL	Full Parallel / MITL	Precision
Franklin County State	3,000	60	MED / REIL	Stub,Taxilane / Med PCL	Non-Precision
Hartness State	5,501	100	MED / REIL	Stubs, Turnaround / N	Non-Precision
John H Boylan State	2,650	120	N/A	N / N	Visual
Middlebury State	2,500	50	N/A	Full Parallel / N	Visual
Morrisville- Stowe State	3,700	75	HIGH / REIL	Stubs / N	Non-Precision
Northeast Kingdom International	5,000	100	MED / REIL	Partial, Turnaround / N	Non-Precision
Post Mills	2,900	80	N/A	N / N	Visual
Rutland - Southern Vermont Regional	5,003	100	MED / REIL	Partial / MITL	Precision
Shelburne	3,077	60	N/A	N / N	Visual
Warren-Sugarbush	2,575	30	N/A	Turnaround / N	Visual
William H. Morse State	3,704	75	HIGH / REIL	Partial Parallel / MITL	Non-Precision

Source: Airport Master Record, 2017. Airport Surveys, 2017.

Visual and Navigational Aids (NAVAIDS), Weather Reporting, and Communications

In addition to runway lighting and approach procedures at system airports, system planning considers other visual aids and NAVAIDS as well as weather reporting and air traffic communications facilities that aid in safe operations for aircraft operators. **Table 3-3:** lists the availability of Air Traffic Control Towers (ATCT), communications systems, approach lighting and vertical guidance systems, weather reporting equipment, and visual aids such as rotating beacons, wind indicators, and segmented circles.

Communications Systems: The only system airport with an ATCT in the Vermont system is Burlington International. Therefore, most general aviation operations in Vermont occur in uncontrolled airspace and utilize Common Traffic Advisory Frequency (CTAF) and Universal Communications (UNICOM) station communications. A CTAF/UNICOM station is provided at all system airports, and operating procedures require pilots to communicate position and intentions with one another whether operating in the airport traffic pattern or moving on the airport runway and taxiway system.

Approach Lighting and Vertical Guidance Systems: Approach Lighting Systems (ALS) are a configuration of sequenced signal lights that guide pilots on approach to the runway threshold. An ALS is typically installed to serve runways with an instrument approach procedure. Approach lights also provide additional visual guidance for nighttime approaches under Visual Flight Rules (VFR) or poor weather conditions during Instrument Flight Rules (IFR). As shown in **Table 3-3:**, ALS is available at Burlington International Airport, Edward F. Knapp State, and Rutland-Southern Vermont Regional.

Table 3-3: also shows that Visual Glide Slope Indicators (VGSI) are available at eight (8) system airports. VGSI equipment installations at system airports vary between several Visual Approach Slope Indicators (VASI) and Precision Approach Path Indicators (PAPI) variants.

Weather Reporting: Automated weather reporting systems are a great benefit to pilots. The most common types of weather reporting systems are Automated Weather Observing Systems (AWOS) and Automated Surface Observation Systems (ASOS). ASOS installations report wind, visibility, cloud height, temperature, dew point, pressure, and precipitation. There are several variations of AWOS in use at Vermont system airports, such as AWOS III and AWOS III-PT. However, for system planning purposes, the most important consideration for weather reporting systems is the presence of weather reporting equipment or lack of weather reporting.

As shown in **Table 3-3:**, ten system airports offer weather reporting systems. System airports without automated weather reporting systems are Basin Harbor, Deerfield Valley Regional, John H. Boylan State, Post Mills, Shelburne, and Warren-Sugarbush. It should be noted that the system airports without weather reporting are either attended irregularly, unattended, or are seasonal facilities closed during the months of October through April.

Other Visual Aids: The following visual aids are in place at system airports:

- Rotating Beacon: A rotating beacon helps pilots locate the airport at night and during periods of low visibility. Eight (8) system airports have a rotating beacon.
- Wind Indicator: A wind indicator provides wind direction information to pilots, and are often lighted for night operations. All system airports have wind indicators, eight of which are lighted.
- Segmented Circle: A segmented circle shows pilots information on the traffic pattern visually, without use of ATC communication. Ten (10) system airports have a segmented circle.

Table 3-3: Visual & NAVAIDS, Weather Reporting Capability, & Communication Equipment

Airport Name	ATCT/ CTAF	Approach Lighting/ Vertical Guidance	Weather Reporting	Rotating Beacon	Wind Indicator (Lighted Y-L)	Segmented Circle
Basin Harbor	N / Y	N / N	N	N	Y	N
Burlington International	Y / Y	Y / Y	ASOS	Y	Y-L	N
Caledonia County State	N / Y	N / N	AWOS-3	Y	Y-L	Y
Deerfield Valley Regional	N / Y	N / N	N	N	Y-L	N
Edward F. Knapp State	N / Y	Y / Y	ASOS	Y	Y	Y
Franklin County State	N / Y	N / Y	AWOS-3	Y	Y-L	Y
Hartness State	N / Y	N / Y	ASOS	Y	Y-L	N
John H Boylan State	N / Y	N / N	N	N	Y	Y
Middlebury State	N / Y	N / N	ASOS-4	N	Y	Y
Morrisville- Stowe State	N / Y	N / Y	ASOS	Y	Y-L	Y
Northeast Kingdom International	N / Y	N / Y	AWOS-3	Y	Y-L	Y
Post Mills	N / Y	N / N	N	N	Y	N
Rutland - Southern Vermont Regional	N / Y	Y / Y	AWOS-3PT	Y	Y-L	Y
Shelburne	N / Y	N / N	N	N	Y	N
Warren-Sugarbush	N / Y	N / N	N	N	Y	Y
William H. Morse State	N / Y	N / Y	ASOS	Y	Y-L	Y

Source: Airport Master Record, 2017. Airport Surveys, 2017.

3.3.3. Landside Facilities and Services

This section presents and summarizes landside facility information collected for system airports. Landside facilities include: terminal buildings, other airport buildings, fuel farms, hangars, T-hangars, aprons, automobile parking facilities and services such as flight training, aircraft rental, snow removal, and courtesy cars.

Landside facility information for the Vermont Airport system airports is described in the following sections, and presented in Table 3-4:, Table 3-5:, Table 3-6:, and Table 3-7::

- Fueling Services
- Aircraft Storage
- Operator and Passenger Services

Fueling Services

Aviation fuel type and fueling services available at Vermont Airport system airports is tantamount to the critical importance of primary runway length. In this regard, the availability of aviation fuel at Vermont Airport system airports is an indicator of the system's ability to accommodate demand by type of aircraft in Vermont. Additionally, the availability of fuel - especially during periods when an airport is unattended or at facilities that do not have full-time line service staff - provides insight into the system's ability to service users operating after hours or for aircraft in flight that may need to refuel. Finally, ownership of fueling facilities at system airports is an indicator of whether the airport sponsor benefits from the fuel sales profit margin. For airports with fuel facilities owned by an FBO, sponsors typically receive a fraction of the fuel profit margin in the form of a fuel flowage fee. **Table 3-4:** presents fueling services available at system airports.

Table 3-4: VASP – Fueling Services Available

Airport Name	AvGas	Jet A	Fuel Farm Own/Ops	Fuel Service Availability	Self-Fueling
Basin Harbor	N	N	N/A	N/A	N/A
Burlington International	Y	Y	FBO/FBO	24-Hours	Y
Caledonia County State	Y	N	Sponsor	24-Hours	Y
Deerfield Valley Regional	N	N	N/A	N/A	N/A
Edward F. Knapp State	Y	Y	N/A	PT	N
Franklin County State	Y	Y	Sponsor/FBO	24-Hours	Y
Hartness State	Y	Y	N/A	N/A	Y
John H Boylan State	N	N	N/A	N/A	N/A
Middlebury State	Y	N	Sponsor/Sponsor	24-Hours	Y
Morrisville- Stowe State	Y	Y	Sponsor/FBO	24-Hours	Y
Northeast Kingdom International	Y	Y	FBO/FBO	24-Hours	Y
Post Mills	N	N	N/A	N/A	N/A
Rutland - Southern Vermont Regional	Y	Y	Sponsor/FBO	24-Hours	Y
Shelburne	N[1/]	N	Sponsor	On-Call	N
Warren-Sugarbush	Y	N	Sponsor	PT	Y
William H. Morse State	Y	Y	Sponsor/FBO	24-Hours	Y

Source: Airport Surveys, 2017.
1/ Shelburne Airport provides MoGas fuel for use in piston aircraft.

As shown, eleven system airports offer AvGas (100LL) fuel, and eight system airports offer Jet A fuel. Motor vehicle fuel (MoGas) for aviation use is offered at Shelburne Airport. Additionally, eleven system airports offer some level of after-hours/24-hour fueling service, whether it be self-

serve or on-call assistance made through prior arrangement. Six system airports do not offer self-fueling services.

Aircraft Storage

Aircraft storage at airports consists primarily of hangars and tie-down/apron parking. Hangar types vary from airport to airport, but typically include T-hangars and conventional or "box" hangars. T-hangars are individual units constructed as multi-bay covered structures, most suitable for storing single-engine piston aircraft and small twin-engine aircraft. Conventional hangars are free-standing, covered buildings for storing larger twin-engine and jet aircraft. Some conventional hangars are utilized to store multiple aircraft as a "community" hangar.

Hangars can be constructed and/or owned by the airport sponsor, private individual, or business/corporate operator and typically depends upon the demand for covered and secure storage at each facility.

A third option for storing aircraft at an airport is on an apron utilizing tie-down spaces. Aircraft tie-down spaces are individual, outdoor locations where aircraft are tied-down and stored. Larger airports will maintain paved tie-down spaces, while smaller general aviation facilities often have grass tie-down areas.

Table 3-5: lists the types of aircraft storage facilities available at each system airport. Also included is information pertaining to hangar ownership (sponsor/private) and waiting lists for hangars at system airports.

Table 3-5: VASP – Aircraft Storage Available

Airport Name	T-Hangars		Conventional Hangars		Wait List	Tie-Downs
	Total	Sponsor/ Private	Total	Sponsor/ Private		
Basin Harbor	-	-	-	-	-	-
Burlington International	12	0 / 12	4	1 / 3	Y (10)	18
Caledonia County State	8	0 / 8	6	2 / 4	N	21
Deerfield Valley Regional	-	-	-	-	-	-
Edward F. Knapp State	0	N/A	31	3 / 28	N	39
Franklin County State	4	0 / 4	38	2 / 31	Y (8)	41
Hartness State	-	-	-	-	-	-
John H Boylan State	0	N/A	3	0 / 3	N	10
Middlebury State	12	1 / 11	11	2 / 9	Y (6)	73
Morrisville- Stowe State	19	0/19	1	1 / 0	Y (22)	25
Northeast Kingdom International	0	N/A	16	2 / 14	N	56
Post Mills	-	-	-	-	-	-
Rutland - Southern Vermont Regional	-	-	-	-	-	-
Shelburne	-	-	-	-	-	-
Warren-Sugarbush	0	N/A	5	0 / 5	N	4
William H. Morse State	20	0 / 20	2	1 / 1	N	40
Total	**75**		**117**		**46**	**327**

Source: Airport Surveys, 2017.

As shown in **Table 3-5:**, there are a total of 75 T-hangars at Vermont system airports, along with 117 conventional or box hangars. As reported by Airport survey participants, there are currently 46 aircraft operators on waiting lists for hangar storage facilities at four system airports.

Ownership of hangar facilities at system airports is predominantly private, with 99 percent of T-hangars and 84 percent of conventional hangars owned by private interests, respectively.

Completed surveys indicated that system airports have 327 tie-down spaces, of which 201 (approximately 62 percent) are utilized for based aircraft.

Operator and Passenger Services

Airports offer a range of services to operators and passengers, whether they be managed by the airport sponsor, FBOs, or other on-airport service providers. **Table 3-6**: and **Table 3-7**: present a snapshot of services offered at each system airport, which are described below:

- **Terminal Building:** Terminal facilities can be provided by either the airport sponsor or an FBO. For the purposes of the VASP, an airport building is considered a terminal if it is

accessible to the public and has basic amenities such as restrooms. Twelve (12) system airports have terminal buildings.

- **Fixed Base Operator:** FBO's provide essential services for operators and their passengers, and oftentimes serve as the "face" of an airport to these users. As indicated in **Table 3-6:**, 11 system airports offer FBOs.

- **Courtesy Car:** A courtesy car is one that is maintained on-airport by the sponsor, FBO, or other service provider, which is offered to aircraft crews and operators free of charge. Three (3) system airports offer a courtesy car for these purposes.

- **Flight Instruction:** Flight instruction refers to either a flight school that is established and located at an airport, or individual flight instructors that offer instruction services. Seven (7) system airports reported flight instruction availability at their airport. For the purpose of the VASP, Aviation Career Education (ACE) Camps sponsored by VTRANS and soaring instruction offered at Morrisville-Stowe, Warren-Sugarbush, and Hartness State Airports is not considered flight instruction.

- **Airframe and Power Plant Repairs:** Airframe repair services at airports can include both minor and major repairs by technicians certified to repair various types of aircraft structural components. Powerplant repair services at airports refers to technicians certified to perform minor and major repairs on a variety of aircraft engines. As shown, nine (9) system airports offer some level of airframe and powerplant repairs.

- **Avionics Sales/Repair:** Avionics sales or repair services indicates whether radio, navigation instrument, and other electronic gear repairs are available for purchase and installation, or if repair services are offered at the airport. **Table 3-6**: shows that five (4) system airports offer avionics services.

- **Aircraft Sales:** Aircraft sales refers to businesses located on-airport that sell aircraft, but does not include aircraft sold by private individuals. As shown in **Table 3-7**: Franklin County State is the only system airport with a business engaged in aircraft sales.

- **Deicing:** Deicing services commonly refers to chemical deicing capability, but also includes radiant (a heated hangar) that is available to deice aircraft. As shown in **Table 3-7:**, seven (7) system airports offer deicing services.

- **Snow Removal:** The survey inquired about the existence of snow removal equipment on each system airport. Nine (9) system airports provide snow removal.

- **Lavatory:** Lavatory service is the sanitary disposal of aircraft lavatory holding tanks. Burlington International is the only system airport that provides lavatory service.

- **Ground Transportation:** Ground transportation at airports includes the availability of public bus service, taxi service, intermodal connectivity with local transit lines, as well as rental cars, private limousine, or executive coach providers. **Table 3-7**: shows nine system airports reported the availability of ground transportation for operators and passengers. Burlington International and Morrisville-Stowe are accessible via Green Mountain Transit bus service routes.

Table 3-6: Operator and Passenger Services

Airport Name	Terminal Building	FBO	Courtesy Car	Flight Instruction	Airframe/ PP Repair	Avionics
Basin Harbor	N	N	N	N	N	N
Burlington International	Y	Y	Y	Y	Y	Y
Caledonia County State	Y	N	N	N	N	N
Deerfield Valley Regional	N	N	N	N	N	N
Edward F. Knapp State	Y	Y	N	Y	Y	N
Franklin County State	Y	Y	Y	Y	Y	Y
Hartness State	Y	Y	-	Y	Y	N
John H Boylan State	N	N	N	N	N	N
Middlebury State	Y	Y	N	N	Y	N
Morrisville- Stowe State	Y	Y	N	N	Y	Y
Northeast Kingdom International	Y	Y	Y	Y	Y	N
Post Mills	N	N	N	N	N	N
Rutland - Southern Vermont Regional	Y	Y	N	Y	Y	Y
Shelburne	Y	Y	-	Y	Y	N
Warren-Sugarbush	Y	Y	N	Y	N	N
William H. Morse State	Y	Y	Y	Y	Y	Y

Table 3-7: Operator and Passenger Services

Airport Name	Aircraft Sales	Deicing	Snow Removal	Lavatory	Ground Transport
Basin Harbor	N	N	N	N	N
Burlington International	N	Y	Y	Y	Y
Caledonia County State	N	N	Y	N	N
Deerfield Valley Regional	N	N	N	N	N
Edward F. Knapp State	N	Y	Y	N	Y
Franklin County State	Y	Y	Y	N	Y
Hartness State	N	-	-	-	-
John H Boylan State	N	N	N	N	-
Middlebury State	N	N	Y	N	Y
Morrisville- Stowe State	N	Y	Y	N	Y
Northeast Kingdom International	N	Y	Y	N	Y
Post Mills	N	N	N	N	N
Rutland - Southern Vermont Regional	-	Y	Y	-	Y
Shelburne	N	N	N	N	N
Warren-Sugarbush	N	N	N	N	Y
William H. Morse State	N	Y	Y	N	Y

Source: Airport Surveys, 2017.

3.3.4. Airport Activity Data

This section presents and summarizes airport activity information collected for system airports. Activity at an airport is measured in terms of based aircraft and operations. Both aircraft type and operations are factors utilized in *Chapter 5., Aviation Forecasts*.

Table 3-8: displays the most recent count available for each system airport's total number of based aircraft by type. As indicated, system airports are a base of operations for 462 single, multi, and jet aircraft fixed wing aircraft, most of which (430) are single-engine piston aircraft. There are 16 based multi-engine aircraft, 16 based jet aircraft, and 12 based helicopters.

Table 3-8: VASP – Based Aircraft by Type

Airport Name	Single Engine	Multi-Engine	Jet	Helo	Other	Military	Total[1/]
Basin Harbor	-	-	-	-	-	-	0
Burlington International	62	3	14	1	-	28	79
Caledonia County State	18	-	-	-	-	-	18
Deerfield Valley Regional	5	2	-	7	-	-	7
Edward F. Knapp State	50	2	-	1	-	-	52
Franklin County State	85	2	1	-	-	-	88
Hartness State	19	-	-	-	8	-	19
John H Boylan State	3	-	-	-	2	-	3
Middlebury State	32	1	1	1	1	-	34
Morrisville - Stowe State	25	3	-	-	6	-	28
Northeast Kingdom International	19	1	-	-	-	-	20
Post Mills	-	-	-	-	9	-	0
Rutland - Southern Vermont Regional	29	-	-	-	1	-	29
Shelburne	53	-	-	-	4	-	53
Warren-Sugarbush	-	-	-	-	50	-	0
William H. Morse State	30	2	-	2	6	-	34
Total – VASP Airports	**430**	**16**	**16**	**12**	**87**	**28**	**464**
Additional – Non-VASP Airports[2/]	**-**	**-**	**-**	**-**	**-**	**-**	**68**

Source: Airport Surveys, 2017. Airport Master Record, 2017.
[1/] Total Fixed Wing Aircraft
[2/] Additional fixed-wing and helicopter aircraft are based at approximately 50 private-use airports, landing fields, and seaplane bases throughout the State.

Among VASP Airports, including all helicopters, other aircraft such as gliders, ultra-light, and/or experimental aircraft, and military aircraft operated by the Vermont Air National Guard and the Army National Guard, there are 464 aircraft operating from Vermont system airports. Additionally, non-VASP airports account for 68 based aircraft, bringing the total number to over 530 based aircraft statewide.

Operations at general aviation airports are difficult to account for accurately. This is because there are no means of tabulating operations at most general aviation airports. Even at facilities with an operating ATCT, operations counts are only recorded during operating hours, after which operations are estimated. Fixed-base operators have noted inaccuracies in the data for airports they manage, and a recommendation of this VASP is to improve counting of aircraft operations to ensure reliable data.

Table 3-9: provides information regarding the most recent activity level estimated at each airport, and the type of operations (one landing and one takeoff equals two operations). These operation estimates are from two sources, Airport Surveys and the FAA Airport Master Record (5010 Form) data. FAA 5010 data was utilized where no estimate was provided by airport management.

Table 3-9: VASP – Annual Operations

Airport Name	Air Carrier	Air Taxi	GA Local	GA Itinerant	Military	Total
Basin Harbor	-	-	-	2,120	62	2,182
Burlington International	12,972	12,131	19,720	19,736	6,241	70,800
Caledonia County State	-	-	5,800	1,280	300	7,380
Deerfield Valley Regional	-	-	1,800	1,300	-	3,100
Edward F. Knapp State	-	625	14,500	8,000	1,000	24,125
Franklin County State	-	-	12,000		600	12,600
Hartness State	-	222	3,752	2,487	150	6,611
John H Boylan State	-	-	127	264	12	403
Middlebury State	-	-	7,200	2,900	800	10,900
Morrisville - Stowe State	-	127	5,023	954	254	6,358
Northeast Kingdom International	-	-	7,234	1,980	238	9,452
Post Mills	-	10	2,920	1,400	-	4,330
Rutland - Southern Vermont Regional	-	1,104	6,187	5,061	30	12,382
Shelburne	-	-	3,820	416	-	4,236
Warren-Sugarbush	-	-	16,520	1,100	-	17,620
William H. Morse State	-	200	1,200	570	100	2,070
Total	**12,972**	**14,419**	**107,803**	**47,448**	**9,725**	**192,367**

Source: Airport Surveys, 2017. Airport Master Record, 2017

General Aviation Activity Overview

The diversity in the general aviation activity at VASP airports is as varied as the general aviation industry itself. Airports across the state support all types of recreational, leisure, and business aviation on a year-round basis with airports near ski areas showing some seasonal variability. At the time of the previous system plan in 2007, the general aviation industry was considered relatively stable. While weakened by the effects of September 11, 2001, the effects were not as far reaching as they were for the airlines and commercial aviation.

General aviation activity, however, was greatly impacted by the sharp increase in the price of oil in 2008 that nearly tripled the cost of aviation fuel (Both 100LL and Jet A). This fuel spike occurred just prior to the economic recession in 2008-2009. All segments of general aviation activity were affected by the fuel costs and weak economy with reductions in both recreational and corporate activity occurring on the national level. A detailed discussion of the trends affecting the growth of general aviation can be found in *Chapter 5., Aviation Forecasts.*

Commercial Service Activity Overview

The airline industry is evolving rapidly to maintain sustained profitability as the economy continues to improve. There have been a number of airline mergers reducing overall system capacity and affecting individual market competition. These mergers have created more efficient airlines with

increased load factors and profits, primarily resulting from reduced competition and unbundled products driving new ancillary revenues for things such as checked baggage and seat assignments.

The decreases in fuel price across the country have also facilitated record profits for most U.S airlines in 2015. As of August 2017, this trend has plateaued, and airlines may be susceptible to the pressure of rising fuel costs once again. Recovery of the economy has led to steady increases in leisure and business travel while the airlines have continued slow growth in seating capacity. The bulk of the traffic growth has been occurring at large-hub airports where competition is at its greatest.

Some specific commercial service activity influencers include:

Pilot Supply – In recent years, the industry has begun to see impacts associated with a reduced number of pilots entering the aviation industry. Reduced pay, with the onset of regional jet flying in the 2000's, and regulatory changes requiring 1500 hours for first officers have added to an already increasingly expensive training process. These are compounding factors that will likely increase the severity of this issue in the coming years. Some industry groups also predict a similar shortage in qualified aircraft mechanics as well. Limited pilot supply is a contributing factor to the recent aircraft up gauging trend.

NextGen – For the past 10 years, the FAA has been incrementally implementing new technology with the broader goal of modernizing the nation's air traffic control system. Some of the key objectives involve improving the safety and efficiency of airspace in and around high-volume airport regions such as Atlanta, New York and Washington. These improvements may not have a noticeable impact on Vermont airport's operational efficiency; however, it may reduce delays to hub airports and provide the opportunity for additional schedule frequencies resulting in an improved passenger experience.

Fuel Prices – Over the past 10 years the aviation industry has demonstrated its sensitivity to fuel prices and their impact on operational cost and ultimately aviation demand. On average, fuel represents approximately one-third of the cost of commercial aviation activity. Thus, during spikes in fuel prices like in 2008, the impacts to both supply and demand are tremendous. Advancements in fuel technology will help reduce industry sensitivity to fuel although it will likely continue to be a key influencer for activity for some time.

Aircraft Technology – Over the past 20 years there have been significant advances and innovations to aviation and aircraft technology. With global positioning system (GPS) technology, unmanned aerial systems (UAS) and single pilot operations for complex aircraft systems, the next 20 years will likely yield numerous additional advances in technology that could impact various airline business models. Monitoring and maintaining an awareness of technology enhancements and potential applications for Vermont airports will help ensure the system is always well-positioned to respond to a changing industry.

- Burlington International Airport

Burlington International Airport is the only airport in the State served by a variety of network airlines, providing access for Vermont residents to the global air transportation network. Service provided under the major airline brands of American, Delta, JetBlue and United, though most

flights are operated by regional affiliate airlines. Porter Airlines seasonally flied between Burlington and Toronto, representing the only scheduled international service at the airport.

Airlines and their destinations offered from Burlington (as of October 2017) include:

- American/American Eagle - Charlotte, Philadelphia, Washington Reagan
- Delta/Delta Connection - Atlanta, Detroit, New York (LaGuardia and JFK)
- JetBlue - New York, JFK
- Porter - Toronto Billy Bishop
- United/United Express – Chicago O'Hare, Newark, Washington Dulles

In addition to passenger service, Burlington International also has air cargo serviced by both Fedex Express and Wiggins Airways (for UPS).

- Rutland-Southern Vermont Regional

Cape Air provides scheduled service from Rutland to Boston Logan International Airport with three daily departures. Service is provided on twin-piston engine 9-seat Cessna 402 aircraft. Cape Air has interline agreements with most major US carriers allowing for seamless ticketing and baggage connections to other flights allowing for one-stop service from Rutland to dozens of domestic and international destinations. Rutland had approximately 5,120 enplanements in 2016.

- Morrisville-Stowe State – (Non-Network).

Tradewinds aviation provides scheduled charter service to/from White Plains/Westchester County Airport with service typically aligned with weekend trips during peak seasons at varying frequencies. Service operated via the FBO at Westchester County Airport and not the passenger terminal. While this represents a type of commercial service, it does not provide the community with access to the global commercial air transportation network and therefore MVL is not considered a commercial service airport like Burlington or Rutland. Furthermore, the FAA threshold for commercial service airports is 2,500 annual enplanements. Morrisville-Stowe had approximately 265 enplanements in 2016 which represented a 390% increase over 2015.

3.4. Summary

The data in this inventory represents the basis for the VASP. The next chapter, *Chapter 4., Current System Performance* will utilize the facility and service objectives presented in *Chapter 2., System Parameters*, to evaluate the current performance of VASP airports against minimum facility and service objectives to identify quantitative deficiencies and qualitative gaps in service that will be addressed with recommendations at the conclusion of the VASP.

4. Current System Performance

4.1. INTRODUCTION

This chapter presents the analyses and results of evaluating the existing performance of the VASP airports. 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. VASP airports are illustrated by Airport Category in Figure 4-1.

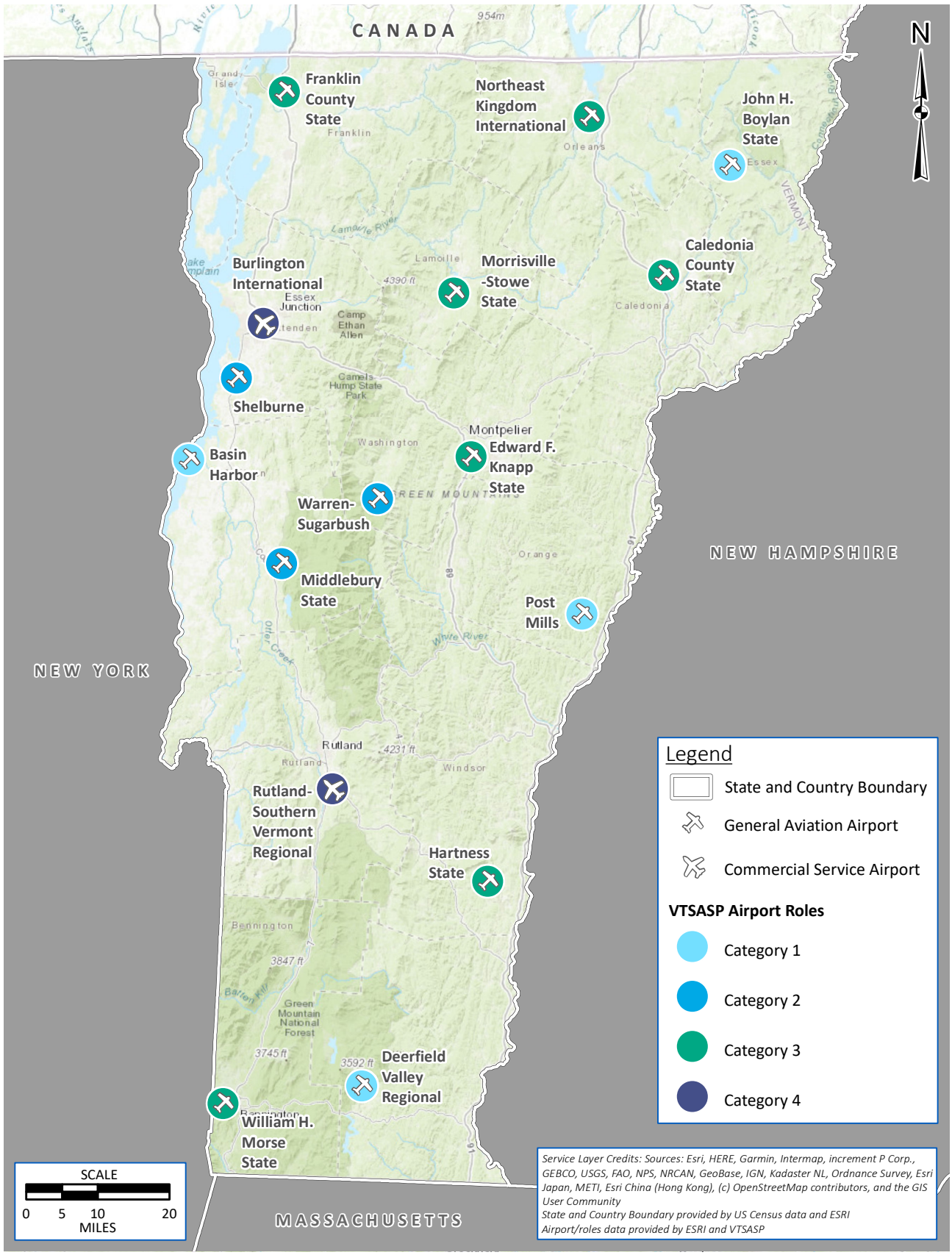
The second step in evaluating the performance of the existing system is to consider geographic performance metrics based on service areas. Geographic service areas for *ground access* are polygons that represent areas of the state that can reach a system airport within a 30-minute drive time for general 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 current VASP airports 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 airport 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



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4.2.1. System Performance Model

The analysis of statewide Airport system airports utilizes a weighted sum model to measure the performance of each system airport. The weighted sum model is designed such that each facility and service objective within each VASP 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 VASP 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[1]/	Weight[1]/	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.
[1]/ *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 VASP airport determine within which VASP 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 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 VASP Categories – have a greater impact to the Vermont State Airport System's performance. The quantitative analysis alone does not account for the unique combination of facilities, services, and operational nuances that truly distinguish some VASP 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 Airport System is presented in **Table 4-2**, sorted by score in ascending order.

Table 4-2: System Performance Results

Airport	Performance Score	VASP 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 Airport System places each VASP airport into a category based upon the value assigned to each minimum facility and service objective.

4.2.3. System Performance Results by VASP Category

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

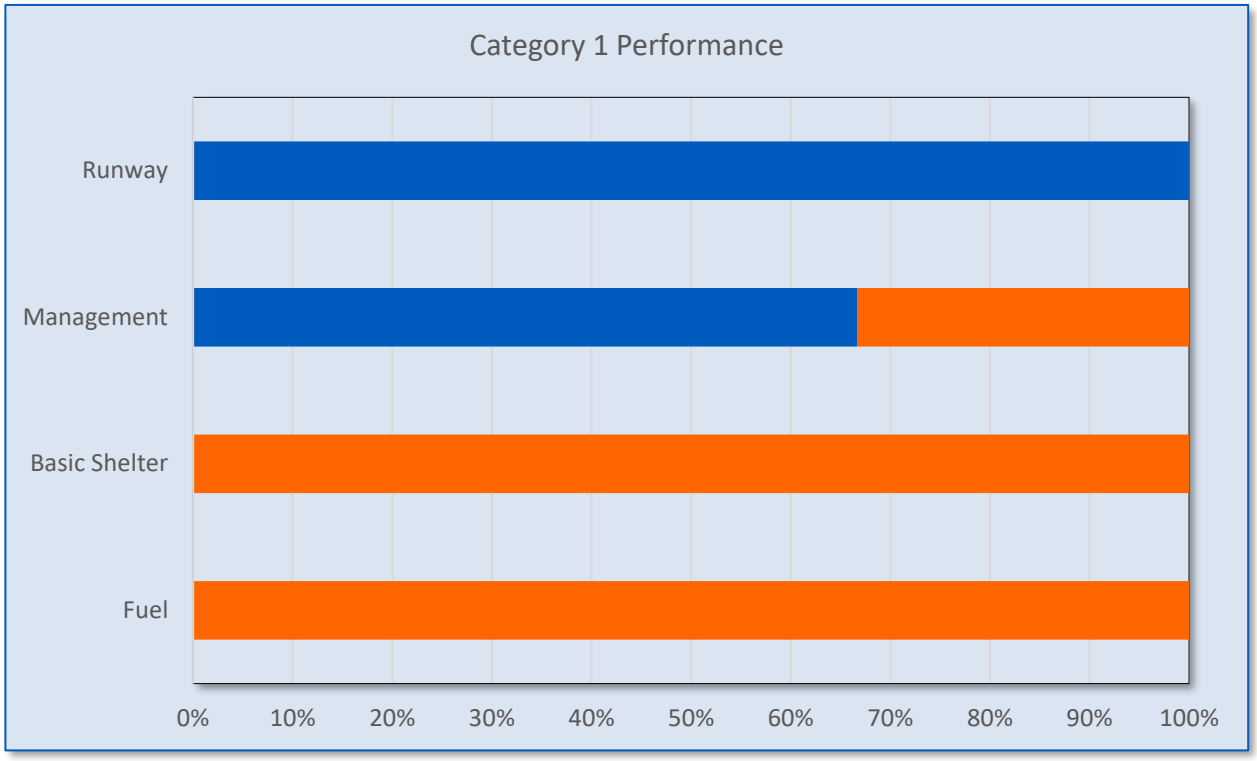
contribution that each airport's performance makes within their respective VASP airport category. The purpose of the weighted performance model is to identify areas of need at the VASP category level, which can guide decision-making for the short-, mid-, and long-term periods.

Category 1 Airports

Vermont Airport 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 Airport 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.

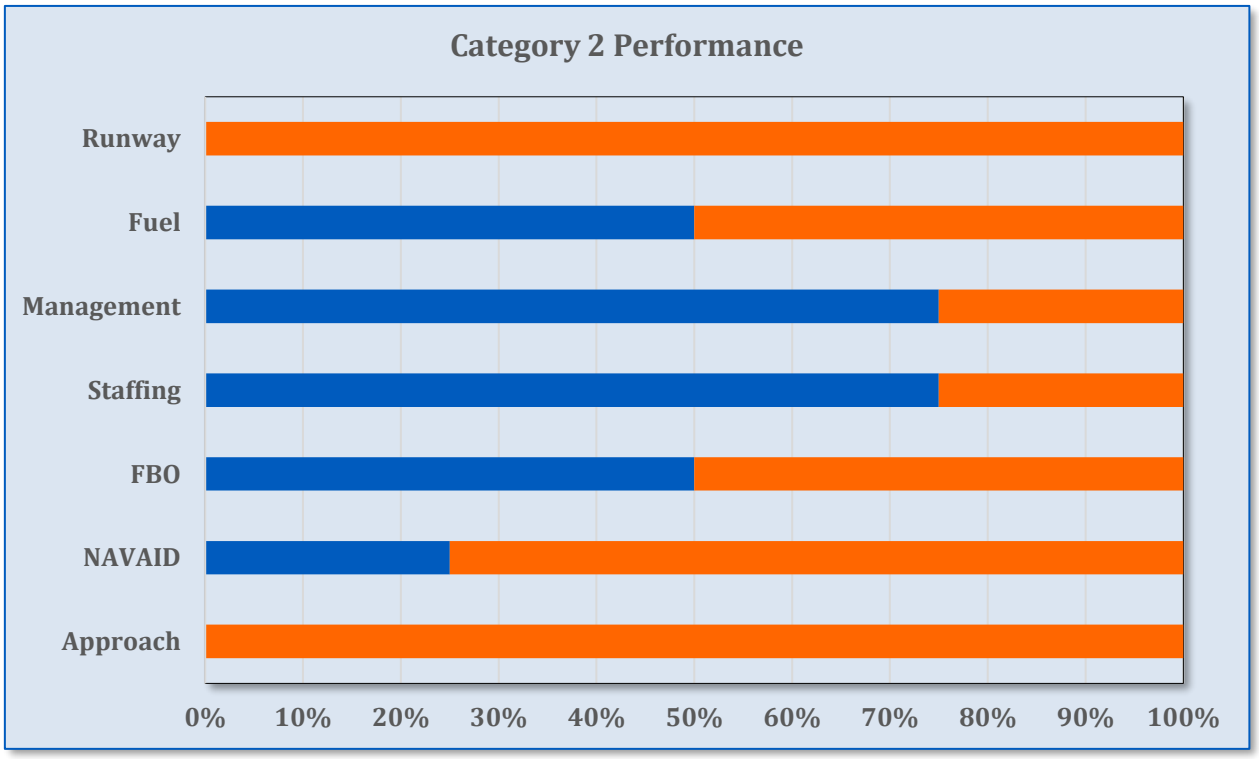
As shown in **Table 4-3**, all system airports in Category 1 meet the runway requirement (≥2,500 feet). Basin Harbor and Post Mills each meet the management requirement for part-time airport manager on-site. All Category 1 Airports do not have a basic shelter or offer aviation fuel services.

Category 2 Airports

Vermont Airport 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 Airport 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.

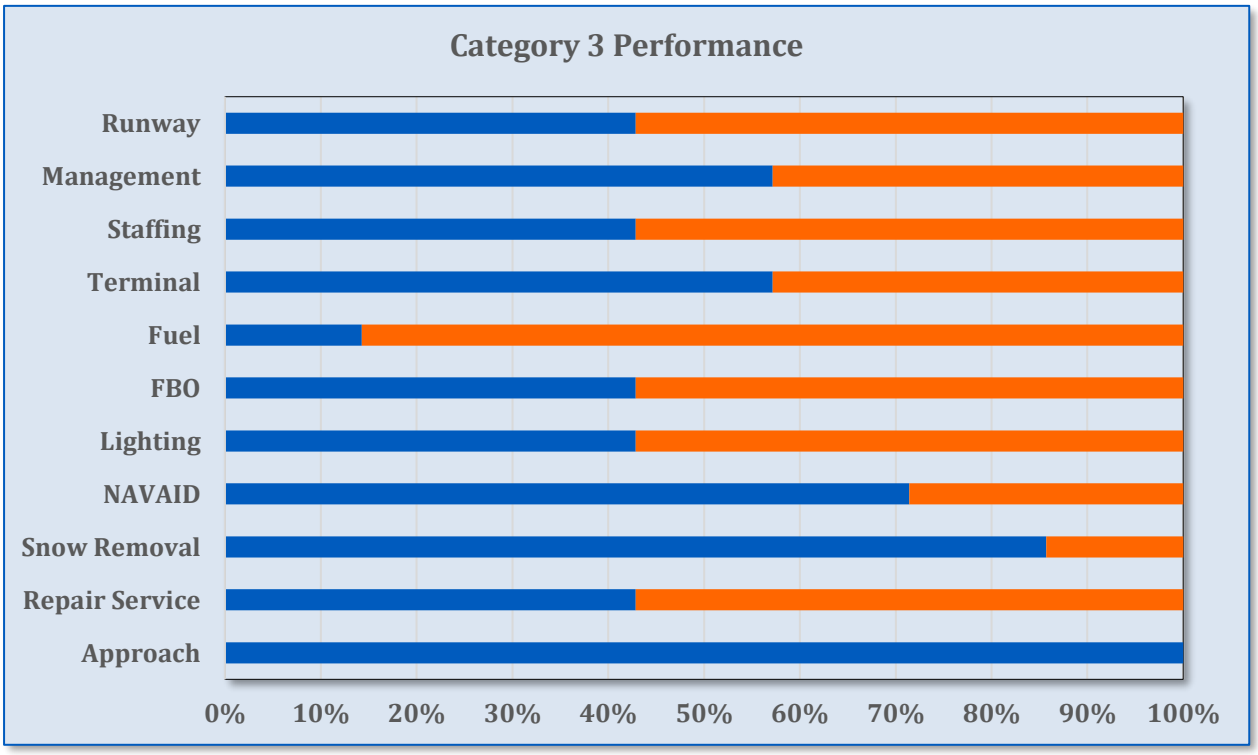
As shown in **Table 4-4**, no VASP airports in Category 2 meet the minimum requirements for primary runway length (≥4,000 feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. However, as shown in the accompanying chart, a qualitative adjustment is made to the Category's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

Category 3 Airports

VASP 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 Airport 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.

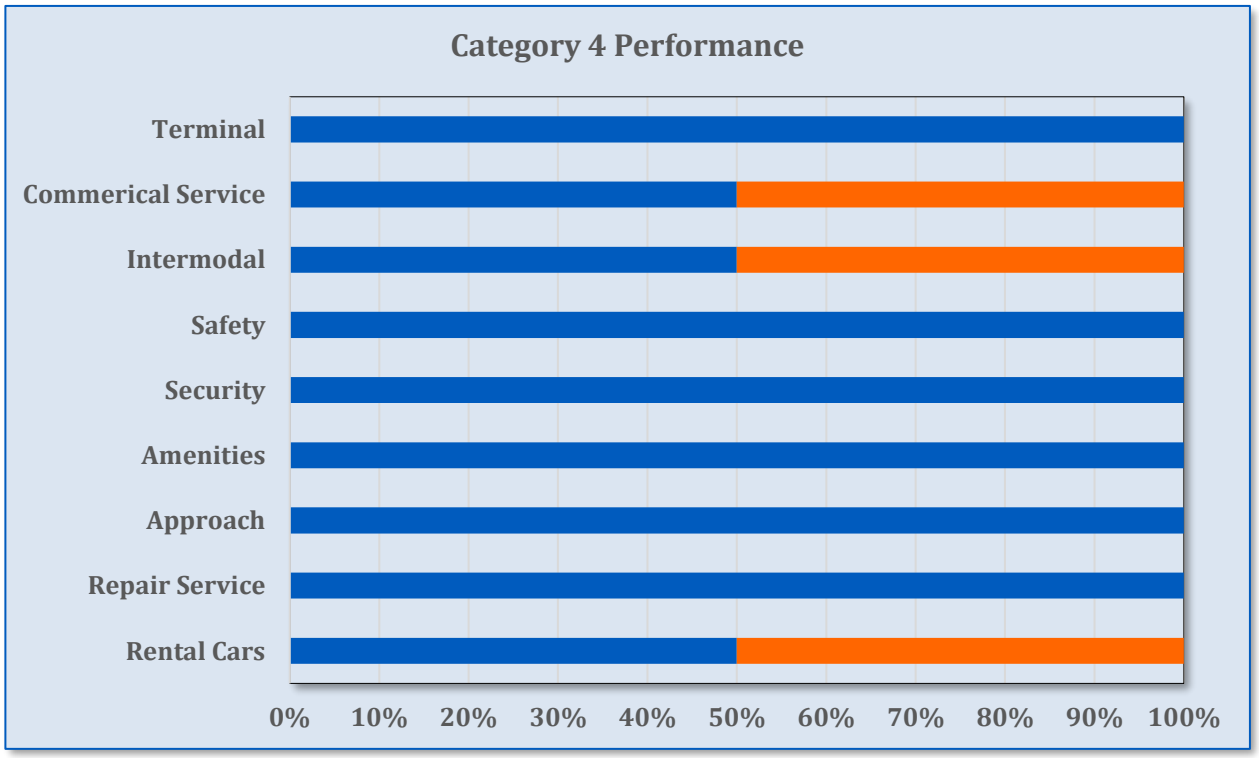
Many of the minimum facility and service objectives are met by VASP airports in Category 3, including: airport management and operations staffing; airfield lighting; rotating beacons; snow removal equipment; and, GPS instrument approaches with vertical guidance. However, the chart illustrates the impact 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 ≥ 5,000 feet.

Category 4 Airports

Vermont Airport 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 Airport 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 Airport System performance presented in the preceding section and illustrated in the accompanying report cards is summarized as follows:

- VASP Category 1 Airports: As described, all system airports in Category 1 meet the runway requirement (≥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 VASP Category 1 Airports are basic shelter facilities and 100LL fuel services.

- VASP Category 2 Airports: No VASP airports in Category 2 meet the minimum requirements for primary runway length (≥4,000 feet), and only Deerfield Valley Regional has a GPS instrument approach procedure. As shown, the primary areas of need for VASP 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.

- VASP 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 (≥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.

- VASP Category 4 Airports: For the VASP, 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.

Importantly, for VASP Category 2 and 3 airports, not meeting VASP minimum facility and service objectives alone is not sufficient justification for award of AIP funding for runway extensions. Further justification must be documented in an airport master plan process and in collaboration with the FAA.

4.3. AIRPORT SYSTEM GEOGRAPHIC PERFORMACE

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 VASP Airport Category – serves.

One overarching and reasonable assumption for evaluating the current performance of the Vermont Airport 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 Airport 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 Airport 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 VASP 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 VASP Airport Categories, which is illustrated in **Figure 4-4**.

Figure 4-2: Existing Airports by Role and Population

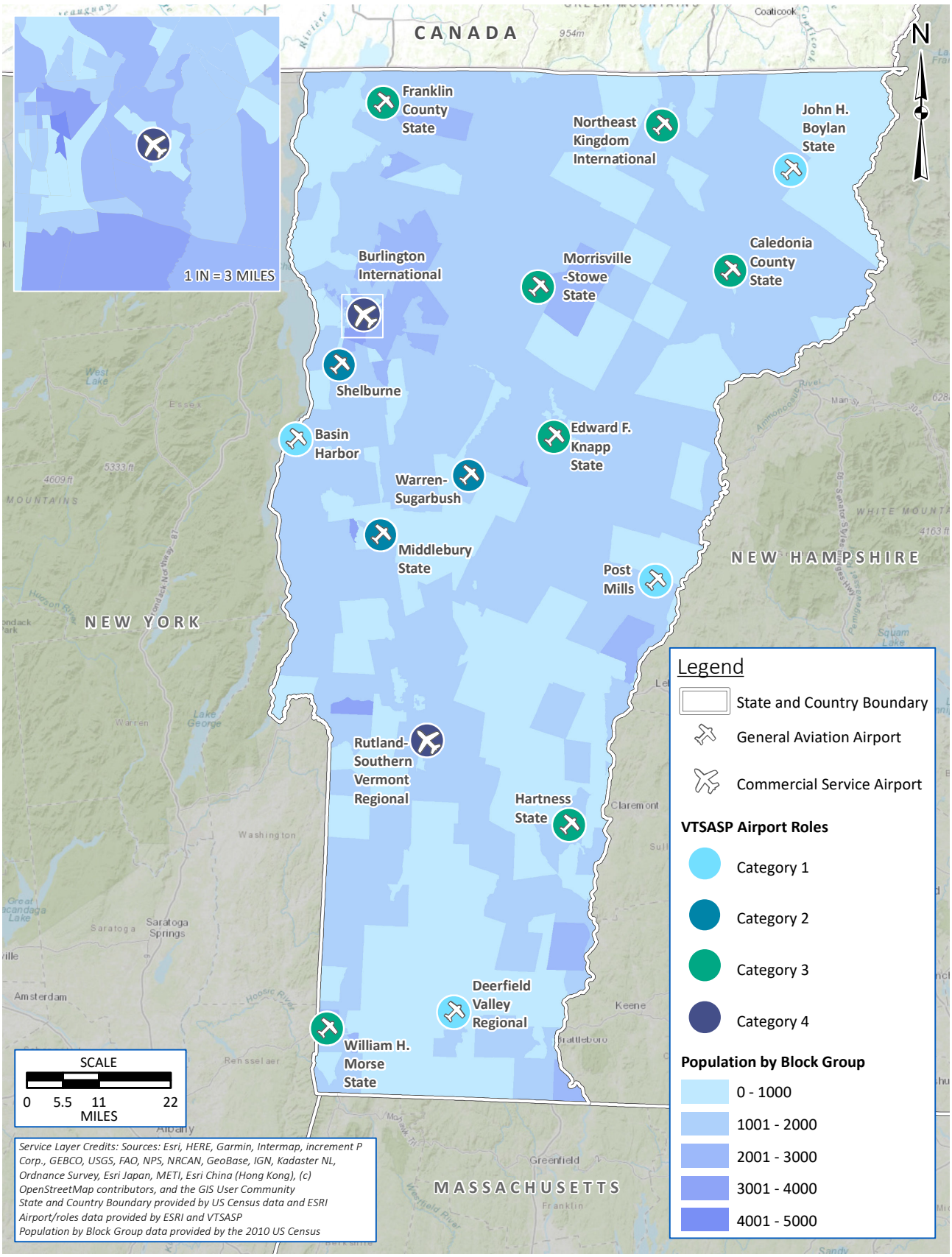


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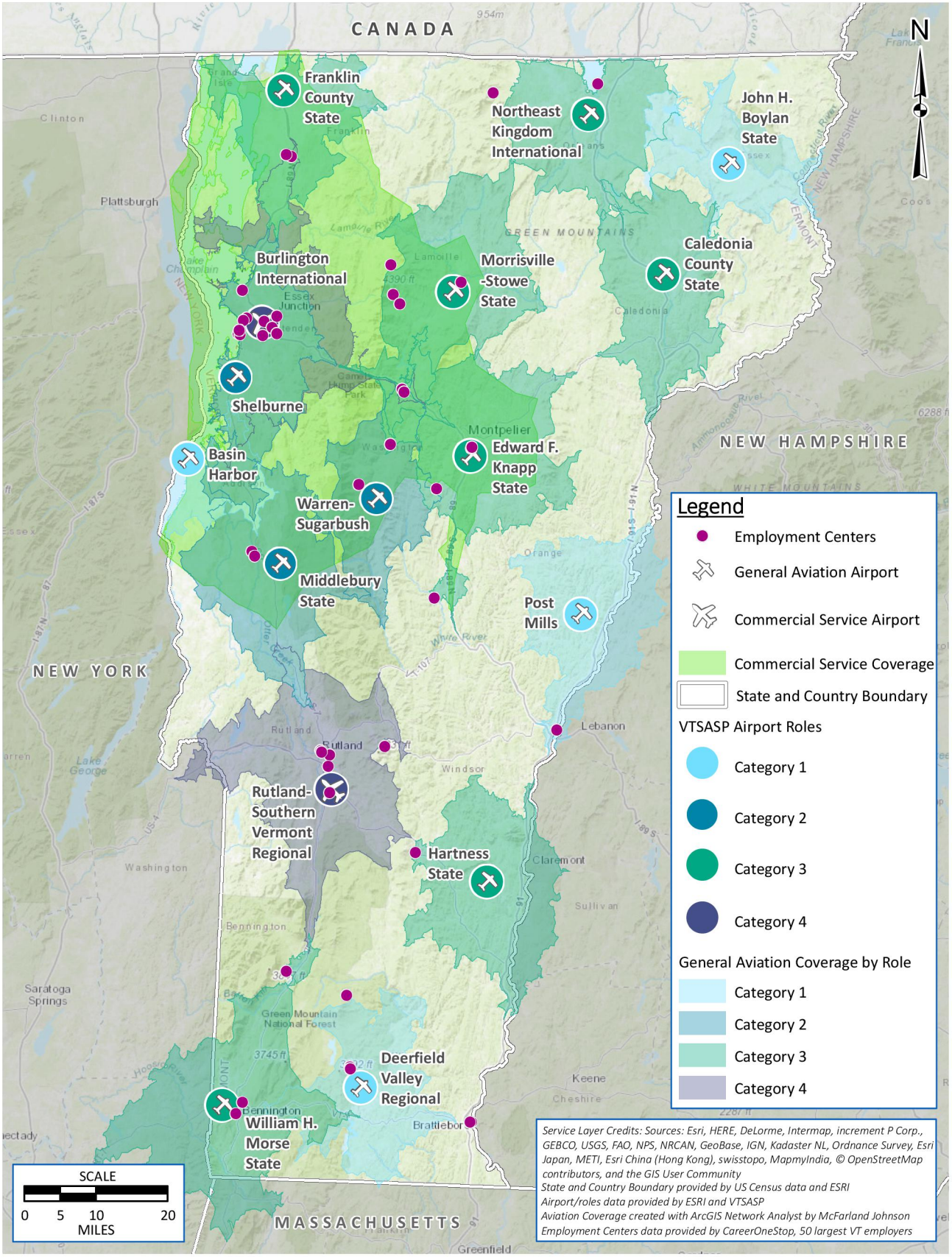
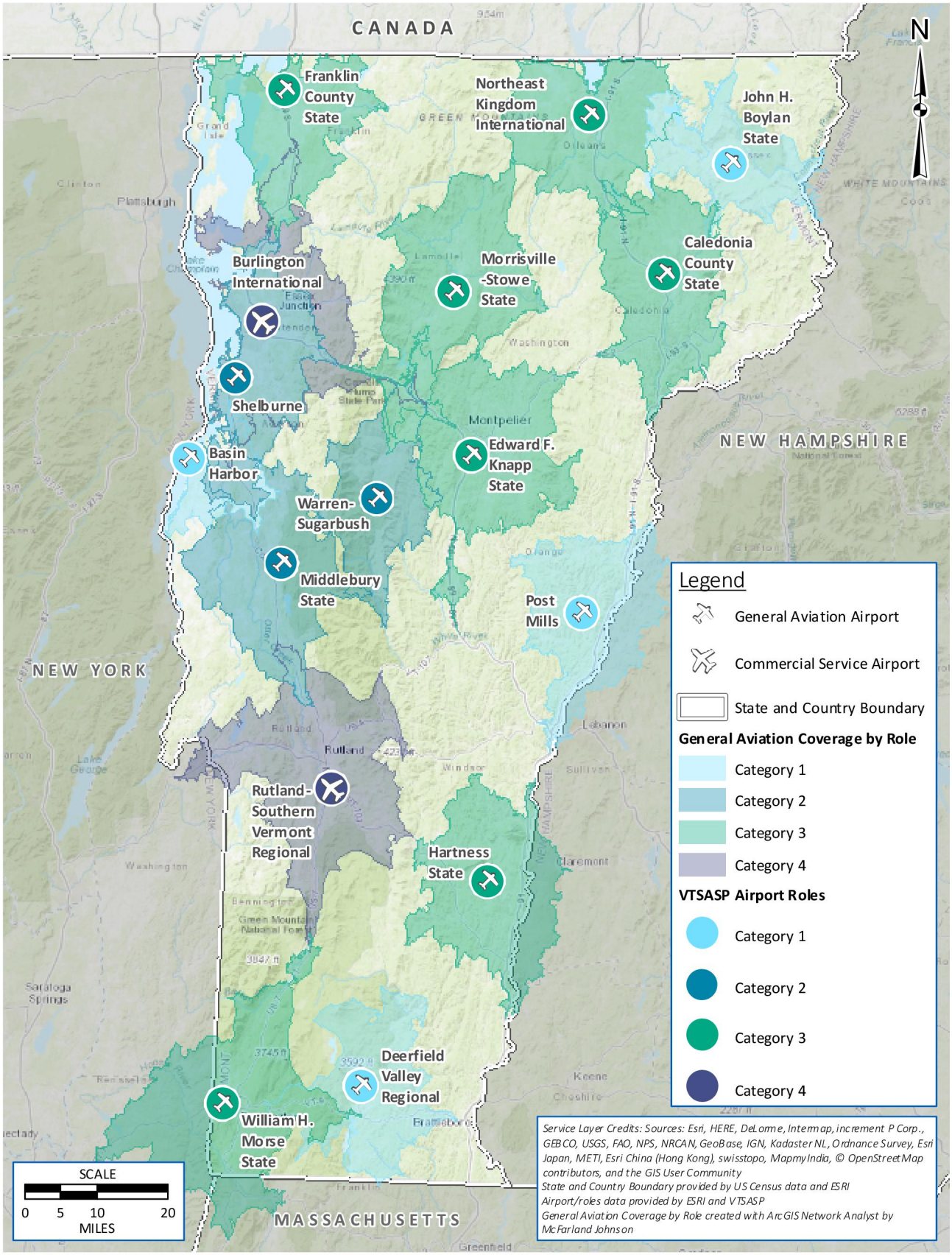
Figure 4-3: Existing Airport Coverage by Role and Employment Centers



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-3 VTSASP Roles Employ.mxd

Figure 4-4: Existing General Aviation Coverage by Role



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-4 VTSASP Roles 30 Min.mxd

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

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

Airport Category	Land Area Coverage (SQMI)	Land Area Coverage (% Total) 1/
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 VASP 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 Airport 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 VASP 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 VASP Airports

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

Source: McFarland Johnson Analysis, 2017.

Considering that the State of Vermont is 9,614 square 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 VASP 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 VASP airport. The next two sections discuss the population and employment centers served by VASP airports, which provides insights into the value of VASP 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 VASP 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 VASP Airport Categories.

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

Airport Category	Population Coverage	Population[1/] 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.
[1/]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 VASP airports in terms of population served.

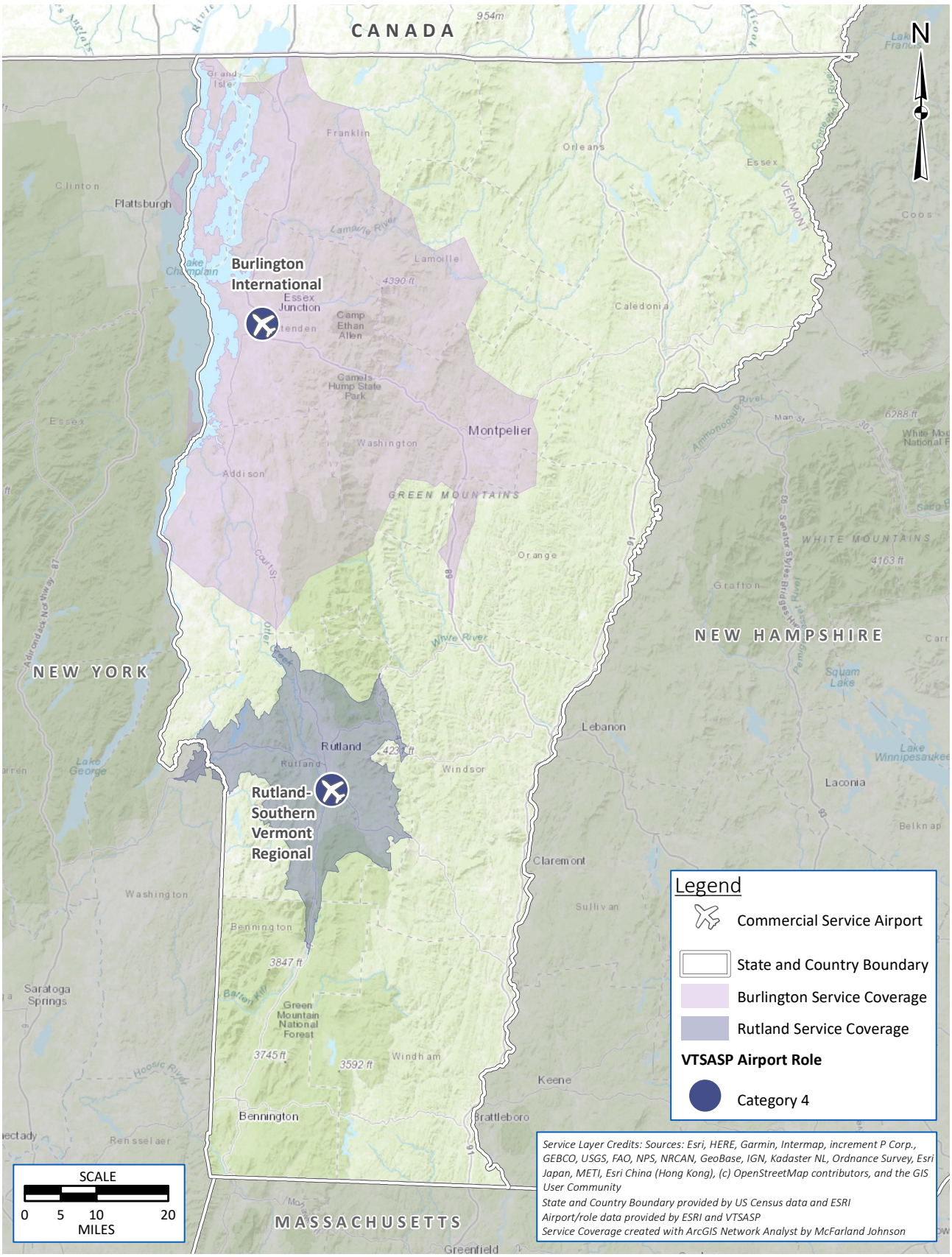
Table 4-12: Ground Access Population Coverage – All VASP Airports

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

Source: McFarland Johnson Analysis, 2017.

As indicated in **Table 4-12**, VASP 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



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-5 VTSASP Roles 60 Min.mxd

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 VASP, 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
Total	**49,951**

Source: ReferenceUSAGov, infogroup, Inc., 2015.

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

Table 4-14: Ground Access Employment Center Coverage by VASP 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 VASP 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 VASP airports in terms of major employment centers and economic activity centers served.

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

Airport Category	Employment Center Coverage	Employment Center Coverage (% Total)
All VASP 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 VASP airport.

Neighboring State Ground Access Coverage in Vermont

An important consideration while evaluating ground access coverage of VASP 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

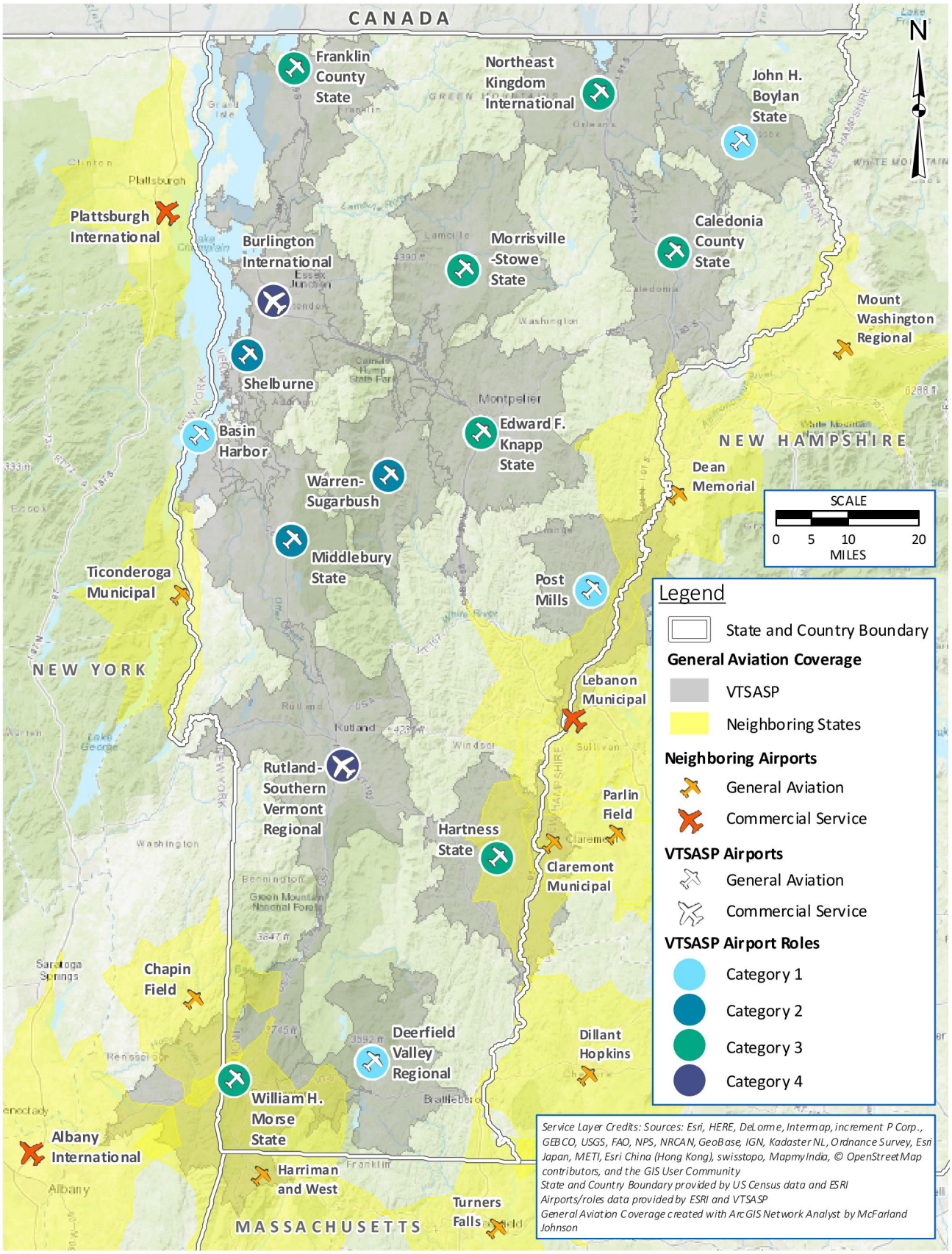


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Figure 4-7: Neighboring Commercial Service Coverage

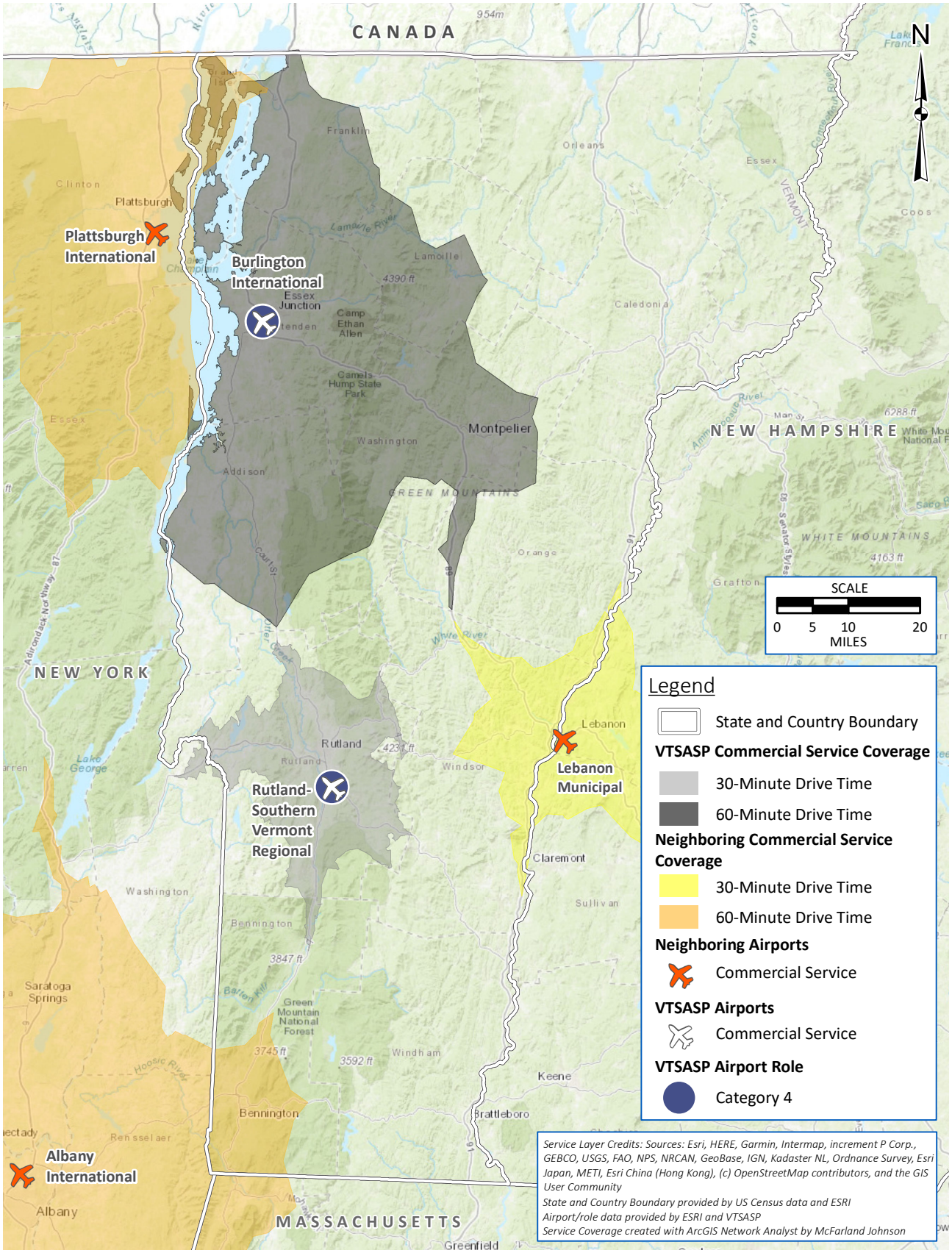

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Table 4-18 presents land area, population and employment center coverage in Vermont by general aviation and commercial service airports in neighboring states.

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

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

Source: McFarland Johnson Analysis, 2017.
[1/]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 VASP 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 Airport System, and one that can highlight the types of needs operators originating outside the State may find most important. Air access coverage by VASP 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 ≥ 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 – VASP Airports with Primary Runway Length ≥ 4,000-feet

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

Source: McFarland Johnson Analysis, 2017.
[1/]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 ≥ 5,000-feet

System airports with runways 5,000 feet or greater are the same VASP 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 – VASP Airports with Primary Runway Length ≥ 5,000-feet

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

Source: McFarland Johnson Analysis, 2017.
[1/]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

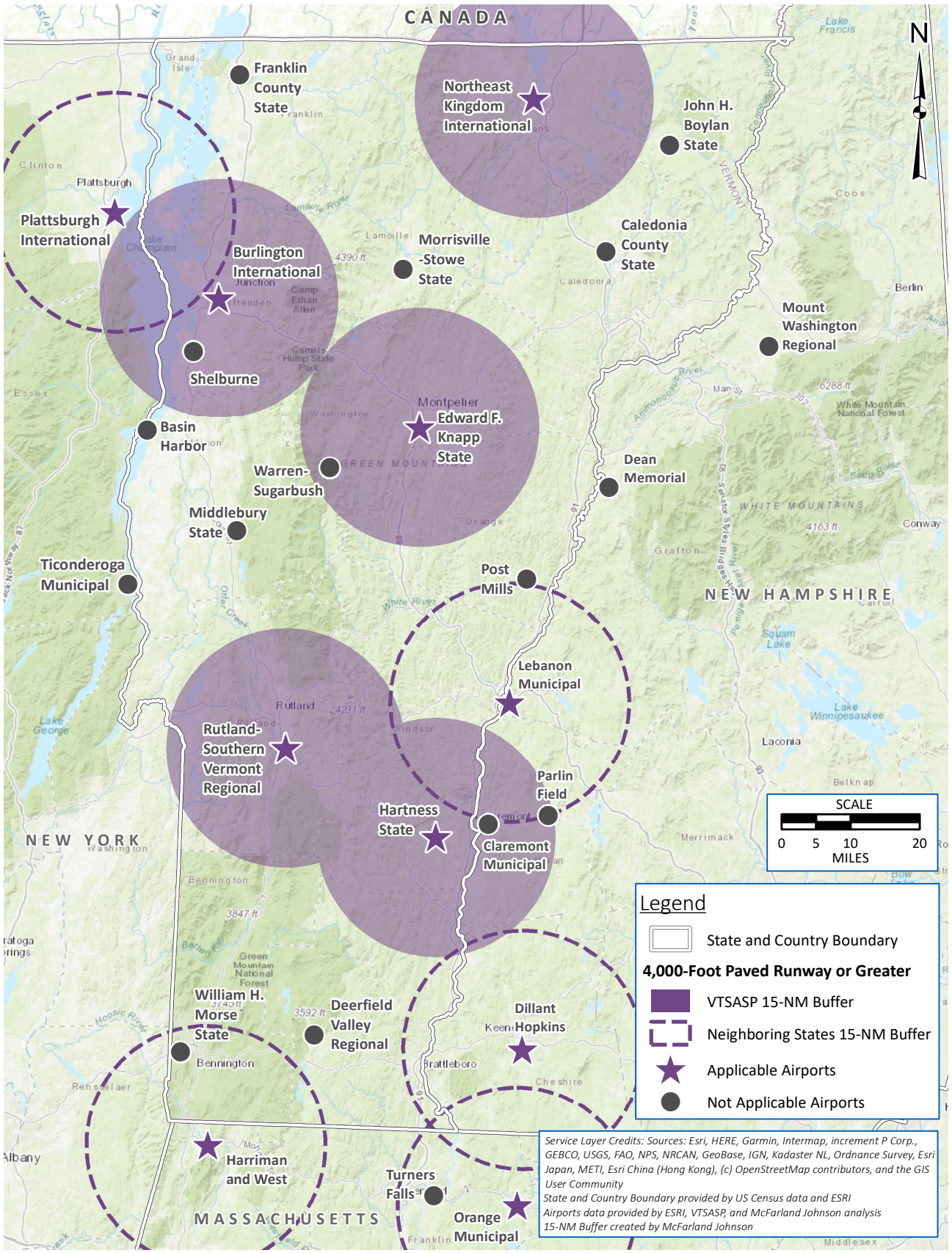
VASP airports with precision approach capability combine to serve 46 percent of the state's population and 29 of the top 50 employers. **Table 4-21** presents the breakdown of nautical mile coverage by these system airports. **Figure 4-10** illustrates this coverage.

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

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

Source: McFarland Johnson Analysis, 2017.
[1/]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



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-8 Air Access Coverage 4000.mxd

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

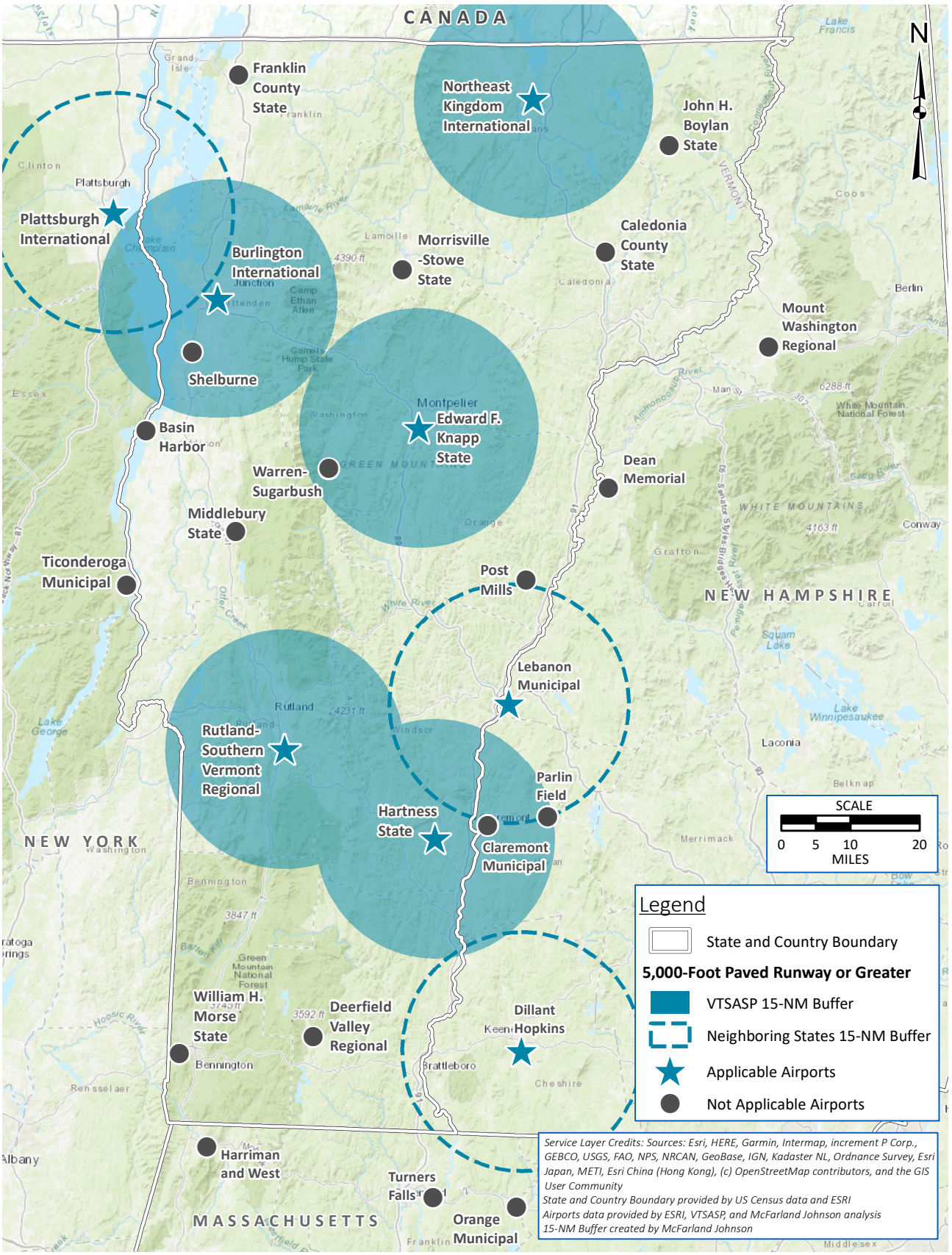


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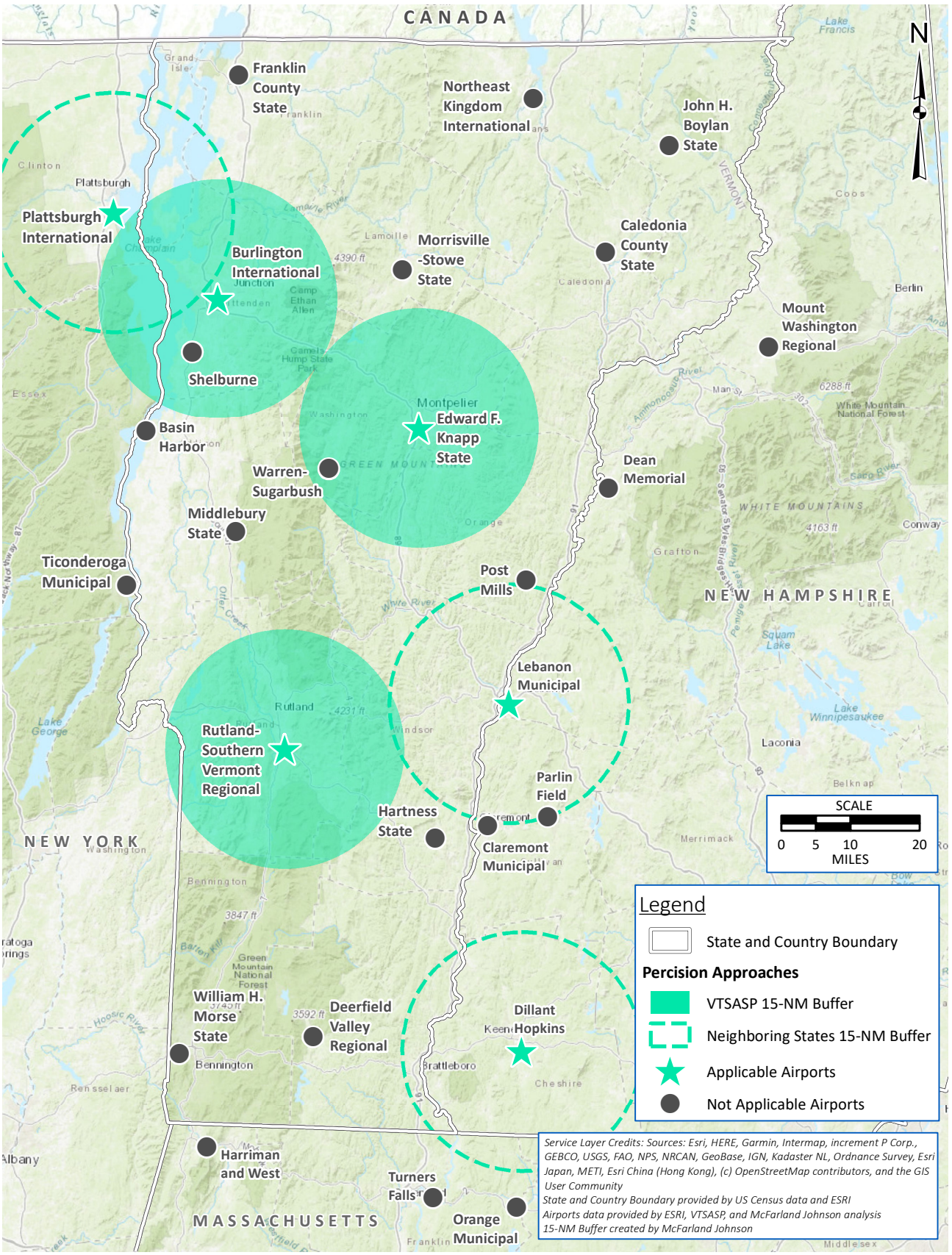
Figure 4-10: Existing Air Access Coverage - Airports with Precision Approaches



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-10 Air Access Coverage Precision.mxd

Coverage by Airports with Non-Precision Instrument Approaches

VASP 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 – VASP Airports with Non-Precision Instrument Approach

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

Source: McFarland Johnson Analysis, 2017.
[1/]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 – VASP Airports with On-Site Weather Reporting Service/Equipment

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

Source: McFarland Johnson Analysis, 2017.
[1/]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 – VASP Airports AvGas (100LL) Fueling Service

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

Source: McFarland Johnson Analysis, 2017.
[1/]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

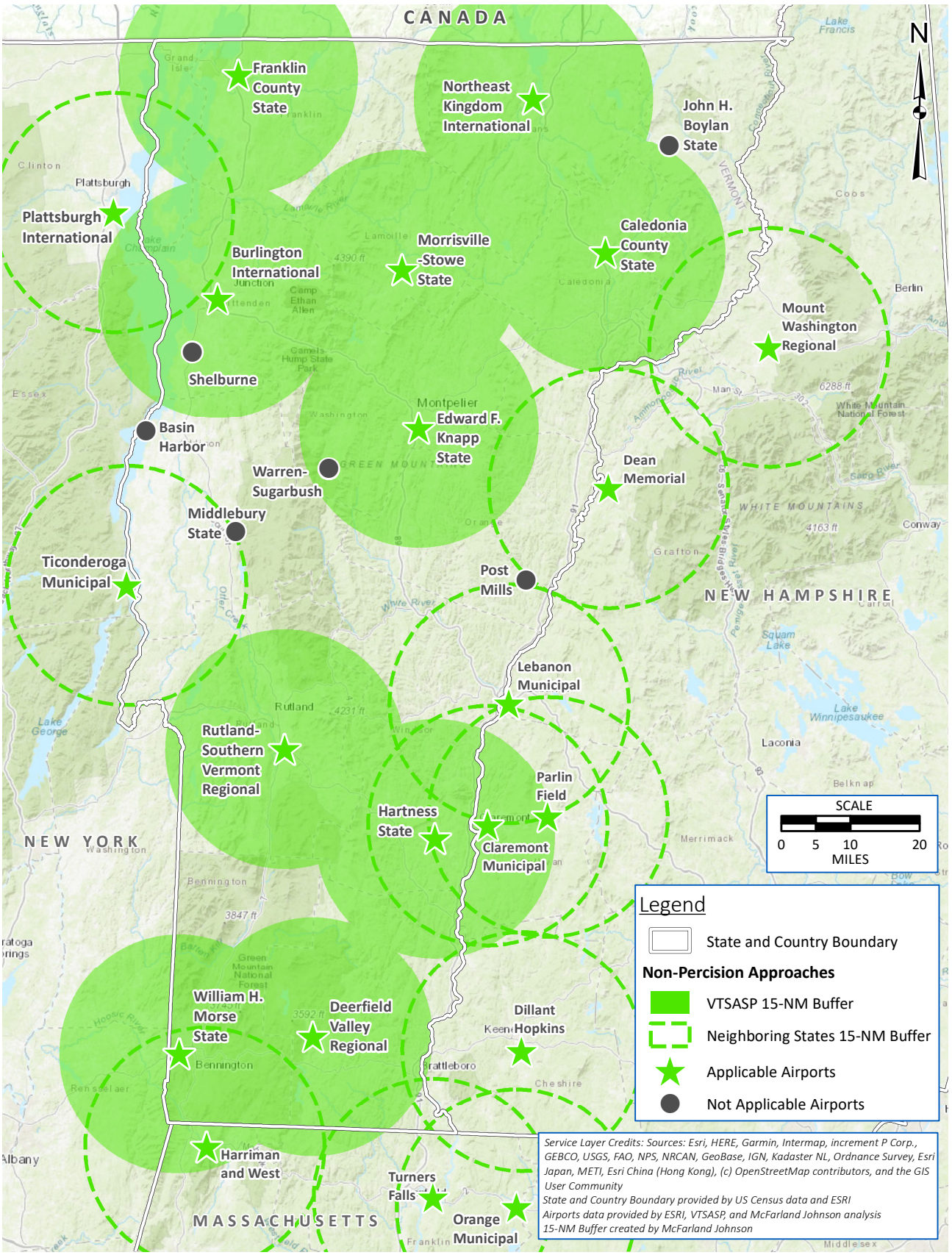


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Figure 4-12: Existing Air Access Coverage - On-Site Weather Reporting Service

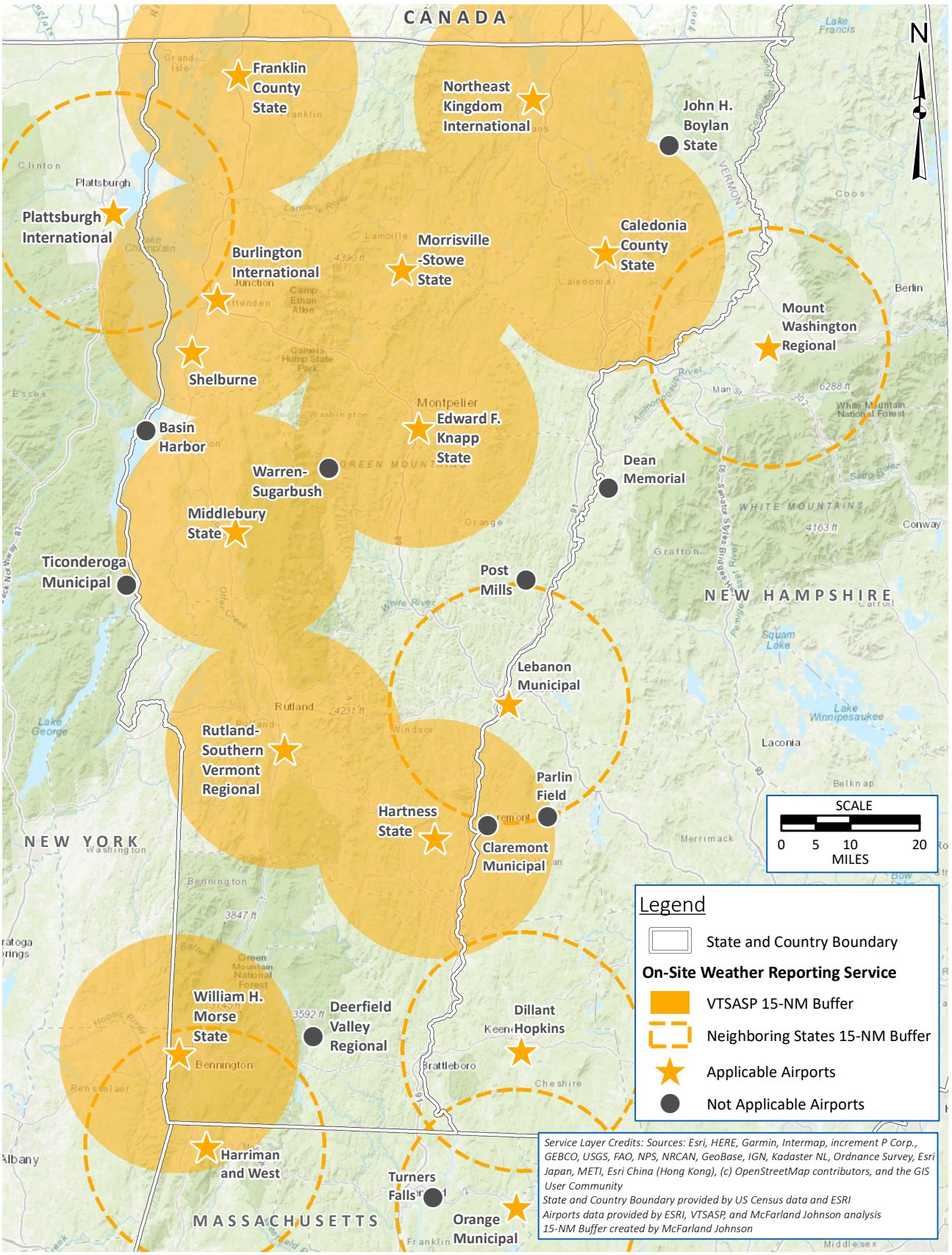

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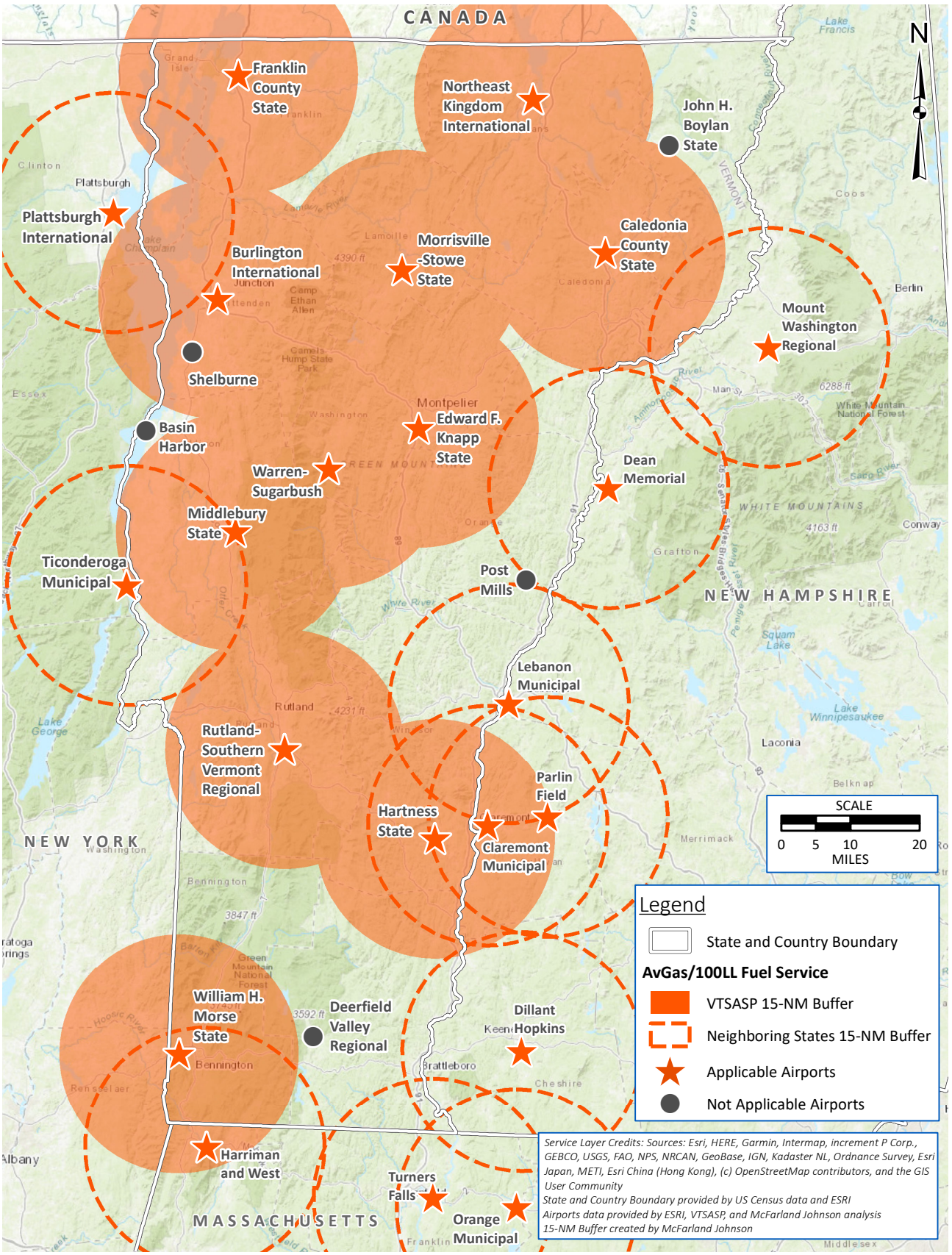
Figure 4-13: Existing Air Access Coverage - AvGas/100LL Fuel Service



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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 – VASP Airports Jet A Fueling Service

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

Source: McFarland Johnson Analysis, 2017.
[1/]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.

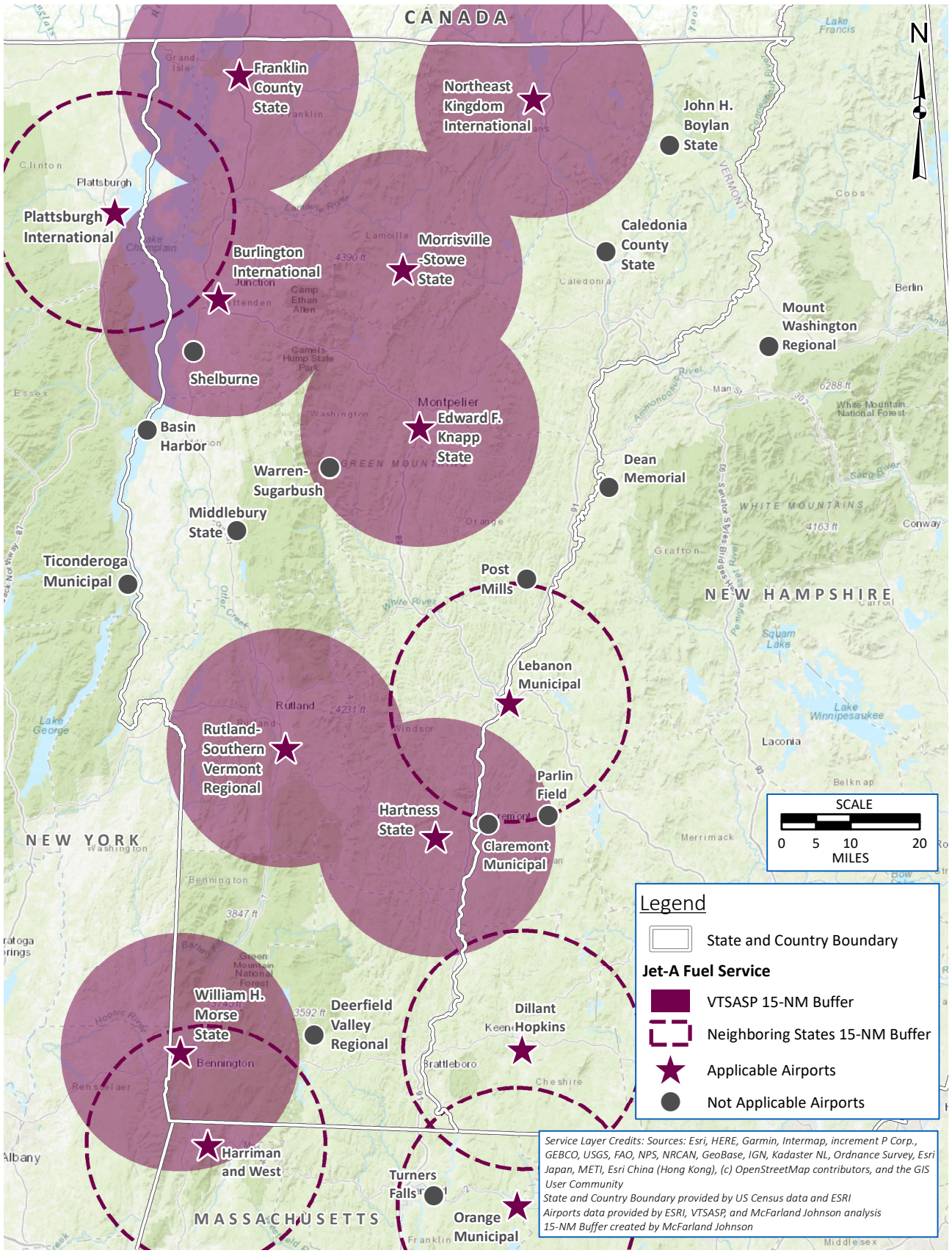
Table 4-26: Neighboring State Airports - Air Access Coverage by Infrastructure, Equipment, & Service Offered

Airport	≥4,000' Runway	≥ 5,000' Runway	Precision Approach	Non-Precision	On-Site Weather	100LL Fuel	Jet A Fuel
New York							
Plattsburgh International	✓	✓	✓	✓	✓	✓	✓
Ticonderoga Municipal				✓		✓	
New Hampshire							
Mount Washington Regional				✓	✓	✓	
Dean Memorial				✓		✓	
Lebanon Municipal	✓	✓	✓	✓	✓	✓	✓
Parlin Field				✓		✓	
Claremont Municipal				✓		✓	
Dillant Hopkins	✓	✓	✓	✓	✓	✓	✓
Massachusetts							
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 VASP airports for comparison purposes.

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



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 4-14 Air Access Coverage JetA.mxd

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[1/]	Population Coverage[1/]	Employment Center Coverage[1/]
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.
[1/]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 4-27**, 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 VASP airports, but also serve areas of Vermont that are not within a 20-nautical miles to a VASP airport.

4.3.3. Airport System Geographic Performance Analysis Summary

In terms of geographic coverage, the Vermont State Airport 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 VASP Airport Category, and combined coverage for the statewide system of all airports.

Table 4-28: Ground Access Coverage by VASP 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
VASP Coverage	**57%**	**93%**	**44**

Source: McFarland Johnson Analysis, 2017.

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

Table 4-29: Air Access Coverage by VASP Airport Categories

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

Source: McFarland Johnson Analysis, 2017.

5. Aviation Forecasts

5.1. INTRODUCTION

This chapter utilizes current and historical Vermont airport data along with national and regional trends to forecast aviation demand during the planning period. It is intended to help guide where the Vermont Agency of Transportation (VTrans) should expect to deploy funding and assets to best align with future aviation demand in the state.

This chapter focuses primarily on operations and based aircraft aspects as they comprise the bulk of the general aviation activity in Vermont. Market-specific activity features such as commercial and military elements are comprehensively analyzed as part of a master plan, with their system wide contributions (i.e. drive time coverage of the state for commercial service) addressed as part of the system plan.

The General Aviation (GA) user base in Vermont is extremely diverse, comprised of private/recreational flying, flight instruction, business travel, emergency medevac operations, agricultural operations, aerial photography and surveying among others. The types of aircraft utilized in GA range from towed motorless gliders to complex business jets employing the most advanced technologies.

This chapter explores historical and current aviation activity on the local, regional and national level to attempt to forecast future aviation activity in the Vermont airport system over the next twenty years. It relies on methodologies and practices accepted in the industry and by the FAA, however it should be noted that as the planning period evolves, events and environmental variables such as socioeconomic and other factors could facilitate unforeseen circumstances at one or more individual airports. As such, not all airports in the Vermont system may realize this forecast activity; however, it is believed that generally, the system as a whole can rely on the information provided and underlying trends identified.

In the process of updating the Vermont Airport System Plan (VASP), forecasting on the local and state levels plays an important role. An understanding of a forecast of aviation activity will drive decisions on where resources and efforts need to be allocated throughout the planning period to meet projected demand. It is also helpful to examine statewide socioeconomic and demographic trends that will contribute to the health of Vermont's air transportation industry as these important factors will drive aviation demand on all levels. Lastly, it is important to identify strengths or weaknesses that will contribute to, or detract from, a healthy Airport system.

The areas forecast for this system plan update include aircraft operations, based aircraft and enplanements where applicable. While the focus for Burlington International Airport will mostly be on passenger enplanements, most of Vermont's airports are general aviation and as such, most of the focus of this chapter will lie in aircraft operations and based aircraft.

5.2. FORECAST BACKGROUND

In the process of forecasting for this system plan update, historical trends and current activity levels were used to attempt to predict future aviation demand. Two important factors in measuring aviation activity are airport operations and based aircraft. Data was collected from the VTrans including historical fuel sales and based aircraft counts and was supplemented with data from the FAA Airport Master Record Forms for each airport. The data was tabulated and used to derive forecast data.

5.2.1. National and Regional Trends

Future aviation activity will be impacted by events at the national, regional and local levels. National events such as the attacks of September 11, 2001 and the 2008 financial crisis have profound negative impacts on U.S. aviation with ripple effects felt worldwide. Similarly, when the price of oil drops below certain levels, GA in particular, sees a boost in activity. At the local level, state demographic shifts and employment growth rates will drive both aircraft operations and based aircraft across the state. The following sections will detail the various tools used to derive forecast data.

FAA Aerospace Forecast

The FAA Aerospace Forecast for the period 2017-2037 indicates that the long-term outlook for GA is stable to optimistic and the general aviation fleet is projected to grow .1% per year, resulting in an increase of approximately 3,400 aircraft.

Utilizing the FAA Aerospace Forecast data to explore the national trends between the calendar years 2010 to 2016, yields the following with respect to active aircraft[1]:

- Fixed wing piston engine aircraft declined 9.9%
- Fixed wing turbines increased 11%
- Rotorcraft increased 6%
- Experimental/light sport aircraft increased 15%
- Total piston engine aircraft declined by 10%
- Total turbine aircraft increased by 12%

These statistics indicate growth in all sectors of GA except single engine piston aircraft which is projected to continue to decline. This is due to many factors, including the aging of the pilot population, the increasing costs of aircraft ownership including maintenance and insurance and other factors.

FAA Terminal Area Forecasts (TAF)

The TAF is FAA's official forecast of aviation activity for U.S. airports. It represents a high-level forecast developed by FAA headquarters using macro-level inputs of national and regional data

[1] The FAA defines an active aircraft as one that has a current registration and was flown at least one hour during the calendar year.

with the airport specific forecast being the result of broad-based forecast applications. While generally understood not to be a detailed reflection of local market demand, the TAF is informed by regional trends and socioeconomic data and used by the FAA as the basis from which a detailed forecast will be measured.

New England Region Airport System Plan – General Aviation (NERASP – GA)

The NERASP - GA was a collaborative plan amongst the six New England state transportation departments with the goals of identifying critical issues that will affect general aviation in new England and working toward strategies for a wisely planned and managed system of airports in New England.

The NERASP - GA study utilized the FAA's General Aviation and Air Taxi Activity (GAATA) Survey, which is an annual survey conducted to help understand the use and utilization of GA aircraft, to derive information about active aircraft in New England. The study found that between 2000 and 2010, the total number of active aircraft in new England varied cyclically from year to year. New England has seen an overall decline in based aircraft since 2007 partly due to older aircraft being retired as result of the economic recession, but also more detailed accountability for seasonal aircraft that are based at more than one airport throughout the year.

Another finding of the study is that in looking at the total number of New England aircraft as a percentage of the total U.S. fleet, New England has closely followed the U.S. trend, however since 2008, New England has seen a slow, steady decline in the number of aircraft in comparison to the remainder of the U.S.

The NERASP – GA study also looked at the numbers of active aircraft per capita and compared New England to the rest of the U.S. The researchers found that the ratio of active aircraft per 100,000 residents, while showing great variability year to year, had the lowest numbers in more urbanized areas in Connecticut, Massachusetts and Rhode Island. New Hampshire seemed to have the highest number of aircraft per capita however the overall trend in New Hampshire was downward. Vermont's aircraft per capita varied greatly over the study period and finished very close to where it started.

The study examined average hours flown per year by active aircraft. They found some anomalies in the data for Connecticut and Rhode Island which skewed the numbers for those states, but generally, average aircraft utilization in New England showed a decline over the 11-year period. Vermont was on the lower end of this scale and seemed to be hit particularly hard in 2001 and 2008 while showing some recovery in the latter years.

5.2.2. Historical Based Aircraft

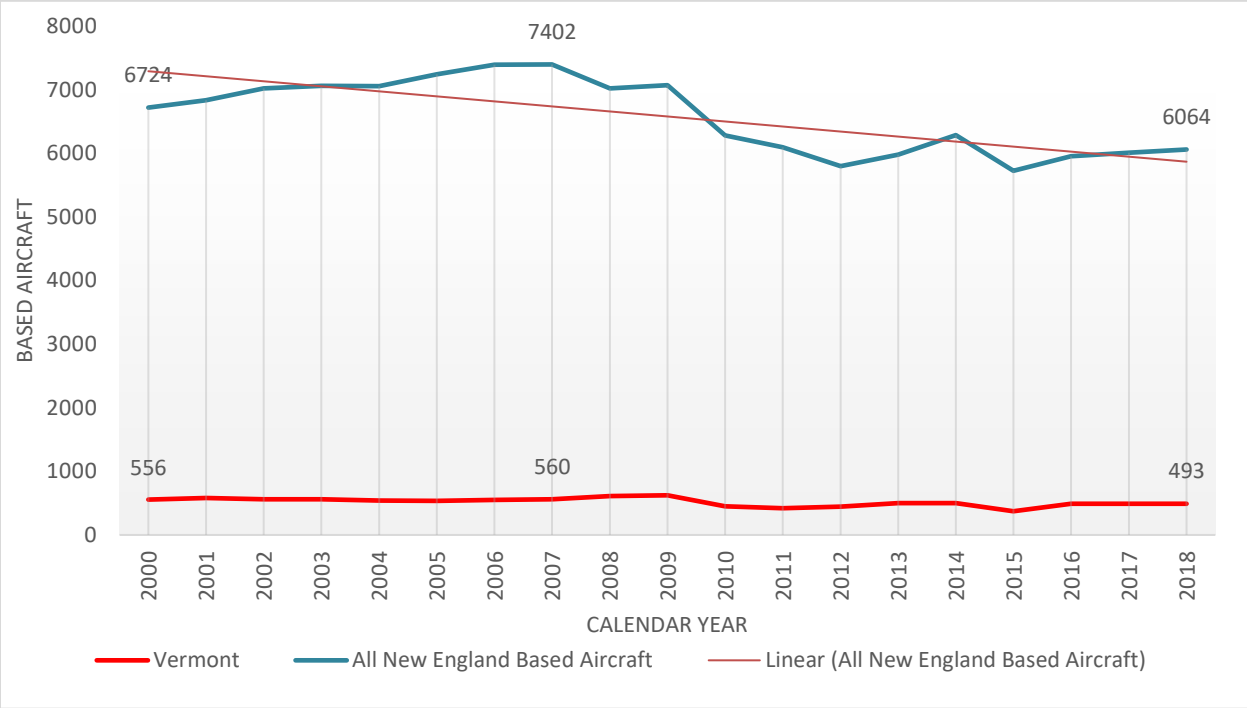
Figure 5-1 represents historical based aircraft in Vermont, while **Figure 5-2** shows the relationship between historical based aircraft in Vermont versus historical based aircraft in all New England. The range of data is from 2000 to 2018 and is derived from the FAA's TAF which provides historical data on based aircraft as well as future projections. These TAF counts reflect public use airports in the NPIAS only and also include military aircraft. The VASP efforts included a survey effort which builds upon the FAA total counts. These revised totals are reflected later in this chapter.

Of significance within the FAA counts however is there appears to be a correlation between Vermont's based aircraft numbers and the rest of the New England Region, though Vermont appears to be seeing a lower rate of decline than the rest of New England. The New England region saw a 13.9% decline in based aircraft over a 16-year period, while Vermont saw a 4.3% decrease over the same timeframe. The main difference between Vermont and the rest of the country is while the U.S. based aircraft inventory is increasing in larger corporate jets and twin-engine class aircraft, Vermont is overwhelmingly single and piston engine aircraft, which has seen slowly and steadily declining both regionally and nationally.

Figure 5-1: Vermont Based Aircraft (2000-2018)

Source: FAA Terminal Area Forecasts

Figure 5-2: Based Aircraft Comparison (2000-2018)



Source: FAA Terminal Area Forecasts

5.2.3. Historical Aircraft Operations

As with based aircraft, historical aircraft operations can be used to produce a reliable forecast trend for the Vermont system of airports. The FAA categorizes an aircraft operation, which is a takeoff or a landing, into varied groups. These categories include commercial operations (air carrier, air taxi and commuter), GA and military activity. For the purposes of this study, GA operations are used which identify operations not classified as air carrier or military. Activity at airports with an air traffic control tower (ATC) facility are systematically recorded and reported, however aircraft operations at airports without an ATC facility are typically an estimate. In Vermont, only Burlington International Airport has an ATC facility, therefore FAA TAF data was used to plot historical Vermont operations.

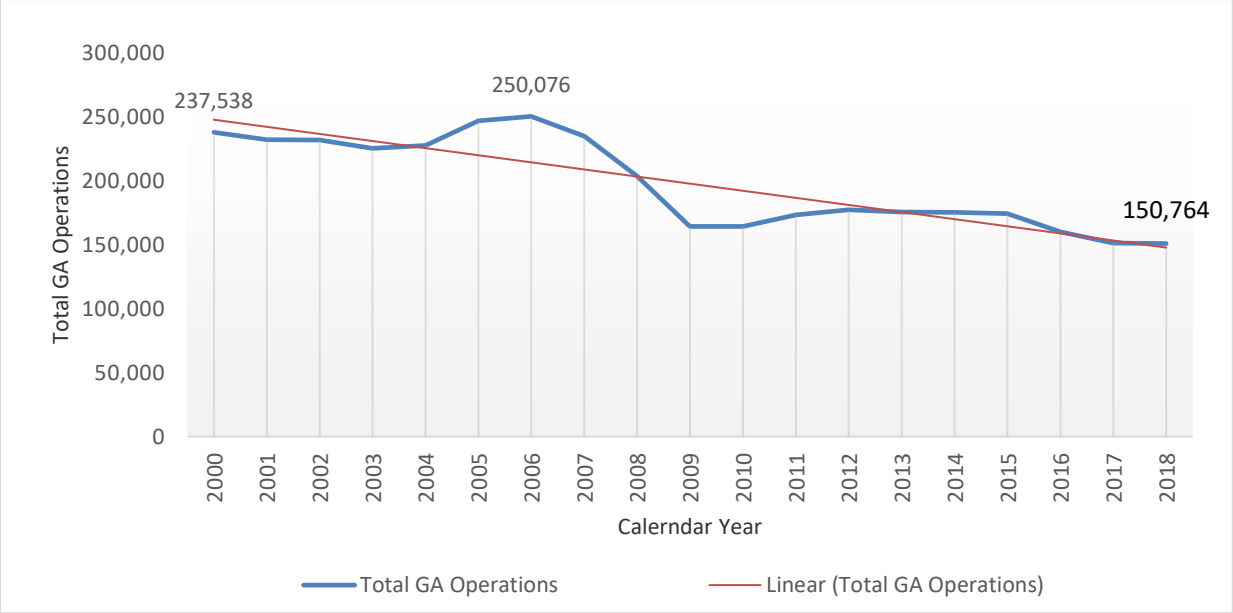
Of the 16 study airports considered for this forecast, historical aircraft operations data was readily available for 12 airports through the FAA Terminal Area Forecast. These airports include:

- Warren-Sugarbush
- Post Mills
- Middlebury State
- Burlington International
- Caledonia County
- William H. Morse
- Newport State
- Franklin County State
- Edward F. Knapp State
- Morrisville-Stowe State

- Rutland – Southern Vermont Regional
- Hartness State

Figure 5-3 shows the historical trend of GA operations in Vermont from 2000 to 2018.

Figure 5-3: Historical Vermont Operations (2000-2018)



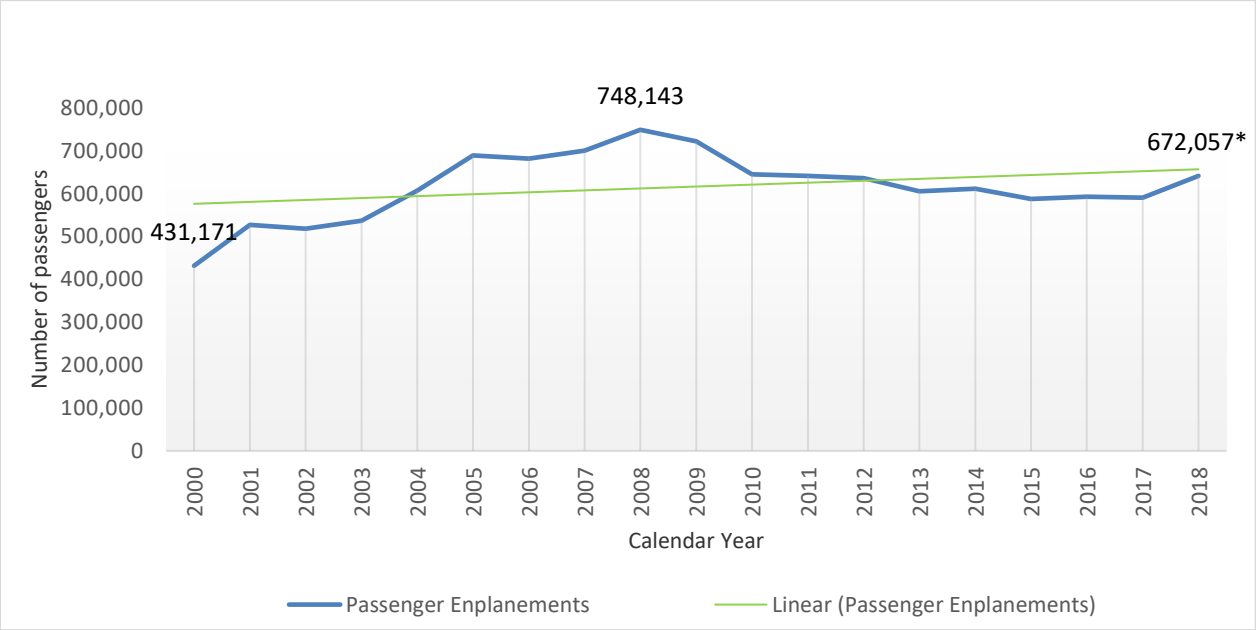
Source: FAA Terminal Area Forecasts

Figure 5-3 indicates Vermont experienced a decline of 36.53% from 2000 to 2018 as operations went from 237,538 to 150,764. In comparison to the national trend which saw a 21.4% decrease over the same period as U.S. GA operations declined to approximately 68 million from approximately 87 million. Vermont's GA operations have seen a greater decline than the national trend.

Regarding passenger enplanements, **Figure 5-4** depicts passenger enplanements in the state of Vermont. Burlington International Airport, which accounts for over 99% of the State's enplanements, has seen a steady climb in enplanements, followed by a period of decline and stagnation consistent with the recession that occurred during that time. Passenger enplanements at BTV are increasing due in part to larger aircraft replacing smaller regional jets and 2019 is anticipated to have increased passenger traffic with the introduction of Frontier Airlines. Since 2010 Rutland enplanements have fluctuated between 5,200 and 5,900 annually, schedules and capacity are set and fixed as part of the essential air service program and these levels are expected to continue. While Morrisville-Stowe does record some commercial enplanements (200-300 in recent years), these enplanements are not as result of regularly scheduled passenger service. The FAA threshold for a commercial service airport is 2,500 enplanements.

Overall, enplanements in Vermont have fared better than the national average which saw a 16.7% increase from 704 million passengers to 823 million passengers over the same period.

Figure 5-4: Vermont Passenger Enplanements



*Source: FAA Terminal Area Forecasts- * 2018 is estimated*

5.3. AIRPORT ACTIVITY FORECASTS

The FAA conducts an annual forecast of aviation activity to properly plan for the allocation of limited financial resources for the highest return on investments. Similarly, this VASP will present forecast data so VTrans can more effectively predict future activity to meet demand.

GA has long been a lagging indicator of the U.S. economy. As such, it has been slow to recover from the Great Recession. Corporate aviation has suffered recently from high operating costs such as fuel and insurance, coupled with a lack of capital for the purchase of aircraft and equipment and the payroll to support a flight department. Recreational GA is typically accomplished with disposable income which has been in short supply for most average income Americans since 2008. Despite this, GA is starting to make a comeback. The recent downturn has had a negative effect on GA airports, which comprise most of Vermont's system. There are however recent gains being made, particularly in the corporate aviation world as companies are beginning to reengage with turbine engine aircraft acquisitions and leasing.

5.3.1. Forecasting Background

According to the TRB's (Transportation Research Board) Airport Cooperative Research Program (ACRP) *Synthesis 2: Airport Aviation Activity Forecasting,* traditional aviation forecasting methods include the following:

- Market share forecasting-local activity calculated as a share of some larger aggregate forecast.
- Econometric model forecasting-aviation activity tied to other economic measures.
- Time series model forecasting-trend extrapolation of existing activity.
- Simulation-a separate method used to provide a high fidelity "snapshot" estimates of how traffic flows across a network or through an airport.

It is important to emphasize that aviation forecasting is not an exact science, so experienced judgment and practical considerations ultimately influence the level of detail and effort required to establish a reasonable aviation forecast and the development of decisions that result from them.

This forecasting effort is presented in standard 5, 10, and 20-year increments. Historically, the general aviation industry has been highly cyclical, exhibiting strong growth during economic expansions and negative growth during economic uncertainty.

The following sections detail the performance metrics used to derive the projected growth scenarios. They include population by county, fuel sales and based aircraft.

Population

Vermont's population is an important factor in trying to determine causal effects of changes in aviation activity. It can also help to identify airports within the system where resources will likely need to be deployed to meet aviation demand. Population information on each Vermont county was collected from 2007 and 2017 from the U.S. Census Bureau and analyzed to determine the population trend for that county over the ten-year period. The results can be seen in Table 5-1. Most of the population changes were relatively subtle, however they typically correlated closely with other factors used to determine the growth rate scenarios. Counties that have seen population growth have typically also seen growth in based aircraft, operations and fuel sales.

First, a baseline growth rate was established for the state and then each county was compared against that baseline. The Counties that scored more than two times the baseline growth rate were grouped into the High Growth Category and those that saw a decline in population of more than two times the baseline were grouped into the Low Growth Category.

Fuel Sales

Historical fuel sales data was provided to the planning team by the Vermont Agency of Transportation. The data was separated into two groups, a 10-year lookback and a more accurate 4-year lookback. The data for the airports that have sold fuel was compiled into a spreadsheet. Average annual growth rates were established and used as an additional metric to determine those airports' activity levels.

Table 5-1: Vermont Population Changes by County (2007-2017)

Location	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017
Addison	36,886	36,905	36,847	36,811	36,861	36,837	36,898	37,009	37,035	36,959	36,776
Bennington	37,077	37,168	37,151	37,077	36,812	36,669	36,692	36,445	36,317	36,191	35,594
Caledonia	31,238	31,167	31,213	31,189	31,130	31,095	31,151	30,981	30,780	30,333	30,164
Chittenden	153,625	154,659	155,793	156,762	157,679	158,641	159,818	160,531	161,382	161,531	162,372
Essex	6,421	6,404	6,331	6,297	6,323	6,216	6,196	6,125	6,163	6,176	6,230
Franklin	47,455	47,462	47,620	47,788	48,175	48,253	48,272	48,642	48,799	48,915	49,025
Grand Isle	7,152	7,211	7,022	6,958	6,983	6,980	6,982	6,994	6,861	6,919	6,998
Lamoille	23,778	23,971	24,193	24,517	24,659	24,905	25,050	25,082	25,235	25,333	25,337
Orange	29,119	29,032	28,965	28,941	29,025	28,933	28,879	28,859	28,899	28,919	28,974
Orleans	27,332	27,269	27,234	27,225	27,162	27,159	27,170	27,082	27,100	26,863	26,841
Rutland	62,618	62,368	61,946	61,573	61,243	60,875	60,545	60,086	59,736	59,310	59,087
Washington	59,275	59,278	59,353	59,550	59,543	59,351	59,221	58,998	58,612	58,504	58,290
Windham	44,444	44,407	44,441	44,503	44,229	43,997	43,808	43,714	43,386	43,145	42,869
Windsor	57,061	56,850	56,708	56,601	56,626	56,227	56,173	56,014	55,737	55,496	55,100

Source: Vermont Population 2000-2014 http://www.healthvermont.gov/health-statistics-vital-records/vital-records-population-data/vermont-population-estimates

Based Aircraft

In the forecasting effort, based aircraft is a critical factor, not only in determining the forecast trend of an airport or a system of airports, but also in determining where to expect growth and a necessary corresponding allocation of resources. The number of based aircraft determines important airport and system needs such as numbers of hangars and tie-downs, amounts of fuel to be sold and airport personnel requirements. Further, understanding the types of aircraft utilizing the airport(s) helps to direct important planning objectives such as determining critical airport design elements like required runway lengths and taxiway widths.

5.3.2. Forecast Methodology

Airport Performance Relative to the VT Airport System - > Airport Growth Categories

VT Airport System Performance Relative to National Trends -> Adjusted Future VT Performance

Adjusted VT Airport System Future Performance + Airport Growth Category -> VASP Growth Rates

Airport Performance

After all the forecast background data was tabulated, trends began to develop respective to airport performance relative to the system. Generally, the counties that have seen growth, also saw growth in airport performance metrics. The compound annual growth rate for Vermont's population for the years 2004 through 2014 is .107%. from that figure, the counties that performed twice as well as the average were grouped into the High Growth Performance Group and those that performed less than twice this number were grouped into the Low Growth Performance Group. The same exercise was conducted for avgas fuel sales, jet-a fuel sales, based aircraft and operations. What was discovered was that Shelburne Airport, Burlington International

Airport, Franklin County Airport, Morrisville-Stowe Airport and Newport State Airport overperformed in most of the performance metrics including population growth. Airports which performed below this level included William H. Morse Airport, Caledonia County Airport, Rutland-Southern Vermont Regional Airport, Warren Sugarbush Airport and Deerfield Valley Airport. The populations of Addison and Orange County and saw near zero population change however the airports located within them, Middlebury State Airport and Post Mills Airport underperformed in based aircraft numbers changes and operations. Conversely, sparsely populated Essex County saw greater than baseline population decline, however John H. Boylan Airport significantly outperformed the baseline for based aircraft numbers. Lastly, Hartness State saw a population decline with an increase in avgas gallons sold.

Airports were assigned a growth category of Low, Average, or High, in regard to their historical performance relative to the system. Airports are not confined to these categories and external economic forces and direct or indirect investment (or lack thereof) could influence an airport's position relative to the system resulting in periods of higher or lower growth over the 20-tear planning horizon. This forecast represents the general growth parameters in which an airports activity is likely to occur over the long run.

Vermont State Performance

National trends are a good general reference for the broader issues and changed that are occurring within the industry, especially for items such as commercial and itinerant general aviation. It is important however to calibrate these national trends to account for the unique features of Vermont. Features from the national aerospace forecast including fuel sales, aircraft mix and operations by aircraft type were calibrated to the activity mix for Vermont. The higher share of single engine piston (100LL) aircraft in Vermont is weighted against the greater projected declines in the national forecast to less of a decline in Vermont as these activity levels are nature. In future updates of the VASP, if the mix remains unchanged in light of continued national decline, a more detailed effort should review in this is a potential liability into the future, however there is nothing to indicate that currently.

Selected Growth Rates

The final step in the VASP forecast methodology involved taking the adjusted VT airport system growth rates and creating the anticipated ranges of growth to help inform the system planning process. The base VT airport adjustment growth rate was assigned to airports in the "Average" growth category. The base growth rate was doubled for airports in the "high" growth category and halved for airports in the "low" growth category. For based aircraft, the actual compound annual growth rate (CAGR) for the high growth category airports of 0.79% was used for the "high" category.

The growth categories for historical based on historical performance are displayed in Table 5-2.

Table 5-2: Aircraft Operations Compound Annual Growth Rates

Airport	2004	2017	Compound Annual Growth Rate	Historical Growth Category
Basin Harbor	-	-	-	N/A
Burlington International	95,106	70,800	-2.25%	Average
Caledonia County State	2,050	7,380	12.35%	High
Deerfield Valley Regional	-	-	-	N/A
Edward F. Knapp State	32,000	24,125	-2.54%	Average
Franklin County State	21,400	12,600	-6.60%	Low
Hartness State	9,300	6,611	-3.05%	Average
John H. Boylan State	-	-	-	N/A
Middlebury State	35,250	10,900	-10.12%	Low
Morrisville-Stowe State	18,020	6,358	-3.65%	Average
Northeast Kingdom International	7,140	9,452	2.58%	High
Post Mills	9,510	4,330	-6.90%	Low
Rutland – S. VT Regional	29,376	12,382	-6.4%	Average
Shelburne	-	-	-	N/A
Warren-Sugarbush	22,500	17,620	-2.20%	Average
William H. Morse State	26,250	2,070	-17.7%	Average
State Total	307,902	215,746	-2.90%	
Average Airports	232,552	173,589	-.62%	
High Growth Airports	9,190	16,832	5.66%	
Low Growth Airports	66,160	25,325	-8.36%	

Source: FAA Terminal Area Forecasts

The Aircraft Operations Growth Rates can be seen in **Table 5-3**.

Table 5-3: Aircraft Operations Growth Rates

Operations	
Average	0.42%
High Growth Rate	0.84%
Low Growth Rate	0.21%

Source: McFarland Johnson 2017

Like aircraft operations, a similar exercise was conducted for historical based aircraft. Based aircraft counts were refreshed during the project so analysis period is for the years 2005-2017. First, the statewide total compound annual growth rate was calculated. Airports that remained positive were conserved as "high", near flat was "average" and below average declines as "low". John H. Boylan was classified as average due to the low sample size. **Table 5-4** lists Vermont's airports and their compound annual growth rates.

Table 5-4: Based Aircraft Growth Rates

Airport	2005	2017	Compound Annual Growth Rate	Historical Growth Category
Basin Harbor	0	0	0.00%	Average
Burlington International (excluding military)	70	86	1.55%	High
Caledonia County State	20	18	-0.93%	Low
Deerfield Valley Regional	6	7	1.19%	High
Edward F. Knapp State	55	53	-0.31%	Average
Franklin County State	71	74	0.34%	High
Hartness State	37	27	-3.09%	Low
John H. Boylan State	1	5	5.56%	Average
Middlebury State	45	37	-1.80%	Average
Morrisville-Stowe State	26	27	0.31%	High
Northeast Kingdom International Airport	19	20	0.42%	High
Post Mills	23	9	-12.96%	Low
Rutland – S. VT Regional	41	30	-3.06%	Low
Shelburne	55	57	0.29%	High
Warren-Sugarbush	65	50	-2.50%	Low
William H. Morse State	47	32	-3.91%	Low
Statewide Total	581	532	-0.55%	
Average	24.8	20.4	-1.61%	
High	49.4	57	1.20%	
Low	42	31.4	-2.39%	

Source: FAA Terminal Area Forecast

Again, the High Growth Rate for based aircraft used the actual for the airport growth category grouping whereas the Baseline Growth Rate used the average and the Low Growth Rate is a blend of state performance and national trends as seen in **Table 5-5**. The industry as a whole has been using aviation assets more efficiently which is the primary reason for increased operations with decreased based aircraft. It is important to note that based aircraft counts may fluctuate above and below these numbers on a seasonal basis and that projects at airports or nearby airports could produce short term shifts.

Table 5-5: Based Aircraft Growth Rates

Based Aircraft	
Average	-1.61%
High Growth Rate	1.20%
Low Growth Rate	-2.39%

Source: McFarland Johnson 2017

5.3.3. Airport Forecast Summaries

In the following sections, the calculated growth rates for operations and based aircraft for each of the 16 airports in the Vermont system are calculated and plotted out for the planning period of 2017-2037 at 5-year, 10-year and 20-year increments.

5.3.4. Forecast Operations

Basin Harbor Airport

Basin Harbor Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	0	0	0
Average Growth (.42%)	**2,165**	**2,211**	**2,305**
High Growth (.84%)	2,211	2,305	2,506
Low Growth (.21%)	2,142	2,165	2,211

As demonstrated in the following table and chart, there was no FAA TAF historical or forecast data for Basin Harbor Airport so a simple chart utilizing the number of operations from the airport's 5010 data was utilized. The Low Growth Rate yielded the lowest number of forecast operations, while the High Growth Rate yielded the highest number of forecast operations.

Burlington International Airport

As demonstrated in the following table and chart, the FAA TAF yielded the lowest number of forecast operations throughout the forecast period, despite high historical operations, followed by the Low Growth Rate. The High Growth Rate consistently yielded the highest number of forecast operations.

Burlington International Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	75,781	70,190	73,743
Average Growth (.42%)	**77,658**	**79,303**	**82,697**
High Growth (.84%)	79,296	82,683	89,897
Low Growth (.21%)	76,850	77,660	79,307

Caledonia County State Airport

From the following table, there is an abrupt shift in the number of operations from 2007 to 2009. After 2009, the TAF data falls in the middle of the range with the High Growth Rate projecting the most operations and the Low Growth Rate predicting the least number of operations.

Caledonia County State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	7,380	7,380	7,380
Average Growth (.42%)	**7,536**	**7,696**	**8,025**
High Growth (.84%)	7,695	8,024	8,724
Low Growth (.21%)	7,458	7,536	7,696

Deerfield Valley Regional Airport

As can be seen in the following table and chart, there was no FAA TAF historical or forecast data for Basin Harbor Airport so a simple chart utilizing the number of operations from the airport's 5010 data was utilized. The Low Growth Rate yielded the lowest number of forecast operations, while the High Growth Rate yielded the highest number of forecast operations.

Deerfield Valley Regional Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	0	0	0
Average Growth (.42%)	**3,167**	**3,235**	**3,376**
High Growth (.84%)	3,323	3,370	3,665
Low Growth (.21%)	3,133	3,166	3,233

Edward F. Knapp State Airport

The following table and graph shows the historical FAA TAF data dropped sharply from 2008-2009. As is typically the case, the Low Growth Rate yields the lowest number of forecast operations while the High Growth Rate predicts the highest.

Edward F. Knapp State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	24,125	24,125	24,125
Average Growth (.42%)	**24,636**	**25,158**	**26,234**
High Growth (.84%)	25,155	26,230	28,518
Low Growth (.21%)	24,379	24,636	25,159

Franklin County State Airport

FAA's historical TAF data shows a steep decline from 2006 to 2007 which could have been some sort of correction. Beyond 2007, the TAF remains flat. The Low Growth Rate produces the lowest forecast operations numbers while again the High Growth Rate yields the highest forecast operations numbers.

Franklin County State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	10,095	10,095	10,095
Average Growth (.42%)	**10,309**	**10,527**	**10,978**
High Growth (.84%)	10,526	10,976	11,933
Low Growth (.21%)	10,201	10,309	10,528

Hartness State Airport

The FAA TAF historical data varied widely from 1997 to 2016 while in the out years, the High Growth Rate forecasts the greatest number of airport operations and the Low Growth Rate forecasts the least amount.

Hartness State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	6,611	6,611	6,611
Average Growth (.42%)	**6,751**	**6,894**	**7,189**
High Growth (.84%)	6,893	7,188	7,815
Low Growth (.21%)	6,681	6,751	6,894

John H. Boylan State Airport

The FAA TAF historical and forecast date was unavailable so the operations data from the 5010 record was used to plot the forecast operations data. The last complete data available for use was 12 months ending in November 2012.

John H. Boylan State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	0	0	0
Average Growth (.42%)	**420**	**429**	**448**
High Growth (.84%)	438	457	497
Low Growth (.21%)	412	416	425

Middlebury State Airport

With the FAA TAF AT Middlebury Airport, there can be seen a precipitous drop in historical operations around 2008.

Middlebury State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	10,900	10,900	10,900
Average Growth (.42%)	**11,131**	**11,367**	**11,853**
High Growth (.84%)	11,366	11,851	12,885
Low Growth (.21%)	11,015	11,131	11,367

Morrisville – Stowe State Airport

With Morrisville-Stowe Airport, there is a disparity between the historic and forecast TAF data and the most recent reported 5010 data, of which the last complete year was 2015.

Morrisville – Stowe State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	11,976	11,976	11,976
Average Growth (.42%)	**6,547**	**6,686**	**6,972**
High Growth (.84%)	6,741	7,029	7,643
Low Growth (.21%)	6,452	6,520	6,658

Northeast Kingdom International Airport

Contrary to many other Vermont airports, the FAA TAF shows historical data at Newport State increasing at the 2008 mark and then remaining flat throughout the planning period.

Northeast Kingdom International Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	9,452	9,452	9,452
Average Growth (.42%)	**9,652**	**9,857**	**10,278**
High Growth (.84%)	9,856	10,227	11,173
Low Growth (.21%)	9,552	9,652	9,857

Post Mills Airport

The FAA TAF historical data reports a drop off in operations in 2008. The High Growth Rate shows the highest increase in forecast operations while the Low Growth Rate shows a decrease in forecast operations during the planning period.

Post Mills Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area	4,330	4,330	4,330
Average Growth	**4,422**	**4,515**	**4,709**
High Growth (.84%)	4,515	4,708	5,119
Low Growth (.21%)	4,376	4,422	4,516

Rutland – Southern Vermont Regional Airport

Again, there seems to be a disparity between the forecast operations numbers in the FAA TAF for Rutland – Southern Vermont Regional Airport. The TAF forecasts over 31,000 operations per year throughout the planning period and for comparison, the graph below shows forecast data based off the most recent operations numbers in the Airport 5010 record.

Rutland-Southern Vermont Regional Airport			
Operations Forecast			
	5 year	10 year	20 year
FAA Terminal Area Forecast	13,091	13,091	13,091
Average Growth (.42%)	**12,614**	**12,881**	**13,432**
High Growth (.84%)	12,880	13,430	14,601
Low Growth (.21%)	12,482	12,614	12,881

Shelburne Airport

Since there was no historical or forecast FAA TAF data for Shelburne Airport, the most recent 5010 data were used as a basis for the projections throughout the planning period.

Shelburne Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (.42%)	**4,326**	**4,417**	**4,606**
High Growth (.84%)	4,417	4,606	5,007
Low Growth (.21%)	4,281	4,326	4,418

Warren-Sugarbush Airport

There was no FAA TAF data prior to 2000 and the data between the years 2000 to 2011 shows wild fluctuations. After 2012, the TAF forecast levels out to 17,620 each subsequent year. The forecast growth rates are shown in the table and line chart below.

Warren-Sugarbush Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	17,620	17,620	17,620
Average Growth (.42%)	**17,993**	**18,374**	**19,161**
High Growth (.84%)	18,373	19,157	20,829
Low Growth (.21%)	17,806	17,994	18,375

William H. Morse State Airport

The FAA TAF data shows great variation on the historical side of the line graph below, while the forecast operations projections are highest in the High Growth Rate, and lowest in the Low Growth Rates.

William H. Morse State Airport			
Operations Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	14,377	14,377	14,377
Average Growth (.42%)	**14,554**	**14,862**	**15,498**
High Growth (.84%)	14,861	15,495	16,847
Low Growth (.21%)	14,402	14,554	14,863

5.3.5. Forecast Based Aircraft

Basin Harbor Airport

The FAA TAF had no historical or forecast information regarding Basin Harbor Airport. Also, the Airport's 5010 record shows there are no based aircraft.

Basin Harbor Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (-1.61%)	**0**	**0**	**0**
High Growth (1.20%)	0	0	0
Low Growth (-2.39%)	0	0	0

Burlington International Airport

As demonstrated in the following table and chart, Burlington International Airport will see the highest growth rate with the FAA TAF, while the Low Growth Scenario would yield the lowest growth rate. In 2017, BTV reported 86 based aircraft which is slightly higher than the reported TAF number which explains the disconnect at 2017 between forecast calculations and the TAF forecast.

Burlington International Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	90	99	119
Average Growth (-1.61%)	**79**	**73**	**62**
High Growth (1.20%)	91	97	109
Low Growth (-2.39%)	76	68	53

Caledonia County State Airport

As can be seen in the following table and graph, the Airport is expected to remain around 18 based aircraft throughout the planning period.

Caledonia County State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	18	18	18
Average Growth (-1.61%)	**17**	**15**	**13**
High Growth (1.20%)	19	20	23
Low Growth (-2.39%)	16	14	11

Deerfield Valley Regional Airport

Absent any TAF data, there is no readily available historical information about based aircraft at the airport so the following table and graph plot only future based aircraft. Utilizing the most recent 5010 data of 7 based aircraft, the forecast based aircraft projections remain flat throughout the planning period.

Deerfield Valley Regional Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	7	7	7
Average Growth (-1.61%)	**7**	**7**	**7**
High Growth (1.20%)	7	7	7
Low Growth (-2.39%)	7	7	7

Edward F. Knapp State Airport

The FAA TAF showed wild variability from year to year with respect to historical based aircraft at Edward F. Knapp State Airport. It also shows a flatline growth in based aircraft from 2015 through the end of the planning period.

Edward F. Knapp State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	54	54	54
Average Growth (-1.61%)	**49**	**45**	**38**
High Growth (1.20%)	56	60	67
Low Growth (-2.39%)	47	42	33

Franklin County State Airport

Like other Vermont Airports, the FAA TAF shows variability in the historical numbers of based aircraft, and then a flatline in the latter half of the planning period.

Franklin County State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	69	69	69
Average Growth (-1.61%)	**81**	**75**	**64**
High Growth (1.20%)	93	99	112
Low Growth (-2.39%)	78	69	54

Hartness State Airport

The based aircraft at Hartness Airport according to the FAA TAF has been varied prior to 2015 and the flat from 2015 through the end of the planning period.

Hartness State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	21	21	21
Average Growth (-1.61%)	**25**	**23**	**20**
High Growth (1.20%)	29	30	34
Low Growth (-2.39%)	24	21	17

John H. Boylan State Airport

As with other smaller airports, there is no FAA TAF date for John H. Boylan Airport. The most recent based aircraft data readily available from the airport's 5010 record was used to plot the forecast based aircraft. The results are shown below in the graph and table.

John H. Boylan State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (-1.61%)	**5**	**4**	**4**
High Growth (1.20%)	5	6	6
Low Growth (-2.39%)	4	4	3

Middlebury State Airport

The TAF for Middlebury State Airport varied wildly from 1990 through 2015 and then flattened out for the remaining years. The Low Growth Scenario shoes a decline throughout the forecast period.

Middlebury State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	36	36	36
Average Growth (-1.61%)	**34**	**31**	**27**
High Growth (1.20%)	39	42	47
Low Growth (-2.39%)	33	29	23

Morrisville – Stowe State Airport

At Morrisville – Stowe Airport, the 5010 record shows 19 fixed-wing aircraft, 6 gliders and 2 ultra-light aircraft which is the basis for the FAA TAF data. For the purposes of this forecast, the gliders and ultralights were included in the table and graph below which explains the discrepancy.

Morrisville – Stowe State Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	19	19	19
Average Growth (-1.61%)	**25**	**23**	**20**
High Growth (1.20%)	29	30	34
Low Growth (-2.39%)	24	21	17

Northeast Kingdom International Airport

At Newport Airport, the historical TAF was relatively stable. The forecast based aircraft for the High Growth Scenario shows a slight increase in based aircraft.

Northeast Kingdom International Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	21	21	21
Average Growth (-1.61%)	**18**	**17**	**14**
High Growth (1.20%)	21	23	25
Low Growth (-2.39%)	18	16	12

Post Mills Airport

The FAA TAF data for Post Mills Airport forecasts zero based aircraft after 2015, while the Low Growth Scenario projects a slight decline from 9 based aircraft down to 7 throughout the planning period.

Post Mills Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (-1.61%)	**8**	**8**	**7**
High Growth (1.20%)	10	10	11
Low Growth (-2.39%)	8	8	6

Rutland – Southern Vermont Regional Airport

Rutland – Southern Vermont Regional Airport has historically shown great variability in based aircraft according to the FAA TAF. Throughout the planning period, it appears the number of based aircraft are forecast to decline to 23 aircraft.

Rutland-Southern Vermont Regional Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	29	29	29
Average Growth (-1.61%)	**28**	**26**	**22**
High Growth (1.20%)	32	34	38
Low Growth (-2.39%)	27	24	18

Shelburne Airport

There was no historical or forecast FAA TAF data so the most recently 5010 data for the airport's-based aircraft was utilized to plot the Baseline Growth scenario, the High Growth scenario and the Low Growth Scenario. The results can be seen in the following table and graph.

Shelburne Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (-1.61%)	**53**	**48**	**41**
High Growth (1.20%)	61	64	72
Low Growth (-2.39%)	51	45	35

Warren-Sugarbush Airport

The forecast TAF data from 2012 through the planning period indicates there will be zero based aircraft so the airport 5010 data showing 50 based aircraft was utilized for the forecast period. The results can be seen in the following table and graph.

Warren-Sugarbush Airport			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	N/A	N/A	N/A
Average Growth (-1.61%)	**46**	**43**	**36**
High Growth (1.20%)	53	56	63
Low Growth (-2.39%)	44	39	31

William H. Morse State Airport

As with other airports, the FAA TAF has forecast a set number of aircraft throughout the latter half of the planning period. The Baseline Growth Rate, High Growth Rate and Low Growth Rates were all based on currently available 5010 data which deviates from FAA's TAF forecast somewhat. The results can be seen in the following table and graph.

William H. Morse State Airport Based Aircraft			
Based Aircraft Forecast			
	5 Year	10 Year	20 Year
FAA Terminal Area Forecast	32	32	32
Average Growth (-1.61%)	**30**	**27**	**23**
High Growth (1.20%)	34	36	41
Low Growth (-2.39%)	28	25	20

5.3.6. Aircraft Fleet Mix Forecast

The FAA Aerospace Forecast utilizes a methodology that considers numerous industry factors as well as economic conditions to attempt to predict future U.S. aviation demand. The following summarizes the most recent average growth rates for the general aviation fleet nationally and are applicable for this effort:

Table 5-6: FAA Aerospace Fleet Mix Forecast

Forecast Active GA and Air Taxi Aircraft Growth Rates 2016-2037	
Single Engine Piston	-0.9%
Multi Engine Piston	-0.5%
Turbo-Prop	1.4%
Turbo-Jet	2.3%
Rotorcraft	1.6%
Experimental	1.0%
Sport Aircraft	4.1%
Total GA Fleet	0.1%

Source: FAA Aerospace Forecast

Considering these FAA national forecast growth rates, the FAA rates were applied to the 2016 based aircraft numbers and projected out to 2037. A fleet mix breakdown was performed using the most recent available 5010 data. The following are percentage of total based aircraft that can reasonably be estimated for each category:

- Piston-powered Fleet (78%)
- Turbo-Jet Fleet (3%)
- Rotorcraft Fleet (1%)

- All Others (18%)

The FAA growth rates applied to the Vermont based aircraft fleet yield the following results for the 5, 10, and 20-year periods. As can be seen in **Table 5-7** the majority of Vermont's fleet is comprised of piston engine aircraft will decline significantly. If the FAA Aerospace Forecast holds up, much of the decline in single engine piston aircraft will be made up for in experimental and light sport aircraft throughout the planning period, with a slight increase in turbine engine aircraft.

Table 5-7: Forecast Vermont Aircraft Fleet Mix

	2016	2022	2027	2037
Piston	396	378	360	325
Multiengine Piston	21	20	19	17
Turbo-Jet	17	19	21	25
Rotorcraft	4	4	5	5
All Others (gliders, ultralights and light sport)	94	118	142	190
Totals	532	539	547	562

Source: McFarland Johnson 2017

5.3.7. Passenger and Cargo Activity

Scheduled Passenger Service

Burlington International Airport began a Master Plan Update in 2018, including a forecast of aviation demand. The forecast reviewed historical data, FAA activity estimates, aviation industry trends, and socioeconomic data to estimate future aviation activity at the airport. Additional insight was provided by airport and airline management on potential route and airframe changes, which factored into the assumptions and methodologies for projecting demand. The forecasts projected future passenger enplanements, operations, and based aircraft. Enplanements at Burlington International Airport are expected to increase at an annual average growth rate (AAGR) of 0.8 percent from 2018 to 2038, reaching 695,171 enplanements by 2023 and 787,012 by 2038. This growth is associated with an expected increase in air carrier operations and average seats per departure of 0.3 percent each with load factors forecasted to increase by 0.2 percent over the 20-year. Total operations are forecasted to increase at an AAGR of 0.5 percent from 71,722 in 2018 to 78,748 in 2038. A summary of the Master Plan Update approved aviation forecast is shown in the table below.

Table 5-8: Burlington International Airport Activity Forecast

Year	Based Aircraft	Enplanements	Operations				
			Air Carrier	GA	Cargo	Military	Total
2018	93	667,004	24,082	39,005	535	8,099	71,722
2023	97	695,171	24,480	40,864	588	5,486	71,418
2028	102	724,528	24,899	42,743	646	5,486	73,773
2038	111	787,012	25,804	46,679	779	5,486	78,748
AAGR	0.9%	0.8%	0.3%	0.9%	1.9%	-1.9%	0.5%

Note: AAGR = annual average growth rate; GA = general aviation.
Source: Airport Master Record (Form 5010), FAA TAF, FAA Aerospace Forecast (FY 2018-2038), Boeing World Air Cargo Forecast (2016-2017), Airbus Global Market Forecast (FY 2018-2037), Burlington Airport Commission, CHA, 2018.

Scheduled passenger service at the Rutland Southern Vermont Regional Airport is provided as part of the Essential Air Service (EAS) program consisting of three daily flights to Boston Logan International Airport. Service is currently provided by Cape Air in twin-engine piston Cessna 402 aircraft, which are unpressurized. Since service levels are set as part of the EAS program and decided by the US Department of Transportation, incremental demand-based capacity increases are difficult to discern. Enplanements have varied between 5,196 and 5,997 since 2010. It is anticipated that enplanements will remain within this range at an average of 5,500 annual enplanements until there are changes to the EAS program.

Charter Passenger Service

In addition to the daily, scheduled service that exists at both Burlington and Rutland, Morrisville/Stowe is served by seasonal scheduled charter flights on select days with various frequencies based on demand. A total of 265 enplanements were recorded in 2016.

These flights are a function of specialty demand between two points as these flights do not connect with other airlines or destinations. Much of the basis for these flights is the connection to a nearby ski resort (Stowe Mountain Resort). With the infancy and varied nature of the charter service, a specific forecast for the MVL passenger service is not developed as part of this statewide system plan. Additional destinations and similar service to other airports is possible and should be evaluated on an airport specific basis either through a master plan forecast or a specialized air service study.

Air Cargo Activity

Air cargo activity is not reported or accounted, with the same degree of clarity as passenger enplanements. A more in-depth review of air cargo activity in Vermont was conducted as part of this system plan and is included in the appendix to this report.

6. Future System Performance

6.1. INTRODUCTION

This chapter presents the options and system-level recommendations to improve the performance of the Vermont State Airport System (VASP). These options and recommendations respond to facility and service objective shortfalls and geographic gaps in service as presented in *Chapter 5, Current System Performance*, and are described in the following sections:

- Facility and Service Objective Improvement Options
- Geographic Coverage Performance Improvement Options
- Systemwide Improvement Recommendations
- Future System Performance

As described in *Chapter 5, Current System Performance*, system airports have been measured against the minimum facility and service objectives established for their respective roles.

As described in the sections that follow, this chapter presents options and system-level recommendations for airport-specific and system role improvements that align with the goals and objectives for the VASP.

6.1.1. Forecast Implications

The forecast chapter identified trends and projected growth patterns that may inform or change an airport's role in the future. For the state, operations and based aircraft have been stagnant or slightly declining over the past 10 years. Airports like Franklin County, Morrisville-Stowe, and Northeast Kingdom/Newport have displayed more positive trends relative to some of their peers; however, from a system planning perspective, it is not anticipated that any of these airports would achieve the criteria necessary to have category 4 airport recommendations.

6.1.2. Future Performance Methodology

As presented in Chapter 4, the analysis of statewide Airport system airports utilized a weighted sum model to measure the performance of each system airport for the VASP. A weighted sum model is a commonly used method for evaluating a set of data attributes or alternatives based upon multiple criteria. It is well-suited to measure the performance of VASP airports and facility and service objectives criteria established for each VASP Category.

The weighted sum model is designed such that each facility and service objective within each VASP Category is assigned a relative weight that corresponds to the importance of the objective within each Category. Table 6-1 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 VASP airport. The points for each airport are the product of the assigned value given to the airport multiplied by the objective's weight.

Table 6-1: System Performance Model Design

Facility or Service Objective[1]/	Weight[1]/	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.
[1]/ *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.

Just as this system was used to score the existing performance, it can be used in the same way to model future performance and prioritize projects. The future performance methodology takes the missing points/weight from their category and translates them into system plan recommended projects.

6.2. FACILITY AND SERVICE OBJECTIVE IMPROVEMENT OPTIONS

Utilizing the weighted sum model to measure performance, each VASP airport was placed into one of the four VASP airport role categories. In this way, each role category represents a performance range where each Airport's score places them in the system. The VSASP performance model scoring ranges are summarized in Table 6-2.

Table 6-2: VASP - Performance Model Score Range

VASP Role	System Performance Model - Score Range	
	Low	High
Category 1 Airports	0	15
Category 2 Airports	16	41
Category 3 Airports	42	90
Category 4 Airports	91	100

Source: McFarland Johnson Analysis, 2018.

Qualitative Adjustments

Also described in *Chapter 5, Current System Performance,* once the system performance analysis was completed, 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. 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 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 VASP Categories – have a greater impact to the Vermont State Airport System's performance. The quantitative analysis alone does not account for the unique combination of facilities, services, and operational nuances that truly distinguish some VASP airports from each other and create different levels of value and impact for the statewide system.

The following sections summarize options to improve future performance of VASP airports by way of improvements to each category based upon minimum facilities and service objectives that are not currently met.

6.2.1. Category 1 Airports

Table 6-3 provides a summary of Category 1 Airports current performance score, future performance recommendations, which are minimum facilities and services that are not met, and points *not* scored, and a future performance score if minimums are met.

Table 6-3: VASP – Category 1 Airports - Minimum Facility and Service Objective Shortfalls

Category 1 Airport		Score
John H. Boylan State	Current System Performance Score	7
Future Performance Recommendation • Basic Terminal Building/Shelter • Part-Time Airport Manager On-Site (Seasonal OK) Facility and Service Objectives Not Included: • MoGas or 100LL On-Site – *Review Economic Feasibility*		8
	Future Performance Score	**15**
Basin Harbor	Current System Performance Score	9
Future Performance Recommendation • Basic Terminal Building/Shelter Facility and Service Objectives Not Included: • MoGas or 100LL On-Site - *Review Economic Feasibility*		4
	Future Performance Score	**13**

Post Mills	12
Future Performance Recommendation • Basic Terminal Building/Shelter Facility and Service Objectives Not Included: • MoGas or 100LL On-Site - *Review Economic Feasibility*	4
Future Performance Score	**16**

Source: McFarland Johnson Analysis, 2018.

As shown, John H. Boylan State, Basin Harbor, and Post Mills Airports all have a need for a basic shelter/terminal building, and at least seasonal, part-time management on-site would be of value for John H. Boylan State. Additionally, no Category 1 Airport meets the minimum facility objective of having MoGas or 100LL fuel services on site.

6.2.2. Category 2 Airports

Table 6-4 provides a summary of Category 2 Airports current performance score, shortfalls in terms of minimum facilities and services that are not met, and points *not* scored, and a future performance score if minimums are met.

Table 6-4: VASP – Category 2 Airports - Minimum Facility and Service Objective Shortfalls

Category 2 Airport		Score
Deerfield Valley Regional	Current System Performance	17
Future Performance Recommendation • 100LL Self-Service Aviation Fuel on Site • Full-Time Airport Manager On-Site (Seasonal OK) • Single-Service SASO or Full-service FBO on Site at Least Part-Time		12
Future Performance Improvements (Previous Partial Deficit/Credit) • Part-Time Operations Staff On-Site or Contracted • GPS Instrument Approach Procedure Facility and Service Objectives Not Included: • Primary Runway (≥4,000') – *Review Economic and Environmental Feasibility*		4
Future Performance Score		**33**
Warren Sugarbush	Current System Performance	31
Future Performance Recommendation • GPS Instrument Approach Procedure		4
Future Performance Improvements (Previous Partial Deficit/Credit) • 100LL Self-Service Aviation Fuel on Site • Full-Time Airport Manager On-Site (Seasonal OK) • Part-Time Operations Staff On-Site or Contracted • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock Facility and Service Objectives Not Included: • Primary Runway (≥4,000') – *Review Economic and Environmental Feasibility*		4 (Half Credit Unless Year-Round Ops)

	Future Performance Score	**39**
Shelburne	Current System Performance	36
Future Performance Recommendation • None Future Performance Improvements (Previous Partial Deficit/Credit) • Full-Time Airport Manager On-Site (Seasonal OK) • Part-Time Operations Staff On-Site or Contracted • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock Facility and Service Objectives Not Included: • Primary Runway (≥4,000') – Paved • 100LL Self-Service Aviation Fuel on Site - *Review Economic Feasibility* • GPS Instrument Approach– *Limited Practicality w/ Turf Runway & Seasonality*		3 (Half Credit Unless Year-Round Ops)
	Future Performance Score	**39**
Middlebury State	Current System Performance	40
Future Performance Recommendation • Primary Runway (≥4,000') – Paved • GPS Instrument Approach Procedure		7
Future Performance Improvements (Previous Partial Deficit/Credit) • 100LL Self-Service Aviation Fuel on Site • Full-Time Airport Manager On-Site (Seasonal OK) • Part-Time Operations Staff On-Site or Contracted • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock		9
	Future Performance Score	**56**

Source: McFarland Johnson Analysis, 2018.

Both Warren-Sugarbush and Shelburne have the ability and robust peak season to support additional facilities and services as demand warrants; however, as seasonal facilities, improvements are shown as half-credit to reflect the part-time nature of each airport. Should these improvements result in year-round operations, the balance of the points would be awarded. It is anticipated that only Warren Sugarbush has the potential to be a year-round facility in the future as Shelburne does not have a paved landing surface.

6.2.3. Category 3 Airports

Table 6-5 provides a summary of Category 3 Airports current performance score, shortfalls in terms of minimum facilities and services that are not met, and points *not* scored, and a future performance score if minimums are met.

Table 6-5: VASP – Category 3 Airports - Minimum Facility and Service Objective Shortfalls

Category 3 Airport		Score
William H. Morse State	Current System Performance	54
Future Performance Recommendation • Full-Service FBO On-Site Full Time (Enhanced Service) • Maximize Runway Length (Future Partial Credit)		8
Future Performance Improvements (Previous Partial Deficit/Credit) • Full-Time Operations Staff On-Site • Terminal Building with Pilot and Visitor Amenities • 100LL and Jet-A Self Service Aviation Fuel on Site • Runway and Taxiway Edge Lighting • Aircraft /Avionics Maintenance Services On-Site		14
Facility and Service Objectives Not Included: • Primary Runway (≥5,000') - *Review Economic/Environmental Feasibility*		
	Future Performance Score	**76**
Caledonia County State	Current System Performance	54
Future Performance Recommendation • Aircraft/Avionics Maintenance Services On-Site • Maximize Runway Length (Future Partial Credit)		8
Future Performance Improvements (Previous Partial Deficit/Credit) • Full-Time Airport Manager On-Site • Full-Time Operations Staff On-Site • Terminal Building with Pilot and Visitor Amenities • 100LL and Jet-A Self Service Aviation Fuel on Site • Full Service FBO On-Site Full-Time • Runway and Taxiway Edge Lighting		14
Facility and Service Objectives Not Included: • Primary Runway (≥5,000') - *Review Economic/Environmental Feasibility*		
	Future Performance Score	**76**
Morrisville-Stowe State	Current System Performance	59
Future Performance Recommendation • Maximize Runway Length (Future Partial Credit)		3
Future Performance Improvements (Previous Partial Deficit/Credit) • Full-Time Operations Staff On-Site • 100LL and Jet-A Self Service Aviation Fuel on Site • Full Service FBO On-Site Full-Time • Runway and Taxiway Edge Lighting		16

• Rotating Airport Beacon • Own/Operate Snow Removal Equipment • Aircraft /Avionics Maintenance Services On-Site Facility and Service Objectives Not Included: • Primary Runway (≥5,000') - *Review Economic/Environmental Feasibility*		
	Future Performance Score	**78**
Franklin County State	Current System Performance	59
Future Performance Recommendation • Maximize Runway Length (Future Partial Credit)		3
Future Performance Improvements (Previous Partial Deficit/Credit) • Full-Time Airport Manager On-Site • Full-Time Operations Staff On-Site • Terminal Building with Pilot and Visitor Amenities • 100LL and Jet-A Self Service Aviation Fuel on Site • Full Service FBO On-Site Full-Time • Runway and Taxiway Edge Lighting • Aircraft /Avionics Maintenance Services On-Site Facility and Service Objectives Not Included: • Primary Runway (≥5,000') - *Review Economic/Environmental Feasibility*		16
	Future Performance Score	**78**
Edward F. Knapp State	Current System Performance	84
Future Performance Recommendation • 100LL AND Jet-A Self-Service Aviation Fuel on Site		4
	Future Performance Score	**88**
Hartness State	Current System Performance	90
Future Performance Recommendation • None		-
	Future Performance Score	**90**
Northeast Kingdom International	Current System Performance	90
Future Performance Recommendation • None		-
	Future Performance Score	**90**

Source: McFarland Johnson Analysis, 2018.

Much of improvements for Category 3 Airports consist of improved facilities and services that currently partially meet the facility and service objectives. All of the airports that currently do not meet the 5,000-foot runway length objective have the opportunity and system plan recommendation to maximize runway length in the future to get as close to the objective as economically and environmentally feasible.

6.2.4. Category 4 Airports

Table 6-6 provides a summary of Category 3 Airports current performance score, shortfalls in terms of minimum facilities and services that are not met, and points *not* scored, and a future performance score if minimums are met.

Table 6-6: VASP – Category 4 Airports - Minimum Facility and Service Objective Shortfalls

Category 4 Airport		Score
Rutland – Southern Vermont Regional	Current System Performance	97
Future Performance Recommendation • Intermodal Transportation Connections at/near Site • Airport Security Measures (SIDA, Badging, Staff etc.) • Aircraft/Avionics Maintenance Services on Site • Rental Cars Future Performance Improvements (Previous Partial Deficit/Credit) • ARFF • On-Site Concessions or Restaurant • Precision Instrument Approach Procedure (ILS and/or CAT I) Facility and Service Objectives Not Included: • ATCT – *Limited Operations Counts* • Improvements to Network/Legacy Airline Service – *Currently Limited by EAS Bid*		1
	Future Performance Score	**98**
Burlington International	Current System Performance	100
Future Performance Recommendation • None		-
	Future Performance Score	**100**

Source: McFarland Johnson Analysis, 2018.

There are no specific system plan recommendations for Burlington International Airport. The ongoing (2019) Burlington International Airport Master Plan Update will contain the airport-specific needs. Much of the recommendations for Rutland-Southern Vermont Regional consists of improved ground transportations options.

6.3. GEOGRAPHIC COVERAGE PERFORMANCE IMPROVEMENT OPTIONS

As described in *Chapter 4, Current System Performance*, system airports were also measured in terms of geographic coverage or reach. The geographic coverage is a metric that approximates each airport's service area, which is defined by 30-minute automobile drive-times (ground access) for general aviation airports and services and a 60-minute drive time coverage for Burlington International. The service area is quantified in terms of land area covered and population and employment centers served. The larger service area for Burlington International recognizes the further distance that the traveling public will drive to utilize scheduled passenger service.

Additionally, as described in *Chapter 2. System Parameters*, performance of the VASP airports is evaluated by utilizing a 15-nautical mile service area for certain airport infrastructure, equipment, and services available to airborne aircraft. Termed air access coverage in this VSASP, the particular infrastructure coverage evaluated includes runway length, approach capability, weather reporting, and fuel type availability.

Together, the geographic service areas and reach of VASP airports represent a performance metrics that can identify any significant gaps that may be addressed by recommendations from this Plan for future airport infrastructure and service improvements.

6.3.1. Ground Access Coverage

As described in *Chapter 4, Current System Performance*, the Vermont State Airport System performs at a high level, reaching approximately 93 percent of the state's population and 44 (88 percent) of the top 50 employers in the state. **Table 6-7** shows ground access for each VASP Airport Category, combined coverage for the statewide system of all airports, and the impact of coverage by neighboring state airports.

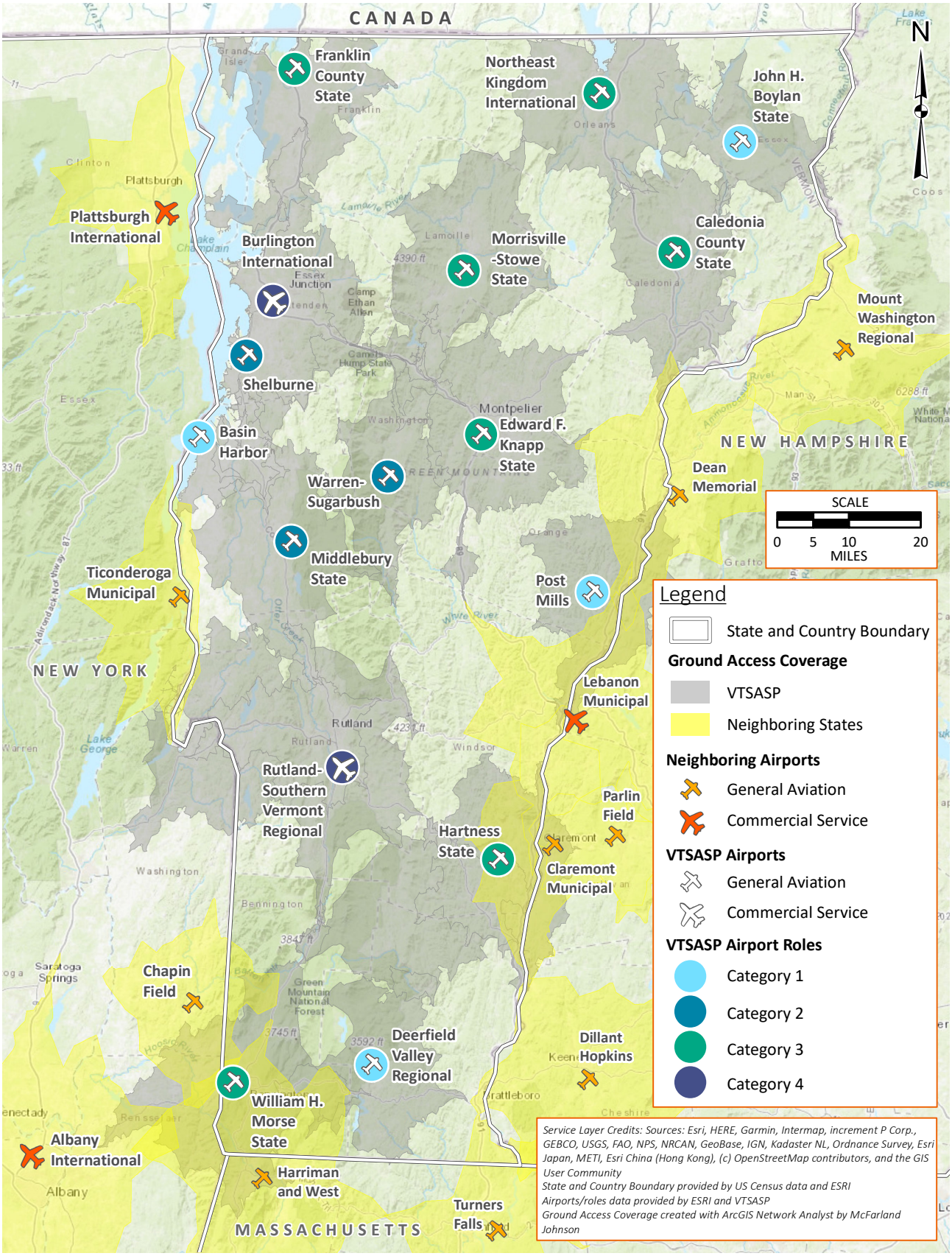
Table 6-7: Ground Access Coverage by VASP Airports and Neighboring State Airports

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
VASP Airport Coverage	**57%**	**93%**	**44**
Neighboring State Airport Coverage	5%	6%	1
VASP & Neighboring State Airport Coverage	62%	99%	90%

Source: McFarland Johnson Analysis, 2018.

Ground access coverage by VASP airports and neighboring state airports is illustrated in **Figure 6-1**.

Figure 6-1: Ground Access Coverage



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-1 Ground Access Coverage Even.mxd

As shown by **Figure 6-1**, the airports that have the greatest reach into Vermont in terms of serving underserved areas, people, and employment centers are Dean Memorial and Lebanon Municipal in New Hampshire. While all neighboring state airports combine to serve 1,000 square miles, more than 81,100 Vermont residents, and 4 of the state's top 50 employers, much of these areas are served by existing VASP airports. Therefore, neighboring state airports provide some duplicate, or competing general aviation services in these areas.

Ground Access Coverage Improvements

Based upon the analysis of ground access provided by VASP airports, the location of and access to VASP airports adequately services statewide population and employment centers. Overall, this means that most residents and businesses are within 30-minutes of a VASP airport. Due to the comprehensive geographic coverage of VASP airports, there appears no immediate need for the introduction of new airport facilities to the statewide system.

Among the areas of the state that are not within 30-minutes of a VASP airport, the most populated area of White River Junction/Hartford is within 30-minutes of Lebanon Municipal Airport in New Hampshire. As such, activity at Lebanon Municipal should be monitored and supported to ensure that services continue such that Vermont residents and business have access to general aviation facilities and services in that area of the state. Should the market demand for airport services or facilities in that part of Vermont increase, Hartness State Airport may be able to expand offerings to capture that demand.

6.3.2. Air Access Coverage

Access to key infrastructure, equipment, and services for airborne aircraft is important because it offers insight into the quality of facilities and services provided to the broader regional and national aerospace system. As such, it is an indication of the system's usability by a broader range of aircraft in the national fleet (not just those based and operated in Vermont) during all weather conditions. **Table 6-8** shows air access coverage these specific key infrastructure elements.

Table 6-8: Air Access Coverage by VASP Airports

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

Source: McFarland Johnson Analysis, 2017.

Figures 6-2 through 6-8 are included from Chapter 4 to illustrate coverage for each key infrastructure component, equipment, or service provided by VASP and neighboring states. Future air access coverage improvement options are summarized in the sections that follow.

Runway Length

Table 6-8 shows that land area coverage for VASP Airports with runways of greater than or equal to 4,000-feet is less than 50 percent of the state. Coverage by Airports with runways of 4,000-5,000 or greater feet is illustrated in Figures 6-2 and 6-3, respectively. These are the same airports.

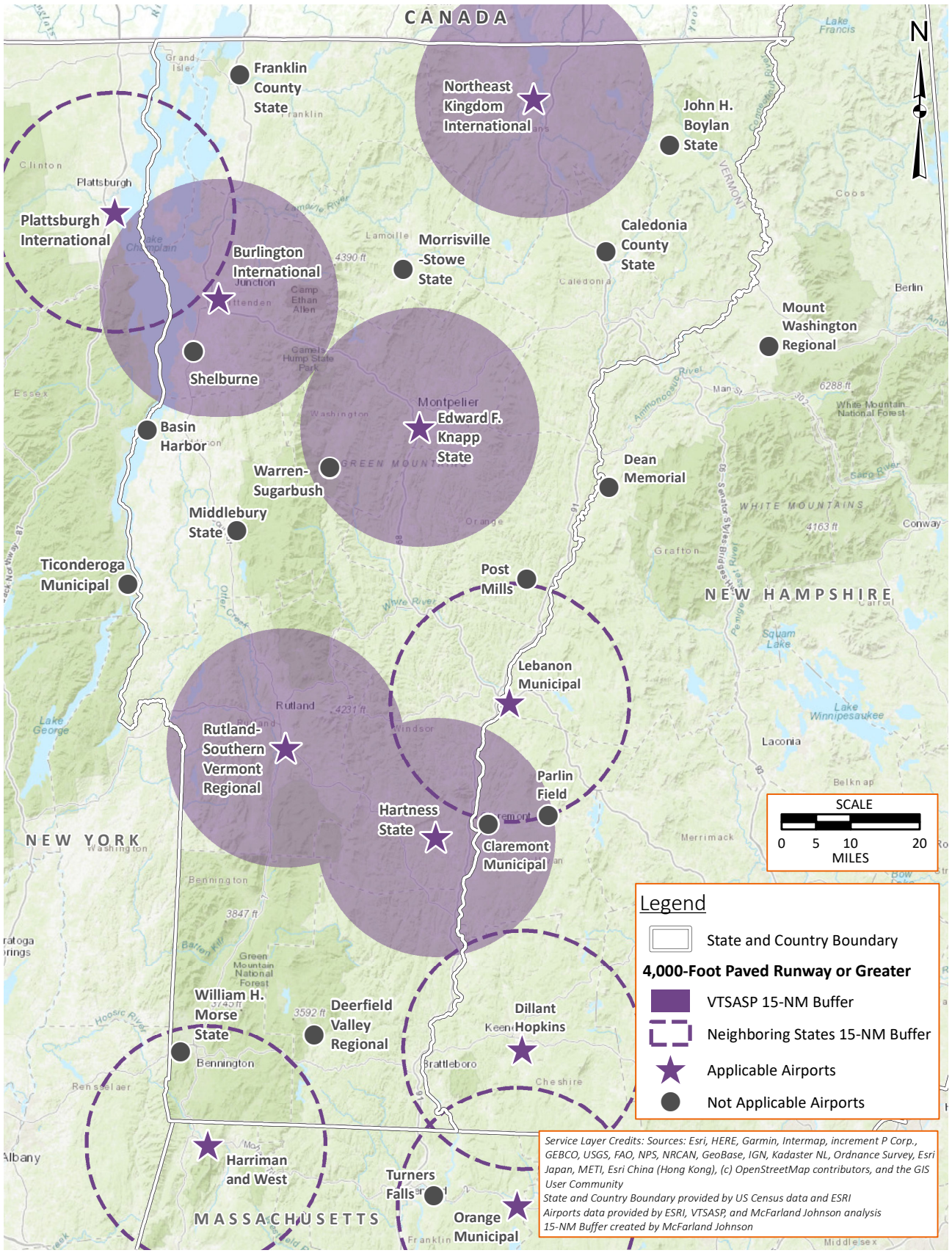
While covering less than half of the state, VASP airports provide service to more than half the population and 62 percent of major employment centers. Additionally, coverage into Vermont by neighboring airports providing these runways (primarily Lebanon Municipal, Harriman-and-West in North Adams Massachusetts, and Dillant-Hopkins in Keene) offers support to residents and businesses. VASP Airports that could be options for improving runway length coverage are summarized in Table 6-9. The table indicates whether the improvement is required by the VASP Airport's category/role and provides commentary regarding improvement considerations.

Table 6-9: VASP Airport Options/Candidates for Improved Runway Coverage

Runway Length Coverage & VASP Airport	VASP Role Requirement	Coverage Improvement Considerations
Runway Length ≥ 4,000-feet		
Airport Options for Improving Coverage: • Caledonia County State • Basin Harbor • Warren-Sugarbush • William H. Morse State	 ✓ ✓ ✓ ✓	• Shortest extension would be at William H. Morse State (296 feet), which serves a greater variety of based aircraft than other airports listed. • Basin Harbor is closed 6 months/year, there are no based aircraft, and the existing runway is not paved. • Warren-Sugarbush is closed 6 months/year, pavement strength is only 8,500 pounds.
Runway Length ≥ 5,000-feet		
Airport Options for Improving Coverage: • Franklin County State • Morrisville-Stowe State • Caledonia County State • William H. Morse State	 ✓ ✓ ✓ ✓	• Franklin County State would require the longest extension (1,999 feet). • Morrisville-Stowe and William H. Morse State airports each would require about 1,300-feet extensions. • Morrisville-Stowe and William H. Morse serve a greater variety of based aircraft, including multi-engine and helicopters. • Franklin County State services predominantly based single-engine aircraft and ultralights. • Caledonia County State airport serves the fewest existing based aircraft.

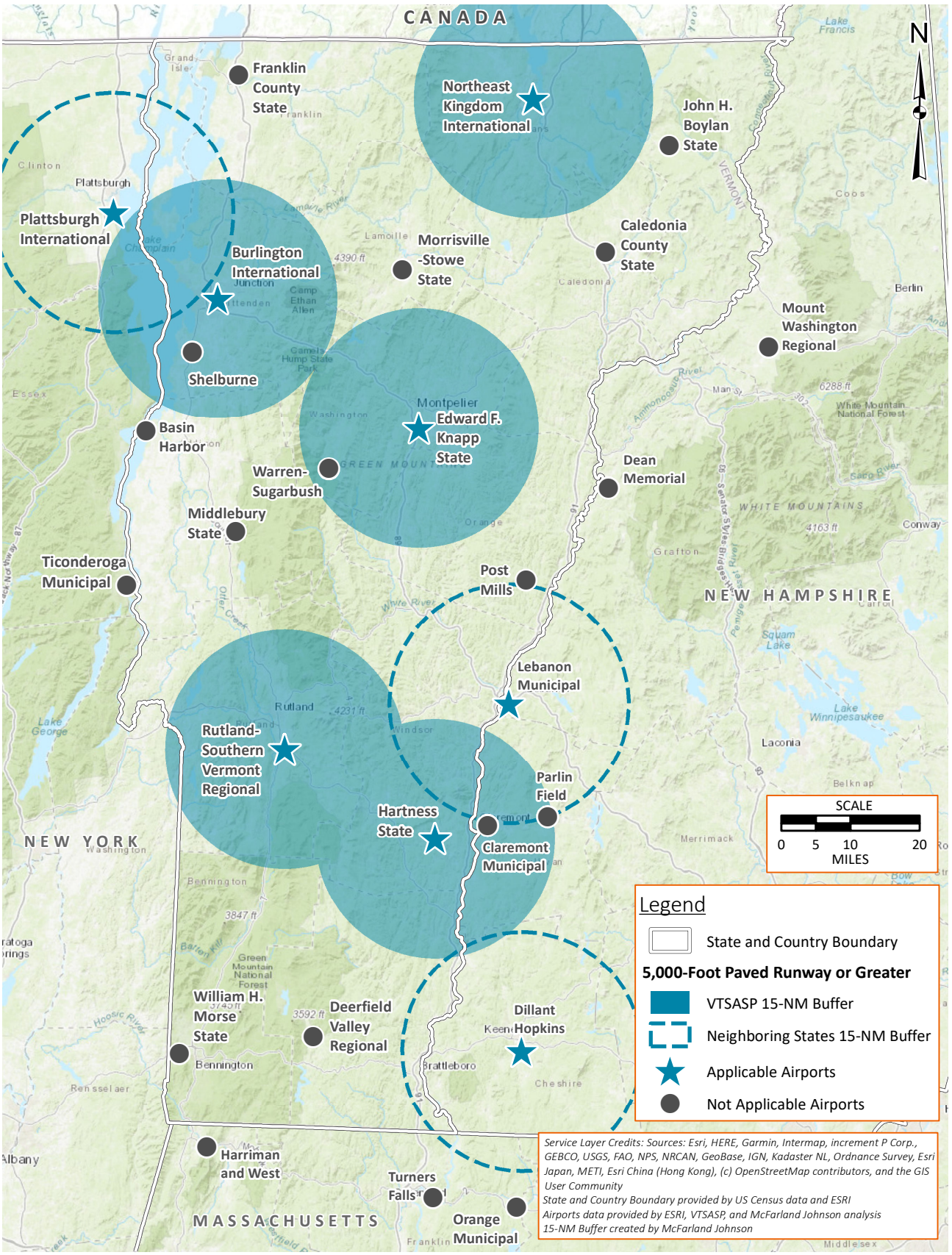
Source: McFarland Johnson Inc., Analysis, 2018.

Figure 6-2: Airports with 4,000-Foot Paved Runway or Greater



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-2 Air Access Coverage 4000.mxd

Figure 6-3: Airports with 5,000-Foot Paved Runway or Greater



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-3 Air Access Coverage 5000.mxd

Approach Capability

Table 6-8 indicates that air access to non-precision approaches provided by the Vermont State Airport System performs very well, serving 70 percent of Vermont, 75 percent of residents, and 88 percent of major employment centers. However, coverage by VASP Airports with precision approach capability is just 27 percent of the state, 46 percent of the population, and just 58 percent of major employment centers. Figures 6-4 and 6-5 illustrate this coverage.

Support provided by neighboring state airports with precision approach capability is offered primarily by Lebanon Municipal, whose service area extends west to Rutland-Southern Vermont Regional. To a lesser extent, precision approaches provided by Dillant-Hopkins and Plattsburgh may be of some benefit to aircraft operating in those regions of the State. VASP Airports that could be options for improving approach capability coverage are summarized in Table 6-10. The table indicates whether the improvement is required by the VASP Airport's category/role and provides commentary regarding improvement considerations.

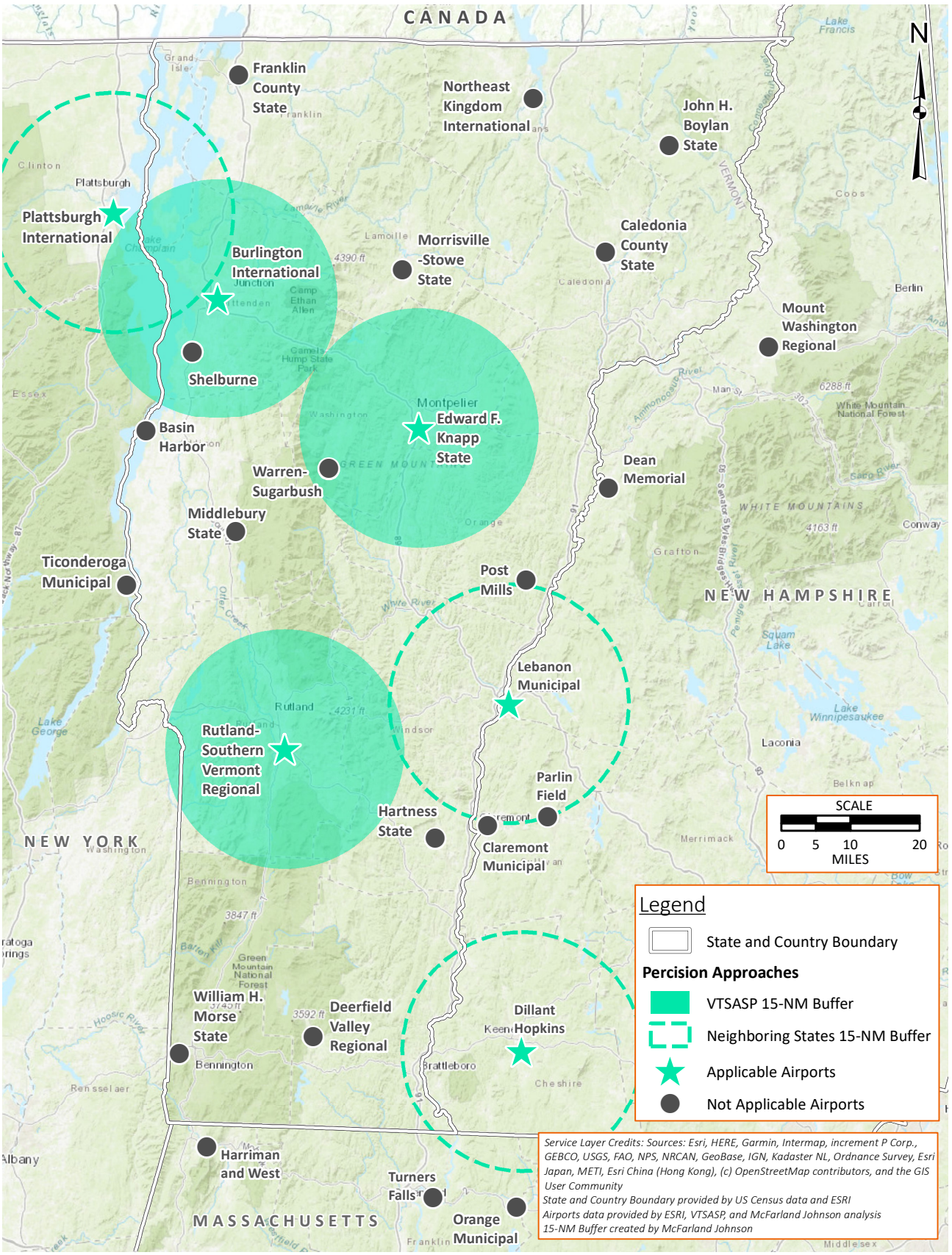
Table 6-10: VASP Airport Options/Candidates for Improved Approach Capability Coverage

Approach Capability Coverage & VASP Airport	VASP Role Requirement	Coverage Improvement Considerations
Non-Precision Approach		
Airport Options for Improving Coverage: • Shelburne • Warren-Sugarbush • Middlebury State	 ✓ ✓ ✓	Aircraft operating in the area of each VASP airport shown at left are in proximity to non-precision approaches offered by adjacent airports, as follows: • Shelburne - Burlington International • Warren-Sugarbush - Edward F. Knapp State • Middlebury State - Ticonderoga Municipal and Edward F. Knapp State
Precision Approach		
Airport Options for Improving Coverage: • Franklin County State • Northeast Kingdom Int'l. • Morrisville-Stowe State • John H. Boylan State • Caledonia County State • Shelburne • Basin Harbor • Warren-Sugarbush • Middlebury State • Post Mills • Hartness State • William H. Morse State • Deerfield Valley Regional	Not Required to Meet VASP Category Minimums	While no VASP airport is required to have a precision approach to meet minimum facilities and services established for their category, the low number of VASP airports offering precision approaches (three) indicates a need. A primary consideration for selecting which VASP airports are most appropriate for precision approaches and/or comparable visibility and decision altitude minimums is the critical aircraft and runway length. As defined by the FAA, critical aircraft is the most demanding aircraft type/group that make regular use of the airport. [1/] Among the VASP airports at left, Northeast Kingdom has the longest runway (5,300 feet).

Source: McFarland Johnson Inc., Analysis, 2018.

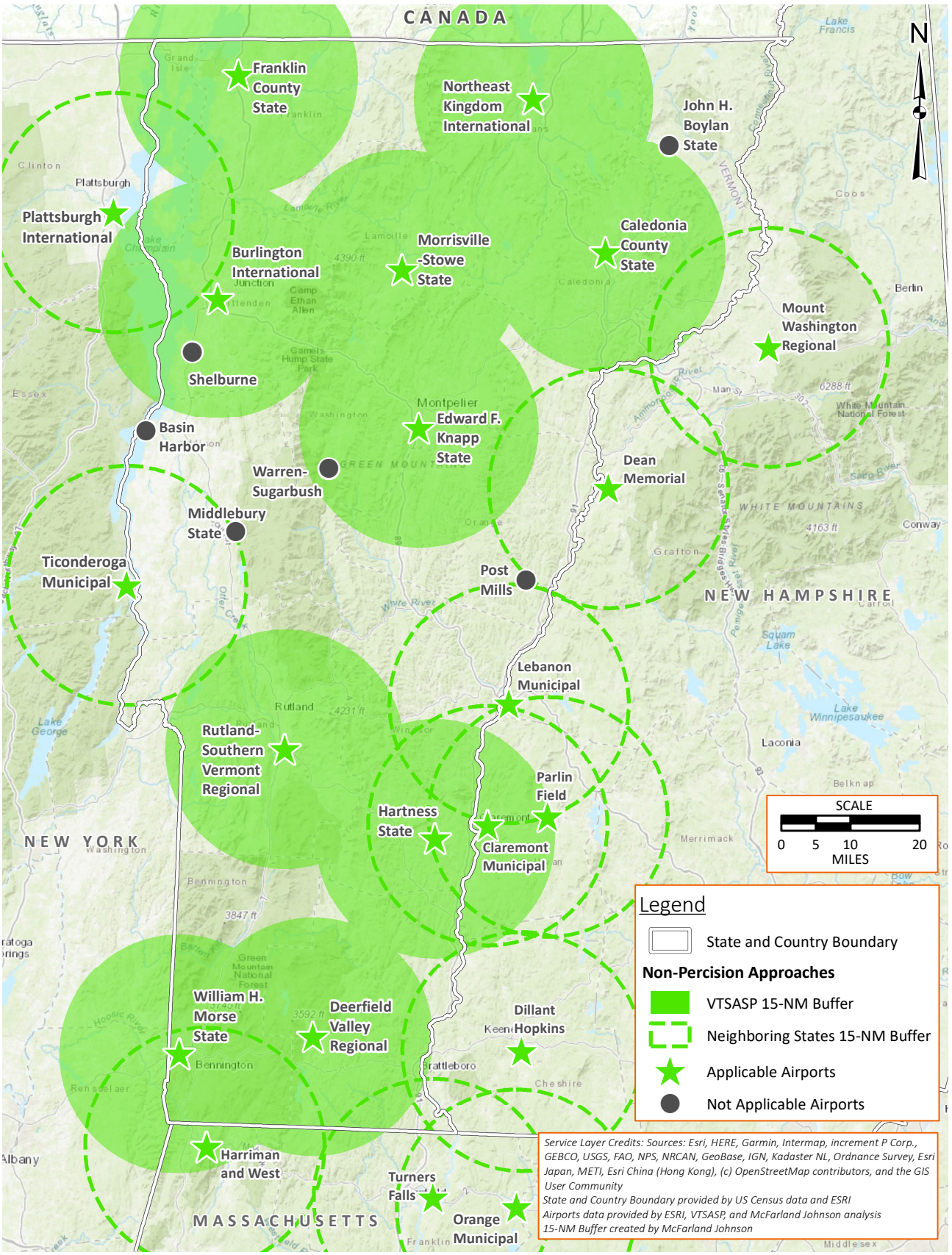
[1/] Federal Aviation Administration, Advisory Circular 150/5000-17

Figure 6-4: Airports with Precision Approaches



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-4 Air Access Coverage 5000.mxd

Figure 6-5: Airports with Non-Precision Approaches



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-5 Air Access Coverage Non-Precision.mxd

On-Site Weather Reporting

Similar to non-precision approach capability coverage, data shown in Table 6-8 indicates that the Vermont State Airport System performs very well, serving 73 percent of the state, 78 percent of Vermont residents, and 84 percent of major employment centers.

Of the remaining areas unserved, Lebanon Municipal provides the greatest reach of all neighboring state airports. VASP Airports that could be options for improving on-site weather reporting coverage are summarized in **Table 6-11**. The table indicates whether the improvement is required by the VASP Airport's category/role and provides commentary regarding improvement considerations.

Table 6-11: VASP Airport Options/Candidates for Improved Weather Reporting Coverage

Weather Reporting Coverage & VASP Airport	VASP Role Requirement	Coverage Improvement Considerations
On-Site Weather Reporting		
Airport Options for Improving Coverage: • Post Mills • Deerfield Valley Regional • John H. Boylan State	Not Required to Meet VASP Category Minimums	While no VASP airports are required to have on-site weather reporting to meet minimum facilities and services established for their category, the addition of on-site weather reporting at John H. Boylan State, Post Mills, and Deerfield Valley Regional would improve coverage for airborne aircraft those areas of the state.

Source: McFarland Johnson Inc., Analysis, 2018.

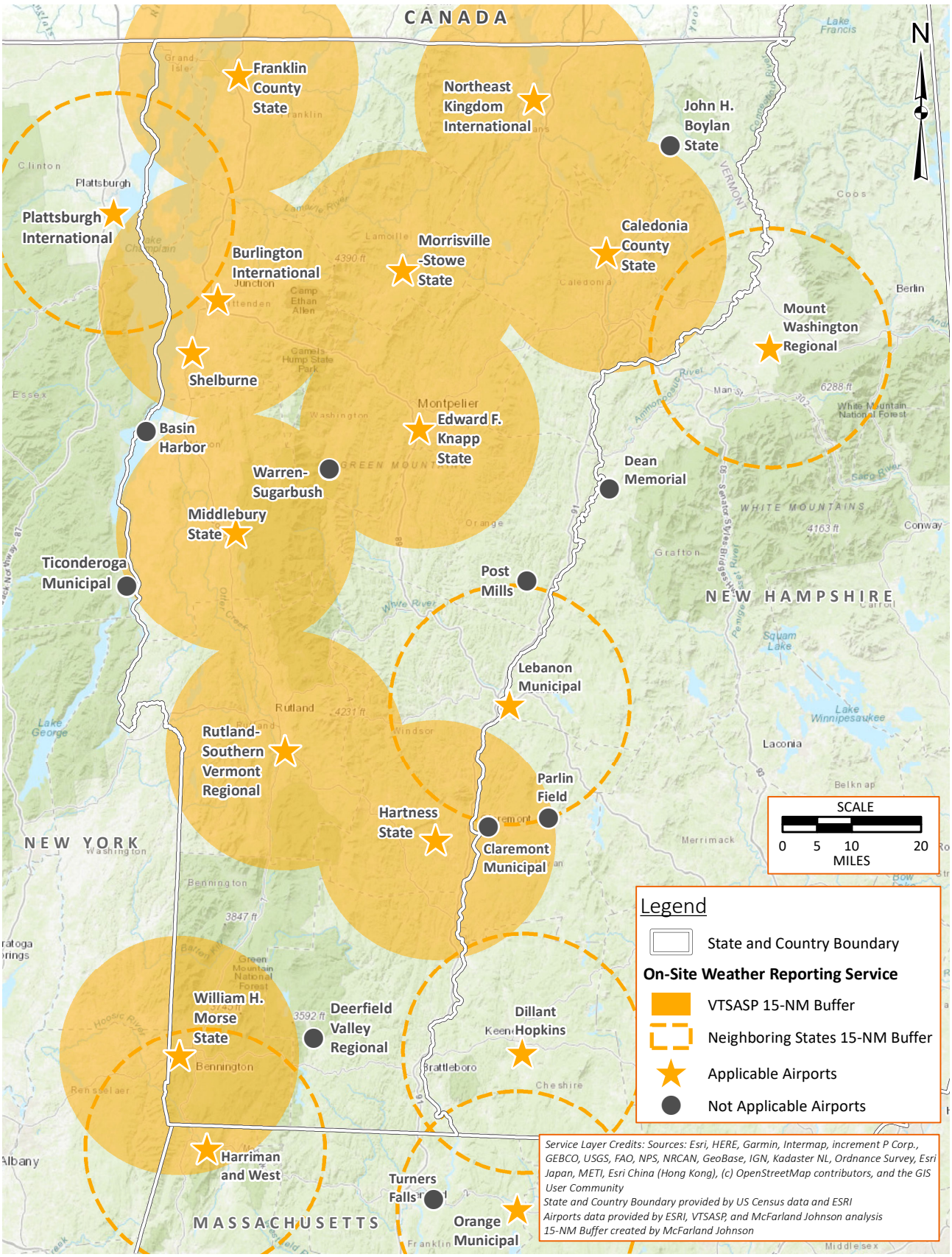
Figure 6-6 illustrates this coverage by VASP Airports providing on-site weather reporting services.

Fueling Services

Finally, data shown in **Table 6-8** shows that air access coverage by VASP airports offering AvGas/100LL fuel service is significant, reaching 73 percent of the State, 79 percent of Vermont residents, and 86 of major employment centers. Five VASP Airports do not offer fueling: Basin Harbor, Shelburne, John H. Boylan State, Post Mills, and Deerfield Valley. However, coverage by other VASP Airports and by neighboring state airports providing 100LL fuel services (primarily Dean Memorial, Lebanon Municipal, and to a lesser extent Harriman-and-West, Turners Falls, Orange Municipal, and Dillant-Hopkins) offers support to residents and businesses that leaves very few areas of the state unserved.

Air access coverage to Jet-A fuel service provided by VASP Airports is provided to 57 percent of the state, 69 percent of residents, and 78 percent of major employment centers. Support provided by neighboring state airports with Jet-A fuel service is offered primarily by Lebanon Municipal, whose service area extends west to Rutland-Southern Vermont Regional and overlaps with Hartness State. To a lesser extent, the southeast corner of the state is supported by service provided by Dillant-Hopkins and Orange Municipal.

Figure 6-6: On-Site Weather Reporting Service



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-6 Air Access Coverage Weather.mxd

VASP Airports that could be options for improving fuel service coverage are summarized in Error! Reference source not found. The table indicates whether the improvement is required by the VASP Airport's category/role and provides commentary regarding improvement considerations.

Table 6-12: VASP Airport Options/Candidates for Improved Fuel Service Coverage

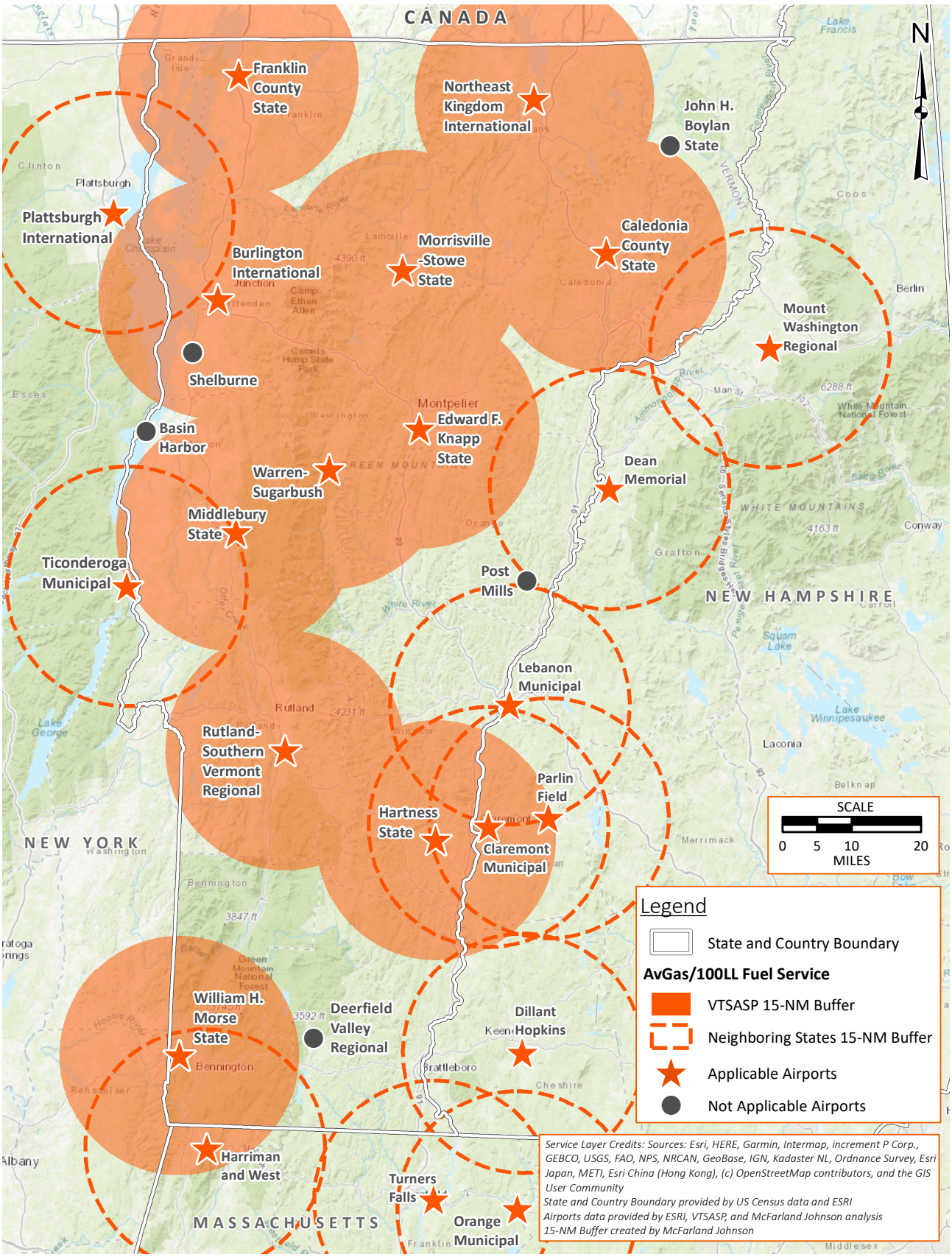
Fuel Service Coverage & VASP Airport	VASP Role Requirement	Coverage Improvement Considerations
100LL/AvGas Fuel Service		
Airport Options for Improving Coverage: • John H. Boylan State • Shelburne • Basin Harbor • Post Mills • Deerfield Valley Regional	 ✓ ✓ ✓ ✓ ✓	A primary consideration for selecting which VASP airports are most appropriate for the addition of 100LL/AvGas fuel service is the level of demand that can justify the capital expense and operating and maintenance costs of a fuel farm or mobile fuel truck. The following are the operating schedules of each VASP airport shown at left: • Basin Harbor – Open May - October • John H. Boylan State – Unattended • Shelburne – Open daily[1/] • Post Mills – Irregular schedule • Deerfield Valley Regional - Unattended
Jet-A Fuel Service		
Airport Options for Improving Coverage: • Franklin County State • Morrisville-Stowe State • Caledonia County State • William H. Morse State	 ✓ ✓ ✓ ✓	Each of the VASP airports shown at left are also candidates for improving coverage by 5,000-foot runways; however, Morrisville-Stowe and William H. Morse serve a greater variety of based aircraft than Franklin County and Caledonia County State airports, including multi-engine and helicopters.

Source: McFarland Johnson Inc., Analysis, 2018.

[1/]*Shelburne Airport provides MoGas, (motor vehicle fuel), which is generally less expensive than AvGas.*

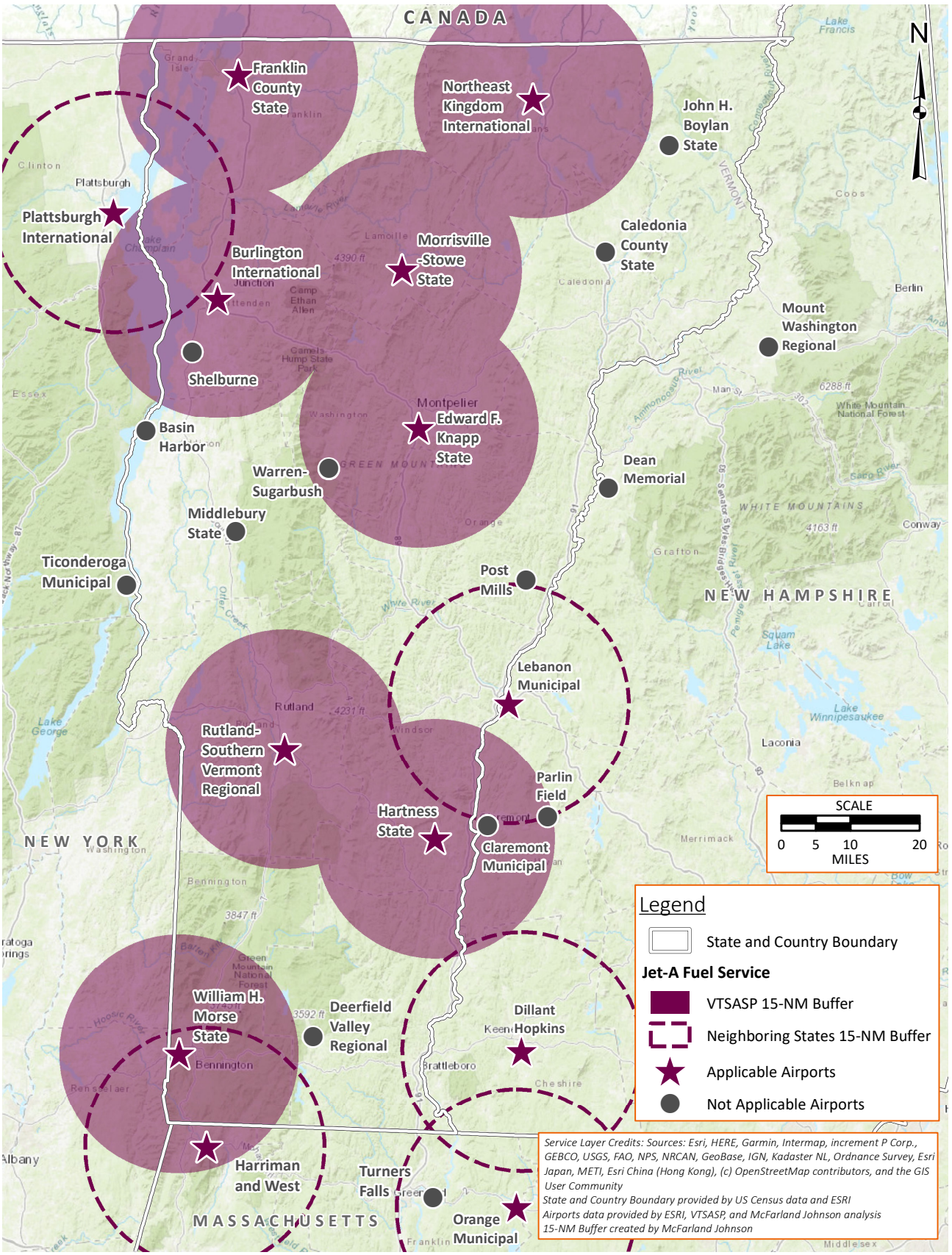
Figures 6-7 and 6-8 illustrates fuel services coverage by VASP Airports providing 100LL/AvGas and Jet-A fueling.

Figure 6-7: AvGas/100LL Fuel Service



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-7 Air Access Coverage 100LL.mxd

Figure 6-8: Jet-A Fuel Service



Document Path: K:\VTRANS\T-18026.12 Vermont SASP\Draw\GIS\Figure 6-8 Air Access Coverage JetA.mxd

6.4. SYSTEMWIDE IMPROVEMENT RECOMMENDATIONS

The future performance of the Vermont State Airport System can be enhanced and expanded by making improvements to facilities and services at VASP airports. Generally, the improvement required start with minimum facilities and services established at the outset of this VASP. In this regard, *Chapter 2, System Parameters* set forth minimum facility and services minimums for each airport based upon their VASP category. Beyond these minimums, *Chapter 3 Current System Performance* measured performance by considering the geographic coverage of facilities and services important to aircraft operators and airborne aircraft using the State Airport System. Together, the provision of minimum facilities and services and geographic coverage represents the desired future condition of the State Airport System. However, some improvements require more investment than others, and some improvements should incorporate private investment and leadership – especially at VASP airports that are privately owned.

For these reasons, this section presents an aggregate list of improvements prioritized into three groups based upon the following thresholds as guidance:

- Top Priority: Top priority projects are those that place prime importance for each VASP airport to meet facility and service minimums for their respective VASP Category.

- Mid-Term Priority: Mid-term priority projects are those that represent a fine-tuning of minimum facility and service minimums, those that improve customer service but are often driven by market demand. For mid-term priority projects that require larger investment, a stronger demand case for the project may be required, or an expanded statewide funding program that can accommodate the provision of expanded facilities and services.

- Long Term/Ultimate Improvements: Long term/ultimate improvement projects are those that will require the largest commitment from state and local stakeholders to accomplish, such as terminal buildings, extensive airfield lighting or precision approach projects, runway extensions, ARFF facilities among other large-ticket items. Additionally, long-term/ultimate improvements also include runway extensions at privately-owned airports that are required to meet VASP minimum facility and service requirements but will be difficult to fund without federal funding support.

VASP Top Priority Improvements

Table 6-13: VASP Future Performance Improvements – Top Priority

Airport	Projects to Improve Future Performance
Basin Harbor	• Basic Terminal Building/Shelter
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Extend Runway to 4,000' (Minimum Objective)
Deerfield Valley Regional[1/]	• Full-Time Airport Manager On-Site (Seasonal OK)
Edward F. Knapp State	• N/A
Franklin County State	• Extend Runway to 4,000' (Minimum Objective)
Hartness State	• N/A
John H. Boylan State	• Basic Terminal Building/Shelter
Middlebury State	• Non-Precision Approach Capability
Morrisville-Stowe State	• Extend Runway to 4,000' (Minimum Objective)
Northeast Kingdom International	• Precision Approach Capability
Post Mills[1/]	• Basic Terminal Building/Shelter
Rutland-Southern Vermont Regional	• N/A
Shelburne[1/]	• Non-Precision Approach Capability
Warren-Sugarbush[1/]	• Non-Precision Approach Capability
William H. Morse State	• Extend Runway to 4,000' (Minimum Objective)

Source: McFarland Johnson Inc., Analysis, 2018.
[1/]Privately owned.

VASP Mid-Term Priority Improvements

Table 6-14: VASP Future Performance Improvements – Mid-Term Priority

Airport	Projects to Improve Future Performance
Basin Harbor	• N/A
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Aircraft/Avionics Maintenance Services On-Site • Full-Time Airport Manager On-Site • Full-Time Operations Staff On-Site • Jet-A Self Service Aviation Fuel on Site • Full Service FBO On-Site Full-Time
Deerfield Valley Regional[1/]	• 100LL Self-Service Aviation Fuel on Site • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Part-Time Operations Staff On-Site or Contracted • GPS Instrument Approach Procedure
Edward F. Knapp State	• Self Service Capability for Aviation Fuel on Site
Franklin County State	• N/A
Hartness State	• N/A
John H. Boylan State	• MoGas or 100LL On-Site
Middlebury State	• GPS Instrument Approach Procedure • Full-Time Airport Manager On-Site (Seasonal OK) • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock
Morrisville-Stowe State	• N/A
Northeast Kingdom International	• N/A
Post Mills[1/]	• MoGas or 100LL On-Site
Rutland-Southern Vermont Regional	• N/A
Shelburne[1/]	• Full-Time Airport Manager On-Site (Seasonal OK) • Part-Time Operations Staff On-Site or Contracted • Single-Service SASO or Full-service FBO on Site at Least Part-Time • Lighted Windsock • 100LL Self-Service Aviation Fuel on Site
Warren-Sugarbush[1/]	• GPS Instrument Approach Procedure • 100LL Self-Service Aviation Fuel on Site • Lighted Windsock
William H. Morse State	• Full-Time Operations Staff On-Site • Aircraft /Avionics Maintenance Services On-Site

Source: McFarland Johnson Inc., Analysis, 2018.
[1/]Privately owned.

VASP Long-Term/Ultimate Improvements

Table 6-15: VASP Future Performance Improvements – Long-Term/Ultimate Improvements

Airport	Projects to Improve Future Performance
Basin Harbor	• MoGas or 100LL On-Site
Burlington International	• To be Determined from Master Plan Update
Caledonia County State	• Terminal Building with Pilot and Visitor Amenities • Runway and Taxiway Edge Lighting • Extend Runway 5000' (Recommended Objective)
Deerfield Valley Regional[1/]	• Extend Runway to 5000' (Recommended Objective)
Edward F. Knapp State	• N/A
Franklin County State	• Terminal Building with Pilot and Visitor Amenities • Extend Runway to 5000' (Recommended Objective)
Hartness State	• N/A
John H. Boylan State	• N/A
Middlebury State	• Extend Runway to 5000' (Recommended Objective)
Morrisville-Stowe State	• Runway and Taxiway Edge Lighting • Rotating Airport Beacon • Own/Operate Snow Removal Equipment • Extend Runway to 5000' (Recommended Objective)
Northeast Kingdom International	• N/A
Post Mills[1/]	• N/A
Rutland-Southern Vermont Regional	• Intermodal Transportation Connections at/near Site • ARFF Capability • Precision Approach Capability • ATCT • Improvements to Network/Legacy Airline Service
Shelburne[1/]	• Extend Runway to 5000' (Recommended Objective)
Warren-Sugarbush[1/]	• Extend Runway to 5000' (Recommended Objective)
William H. Morse State	• Terminal Building with Pilot and Visitor Amenities • Runway and Taxiway Edge Lighting • Extend Runway to 5000' (Recommended Objective)

Source: McFarland Johnson Inc., Analysis, 2018.
[1/]Privately owned.

6.5. FUTURE SYSTEM PERFORMANCE

Table 6-16 presents the future performance scores of VASP airports.

Table 6-16: Future Performance Scores and VASP Category

Airport	Current VASP Category	Current Performance Score	Future Performance Score	Future VASP Category
John H. Boylan State	1	7	15	1
Basin Harbor	1	9	13	1
Post Mills	1	12	***16***	***2***
Deerfield Valley Regional	2	17	33	2
Warren Sugarbush	2	31	39	2
Shelburne	2	36	39	2
Middlebury State	2	40	***56***	***3***
William H. Morse State	3	54	76	3
Caledonia County State	3	54	76	3
Morrisville-Stowe State	3	59	78	3
Franklin County State	3	59	78	3
Edward F. Knapp State	3	84	88	3
Hartness State	3	90	90	3
Northeast Kingdom International	3	90	90	3
Rutland – Southern Vermont Regional	4	97	98	4
Burlington International	4	100	100	4

Source: McFarland Johnson Inc., Analysis, 2018.

7. Policy Issues & Recommendations

The policy chapter of Vermont Airport System Plan (VASP) addresses a range of issues emerging from a comprehensive stakeholder outreach process which included the Vermont Aviation Council, fixed-based operators, airport users, local and state officials, and members of the public. Previous chapters of this report have detailed Vermont's system of VASP airports, grouping airports into four categories according to their service levels, and establishing facility and service objectives for each of the four groups.

This chapter outlines the policy framework needed to maintain, sustain and grow VASP airports over a 20-year planning period, and includes recommendations to be implemented by various aviation stakeholders. The policy framework will also serve as a critical input into the development and updates to individual airport master plans, and associated project development activities.

As noted in previous chapters, VASP airports are multifaceted and encompass commercial service, general aviation, business, emergency management, military, and medical uses. The policy framework incorporates the varied roles of VASP airports, and due to their local, state and federal significance, are guided by the following policies and plans:

- State Goals on Growing the Economy, Affordability, and Protecting Vulnerable Populations - https://governor.vermont.gov/content/governor-scotts-priority-initiatives
- Vermont's Long-Range Transportation Plan - https://vtrans.vermont.gov/planning/long-range-plan
- Vermont's Comprehensive Energy Plan - https://publicservice.vermont.gov/publications-resources/publications/energy_plan
- Vermont's Comprehensive Economic Development Strategy - https://accd.vermont.gov/economic-development/major-initiatives/ceds
- Federal Aviation Administration (FAA) Strategic Plan - https://www.faa.gov/about/plans_reports/
- FAA Airport Improvement Program Handbook - https://www.faa.gov/airports/aip/aip_handbook/

7.1. VISION AND GOALS FOR VERMONT'S AIRPORT SYSTEM

The Vision and Goals for VASP airports were developed using input from the Vermont Aviation Advisory Council during several quarterly meetings, outreach to fixed-based operators, airport users, and the general public during a series of 9 public meetings.

Vision

Vermont's public-use airport system will:

- Provide for accessible, safe, and secure aviation, meeting the needs of its users, businesses, and surrounding communities.
- Implement new technologies to support the future system.
- Focus on preservation and enhancement, while meeting Federal and State requirements and promoting responsible environmental stewardship and land use compatibility.
- Operate as business-oriented facilities focused on creating opportunities and return on investment.
- Provide intermodal linkages to regional, state, and national transportation systems.

State Airport System Goals

- Provide a safe and secure system of airports that meets State and Federal requirements, including routine inspections of airports.
- Provide a system of airports that is accessible for people and goods from both ground and air transportation throughout the State.
- Support intermodal ground access opportunities and services such as rental car, taxi, and interconnectivity with other modes of transportation.
- Preserve and enhance Vermont's existing airport system's infrastructure investment through maintenance and rehabilitation to meet current and future demand to support regional, state and national air transportation systems.
- Plan for future airport development and protect public investment in airports through promotion of compatible land use in the vicinity of airports.
- Seek adequate and stable funding, including FAA assistance, and assure appropriate staffing for airports to support the Vision and Goals.
- Make timely, sound infrastructure investments derived from airport master plans and based on priorities that are determined through coordination with Vermont's aviation stakeholders.
- Maintain commercial air services at Rutland-Southern Vermont Regional Airport and support its development elsewhere in the State, as well as encourage additional commercial and cargo services where appropriate.
- Maintain an up-to-date integrated database of air and landside facilities including capital plans and improvements, contacts, relevant zoning as well as the system's performance.
- Strive to generate appropriate revenues from the operation of the State-owned airports in support of their continued operation and expansion utilizing a business-oriented approach.

7.2. VERMONT AIRPORTS & AVIATION: A STRATEGIC FRAMEWORK

The policy framework encompasses the following topical areas, which were identified as common themes during the outreach process:

- Aviation Connectivity with Other Transportation Modes
- Land Use & Environmental Linkages
- Economic Development
- Marketing
- Financial Sustainability
- State Policies Compared to Neighboring States
- Funding Sources for Airport Projects
- Project Prioritization for State-Owned Airport Projects
- Emergency Response & Training Planning
- Aviation Education Support

7.3. AVIATION CONNECTIVITY WITH OTHER TRANSPORTATION MODES

VASP airports are integral to local, state and national transportation systems. The mobility options they provide are enhanced when interconnected with ground transportation. The Vermont Agency of Transportation (VTrans) surveyed available ground transportation and interconnectivity options in the general areas of VASP airports, with the data presented in **Table 7-1**, and described as follows:

- ***Rental Cars:*** Of the sixteen public use VASP airports, eleven have rental car services available in nearby areas (both Burlington International Airport and Rutland-Southern Vermont Regional Airport have rental car services on-site). Rental car service companies include Enterprise, Avis, Hertz, Budget, Green Mountain Car Rental, among others. In Newport, Hayes Ford also provides rental vehicles. The Burlington area includes the largest concentration of rental vehicle companies, with eleven different companies available at various locations. However, evening and weekend service availability across all regions is unclear.

- ***Taxi Services:*** Taxi services are available in the general vicinity of fourteen of the sixteen VASP airports, including on-site at Burlington International Airport. The only airports without available taxi service in the general area are John H. Boylan State Airport and Post Mills Airport. Evening and weekend service availability is unclear.

- ***Public Transit:*** Public transit services are available at three public use airports - Burlington, Rutland, and Morrisville-Stowe. Most of these transit routes offer very limited evening and weekend service.

    - Burlington International Airport is served by Green Mountain Transit *Bus Route #12*, which provides 27 round trips daily from BTV to University Mall - a major connection point to other local and regional routes. The *Route 7 Intercity Bus* service also provides access to Greyhound Bus Lines at Burlington International

Airport. This service travels the length of U.S Route 7 from Burlington south, and connects to both the bus terminal and airport in Albany, NY. *Greyhound Lines* provides service from the Burlington International Airport to Montpelier, White River Junction, Boston and Montreal.

- Rutland-Southern Vermont Regional Airport is served by the Marble Valley Regional Transit District (MVRTD) *Manchester Bus Route*, which makes eight stops at the Rutland Airport Business Park, four southbound and four northbound, Monday through Saturday.
- Morrisville-Stowe State Airport is served by Green Mountain Transit *Bus Routes 100 and 103*. The Route 100 service provides 3 round trips daily Monday to Friday while Route 100 provides 1 daily return trip. Both services connect the airport to the Stowe Town Center.

- ***Ride Sharing:*** Transportation network companies (TNCs) have grown in recent years. Companies such as Uber and Lyft use computer applications, typically installed on mobile phones, to connect drivers and riders for a fee. Uber and Lyft services are currently available in the Rutland, Middlebury, Montpelier-Barre, Shelburne, Morrisville-Stowe, and Burlington areas. Because these services are dependent of driver availability, it is unclear what the scope of services is in these regions.

Table 7-1: VASP Airports' Area Ground Transportation Connectivity Options

Airport	Rental	Taxi/Service	TNC	Transit
Basin Harbor	-	✓	-	-
Burlington International	✓	✓	✓	✓
Caledonia County State	✓	✓	-	-
Deerfield Valley Regional	✓	✓	-	-
Edward F. Knapp State	✓	✓	✓	-
Franklin County State	✓	✓	-	-
Hartness State	-	✓	-	-
John H. Boylan State	-	-	-	-
Middlebury State	✓	✓	✓	-
Morrisville-Stowe State	✓	✓	✓	✓
Northeast Kingdom International	✓	✓	-	-
Post Mills	-	-	-	-
Rutland-Southern Vermont Regional	✓	✓	✓	✓
Shelburne	✓	✓	✓	-
Warren-Sugarbush	-	✓	-	-
William H. Morse State	✓	✓	-	-

Source: VTrans Analysis, 2019.

Ground transportation and interconnectivity services are available in the vicinity of most VASP airports. However, their availability, costs, and hours of operation are generally not publicized in a consistent or coordinated manner at airports to ensure users can readily access them. A concerted effort to make available and continually update ground transportation and

interconnectivity services information will benefit VASP airport users and may encourage additional airport use.

Recommendations

- Maintain and disseminate ground transportation and interconnectivity services information at all VASP airports, including lists of available services, costs and contact information (FBOs, Airport Sponsors)
- Market airport travel trends to ground transportation providers to encourage the provision of services at airports (FBOs, Airport Sponsors)

7.4. LAND USE & ENVIRONMENTAL LINKAGES

The long-term sustainability of airports depends in large part on compatibility with their host communities, both in terms of adjacent land uses and environmental linkages. Airports are interested in keeping nearby airspace free of obstructions and maintaining community support. Communities support their residents' quality of life and reasonable opportunity to participate in decisions that will affect them. Best practices for airports and communities to engage in cooperative planning are detailed in resources such as the FAA's *Airport Environmental Programs* www.faa.gov/airports/environmental and the *Aircraft Owners and Pilots Association's Guide to Airport Noise and Compatible Land Use* - https://www.aopa.org/-/media/Files/AOPA/Home/Supporting-General-Aviation/Get-Involved/Airport-Support-Network/AOPA-Resources-for-You/120112asn-airport-noise-compatible-land-use.pdf.

The following section details the various land use and environmental linkages that are important to the long-range operations and development of VASP airports, particularly as longer runways and new aircraft mix are anticipated over the 20-year planning period.

7.4.1. Land Use and Zoning Regulations

Protection of airports, land, and assets of local communities are accomplished through several methods, the most common of which is the adoption of land use and zoning regulations. Vermont statutes include provisions specific to airport zoning. The Airport Zoning Act (5 V.S.A. 17) provides zoning commissions with the authority to adopt and enforce zoning regulations around Vermont's airports in order to regulate structure heights that could pose as a hazard to aircraft. Municipalities may adopt special bylaws governing the use of land, location, size and height of buildings and population density within a distance of two miles from the boundaries of an airport under an approach zone and for a distance of one mile from the boundaries of the airport elsewhere. The Act allows for the creation of a joint zoning board for protected lands that may fall into adjacent political subdivisions.

The Act also requires that any new structures, repairs, alterations, rebuilding or allowing any existing structures to grow higher, receive a permit to proceed, and precludes the issuance of permits which result in airport and air traffic hazards. In certain circumstances, a variance may be applied for and granted, however any variance may be subject to any reasonable conditions a board of adjustment might wish to impose in order to protect airports and airspace.

Zoning regulations largely delegate responsibilities to local municipalities and zoning boards with little guidance on aeronautical standards, which can create a lack of consistency in process and outcomes. A key issue is that the Act makes no mention of the FAA's policies and guidance regarding airspace protection (FAA Form 7460 – obstruction analysis and construction permitting). The statute emphasizes obstructions to airspace (a reactive approach), rather than focusing on airport-compatible land uses on the ground (a proactive approach), and does not address overflight issues such as aircraft noise, which can affect the public's perception and support of local airport operations and development. **Table 7-2** provides a summary of gaps between 5 V.S.A 17 and FAA Guidance.

Table 7-2: **Summary of Legislative Analysis***

Legislative Issue	Existing Gaps	Desired End State	Bridging Actions	Resources and Considerations
Airspace Obstructions	- Local jurisdiction - Lacks adherence to FAA 7460 process	Standardized airspace protection laws and processes across the state	Statutory changes to provide comprehensive airspace protection; Include Part 77 drawings in ALP sets	Provide notice and continuing guidance to local municipalities; Consider airspace analyses as recommended
Land Use and Zoning	- Lack of standardization - Lack of sensitivity topics (noise, odor, etc.)	Comprehensive and standardized airport land use and zoning laws and processes across the state	Statutory changes to foster compatible aeronautical and non-aeronautical land uses around airports; Standardize regulations and processes across the state	Utilize existing legislation from other states as examples; Provide notice and continuing guidance to local municipalities

**This methodology is a GAP analysis, which is intended to evaluate a system's current and existing conditions against potential and desired outcomes. The purpose is to bridge the gap between the differing ends of the performance spectrum by identifying explicit actions and processes to be applied.*
Source: McFarland Johnson analysis

Aviation stakeholders can review airport land use and zoning statutes for opportunities to incorporate more comprehensive components, as well as provide more thorough guidance for municipalities and local zoning boards.

In addition to FAA and Aircraft Owners and Pilots Association (AOPA) resources, several states developed airport land use planning handbooks which may help Vermont address more comprehensive land use considerations. California developed a comprehensive land use planning handbook to guide municipalities in developing, enacting, and implementing land use controls, and includes statewide guidelines for airport land use compatibility regulations. The *California Airport Land Use and Planning Handbook* provides a comprehensive guide to inform the general public, elected officials, and decision-makers on the importance of appropriate and responsible land use planning to prevent encroachment and preserve the State's airport system. Detailed section on FAA Part 77 (airspace) and Part 150 (noise) are included in California's Handbook – https://flyquietoak.com/sites/default/files/inline-files/California%20Airport%20Land%20Use%20Handbook_2002.pdf

Similarly, the Florida Department of Transportation developed the *Airport Compatible Land Use Handbook,* which provides thorough information, guidance, and model language on land use compatibility regulations, including on Part 77, noise and safety - http://www.florida-aviation-database.com/library/filedownload.aspx?guid=b261c39f-2ab1-4852-835c-b8920bf8b551

7.4.2. Noise & Lighting Impacts

Noise and lighting impacts are core components of land use compatibility. In the context VASP airports, noise and lighting impacts may be related to current airport operational conditions, or conditions triggered by the growth in airport infrastructure.

Compatible land uses are generally defined as those uses that can coexist with a nearby airport without constraining the safe and efficient operation of the airport or exposing nearby residents and businesses to unreasonable levels of noise or lighting impacts. Incompatible noise and lighting impacts can lead to a politically contentious relationship between an airport and the communities around it, resulting in complaints and demands for restrictions on airport operations, ultimately threatening the airport's ability to operate efficiently and serve its functions. Various practical considerations can shift the demarcation line between acceptable and unreasonable exposure. Both airports and communities need to reflect upon such factors when establishing compatibility criteria and undertaking airport growth projects.

Noise and light impacts are often perceived to be the most significant concern generated by aircraft operations. The challenge of determining appropriate land use compatibility policies regarding aircraft noise and lighting impacts is that not everyone responds to these factors in the same way. A sound or lighting impact that is an annoyance to one person may be barely perceived by another. Furthermore, one community may deem a land use reasonable within a certain noise level, while another may not.

Setting appropriate noise and lighting level criteria for a community requires that an element of feasibility or cost-effectiveness be taken into account. For example, it is usually more feasible to

avoid creating new incompatible land uses than it is to reduce existing noise and light impacts through land use changes. Moreover, while the benefits or effectiveness may be the same in each case, the cost of mitigating existing land use incompatibilities is usually far greater than avoiding them in the first place.

7.4.3. General Permitting Requirements

This section provides a summary of common state and federal permitting requirements for airport capital projects. Many airport activities require permits or approvals from state and federal agencies. Projects such as adding pavement, earthwork, new or altered infrastructure, and certain maintenance and operations work, can trigger permit requirements. The specific permits and approvals needed depend on the resources to be disturbed, the nature of the activities or projects, and the sources of funding. For example, work impacting wetlands generally requires approvals from both the Agency of Natural Resources' (ANR) Department of Environmental Conservation (DEC) and the U.S. Army Corps of Engineers (ACOE). Alterations in pavement areas may require a stormwater permit from the DEC Watershed Management Division. Ground-disturbing activities over one acre in size also require a DEC construction permit and archeological review, and any project using federal funding must meet the requirements of National Environmental Policy Act (NEPA), which covers a broad range of resource categories.

Table 7-3 describes the most common types of resources and associated permit programs encountered that would apply to airport projects. Following the table, there are more detailed descriptions of state stormwater permitting and federal NEPA requirements, wetland permitting, rare species issues, and cultural resource approvals, which are some of the more common permits airports have to address.

Table 7-3: Permitting Programs

Regulated Resources	Types of Airport Actions that Might Be Involved	Federal Permit or Approval Program (and Agency)	State Permit or Approval Program (and Agency)
Wetlands	Any project that impacts wetlands or surface waters	Section 404 of the Clean Water Act (Army Corps of Engineers)	Section 401 of the Clean Water Act Water Quality Certification; and where applicable, 10 VSA 913-Wetland General Permit or Individual Permit (VTDEC))
Threatened, endangered, and rare plants and animals	Any project that involves other federal permits (such as a wetland permit) requires compliance with U.S. Endangered Species Act or impacting a state protected species	Endangered Species Act; Migratory Bird Treaty Act (U.S. Fish and Wildlife Service)	Wetland and Stream Alteration permits require consideration (VTDEC) & 10 VSA 5408 T&E Taking Permit (VT Fish & Wildlife)

Regulated Resources	Types of Airport Actions that Might Be Involved	Federal Permit or Approval Program (and Agency)	State Permit or Approval Program (and Agency)
Historic sites, structures, or districts, including potential archeological resources	Any project the federal government carries out, assists, funds, permits, licenses, or approves. requires compliance with Section 106.	Section 106 of the National Historic Preservation Act (U.S. Department of Interior (DOI), National Park Service)	Section 106 of the National Historic Preservation Act (State Historic Preservation Office – VT Division for Historic Preservation)
Historic sites, parks, and wildlife refuges	All Federally Funded Projects	Section 4(f) (FAA, DOI)	
Rivers and streams	Any project that involves work within a watercourse	Section 10 of the Rivers & Harbors Act (Army Corps of Engineers)	10 VSA Chapter 41 Stream Alterations Permit (VTDEC)
Lakes and ponds	Activities encroaching on public waters or within 250 of shoreland of lakes > 10 acres	Section 404 of the Clean Water Act (Army Corps of Engineers)	29 VSA Chapter 11 Lake Encroachment Permit & 10 VSA Chapter 49A Shoreland Permit (VTDEC)
Land use and development	Any construction of improvements or expansion		10 VSA Chapter 151 Act 250 Land Use Permit (VT Natural Resources Board)
Stormwater runoff	Runoff from existing airport facilities, new paved areas, earth disturbance associated with construction activities , or other impervious surfaces	DEC permit	10 VSA Chapter 47 Multi-Sector General Permit (VTDEC); General Permit 3-9050, Construction SW, 3-9007 (TS4), 3-9010 and 3-9015

Source: McFarland Johnson analysis

7.4.4. National Environmental Policy Act

NEPA was enacted to ensure that the environmental impacts of any federal action or federally funded projects were thoroughly assessed, and opportunities for public involvement in that process were made available before final decisions are made and actions are taken. NEPA requires that the federal lead agency, which is normally FAA for airport projects, documents potential impacts to a broad range of resources. NEPA also requires that the significance of impacts be determined. Significance is based on the context and intensity of activities and impacts. The types of documentation required include the following:

- If the activity has little potential for significant impacts, it is classified as a *Categorical Exclusion* (CE) and limited from further NEPA documentation. The findings are documented in a format which can range from simple checklists to extended narrative reports. In 2017, FAA issued a Standard Operating Procedure with standardized guidance and format for Categorical Exclusions:

https://www.faa.gov/airports/resources/sops/media/arp-sop-510-catex.pdf.

- If the significance of impacts is uncertain, an *Environmental Assessment* (EA) is prepared. Guidance for preparing an EA is provided in the following FAA documents:
  - Order 5050.4B: National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/14836
  - Order 1050.1F: Environmental Impacts: Policies and Procedures https://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.current/documentnumber/1050.1

- If the project is anticipated to result in significant impacts that cannot be mitigated below NEPA significance thresholds, an *Environmental Impact Statement* (EIS) is prepared. Guidance for preparing this document is available in Orders 5050.4B and 1050.1F as cited above.

The range of resources that must be considered in preparing FAA NEPA documents includes:

- Air quality
- Biotic resources (fish, wildlife, plants)
- Climate
- Coastal resources
- Compatible land use
- Construction impacts
- Farmland soils
- DOT Section 4(f) resources
- Rare species
- Floodplains
- Hazardous materials
- Solid waste
- Historical, architectural, archeological, and cultural resources
- Light emissions and visual impacts
- Natural resources and energy supply
- Noise
- Secondary (induced) impacts
- Socioeconomic impacts
- Environmental justice
- Health and safety risks
- Water quality
- Wetlands
- Wild and scenic rivers

7.4.5. Wetland Permitting

Wetlands consist of aquatic and semi-aquatic environments such as forested swamps, marshes, and bogs. Wetlands do not need to have standing water to be regulated under state and federal laws. Wetlands, streams, rivers, ponds and lakes are all regulated under various laws. Impacts to these resources may occur during construction of airport facilities, obstruction clearing, or during any ground disturbance activities.

Wetlands and wetland buffers are regulated under federal Clean Water Act. The ACOE issues General Permits or Individual Permits for activities within waters of the United States. When all terms and conditions of a General Permit are met, the project may proceed without notification to the ACOE. If terms and conditions cannot be met, an application (pre-construction notification) to the ACOE is required. Projects that are not authorized by a General Permit may require an Individual Permit.

Wetlands are also regulated at the state level under 10 V.S.A. § 905b (18). Some municipalities regulate wetlands or wetland setbacks through zoning. DEC implements the state wetlands law and issues permits for dredge and fill in wetlands.

7.4.6. Endangered, Threatened, Rare Species

Endangered, threatened, rare species and their habitat are protected in Vermont under state and federal laws. 10 V.S.A. 5403 (Protection of Endangered Species) and the Vermont Threatened and Endangered Species Rule protects several hundred plants, insects, fish species, reptiles, amphibians, mammals, and birds from taking, transporting, possessing, or sale. The USFWS protects federally listed threatened and endangered species. Airport projects that could affect rare species include airport construction, safety area improvements, or tree clearing, for example.

7.4.7. Historic & Archeological Resource Approvals (Section 106)

Historic resources may include bridges, buildings, structures, objects, sites, archeological resources, and historic districts that are at least 50 years old or meet certain other criteria. Archeological resources include both pre-contact Native American resources and more recent agricultural or industrial archeological artifacts and sites. The significance of historic resources may be recognized nationally by being on the federal National Register of Historic Places, an official list of historic places that have been deemed worthy of preservation. Resources with statewide significance may be included on the State Register of Historic Places. The National Historic Preservation Act (16 USC 470) provides for the preservation of historic and archeological resources. Section 106 of the law requires that federal undertakings must consider the effect on historic properties. The Section 106 Program is administered in Vermont by the Division for Historic Preservation, part of the Agency of Commerce and Community Development (ACCD).

7.4.8. Meeting Greenhouse Gas Emissions and Energy Goals

Transportation is the largest end use of energy (37%) and the largest generator of greenhouse gas emissions (45%) in Vermont. Vermont's Comprehensive Energy Plan (CEP) relies on transportation-related strategies to achieve reductions in statewide energy consumption as well as obtaining most of its energy from renewable sources. The CEP advances guiding goals, both through the detailed recommendations found throughout the plan and by building on the State's goal, established in the 2011 CEP, of meeting by mid-century 90% of Vermont's energy needs from renewable sources while virtually eliminating reliance on non-renewable fuels:

- Reduce total energy consumption per capita by 15% by 2025, and by more than one third by 2050.
- Meet 25% of the remaining energy need from renewable sources by 2025, 40% by 2035, and 90% by 2050.
- Three end-use sector goals for 2025: 10% renewable transportation, 30% renewable buildings, and 67% renewable electric power.

Approximately 94% of Vermont's transportation sector is currently powered by petroleum, and while the aviation accounts for 2% of transportation greenhouse gas emissions, the sector is anticipated to shift to electrification as part of a broader transition underway in the motor vehicle and public transit sectors.

In 2020, Vermont enacted the Global Warming Solutions Act (Act 153). This act creates binding GHG reduction requirements and establishes a Climate Council to develop a Climate Action Plan to meet those requirements. ANR will be responsible for promulgating rules and recommending legislation necessary to carry out the plan. The plan will need to coordinate GHG mitigation strategies for all sectors of the economy, including transportation. Key transportation strategies will include vehicle electrification, smart growth, intermodal transportation (passenger and freight rail, bike/ped, public transit), and broadband infrastructure development to facilitate telecommuting. VTrans' will likely need to develop recommendations for GHG mitigation from airport operations.

Aircraft Renewable Energy

Since the dawn of aviation, aircraft have primarily been powered by petroleum-based fuels and synthetic fuel blends. These fuels are energy-intensive and provide the power needed to lift aircraft that range from general aviation to the largest airliners. However, to meet operational efficiency needs and reduce greenhouse gas emissions, the future of aviation depends on finding alternative power sources. Continued improvements in the power to weight ratio of batteries, and advances in motors and thermal management, is anticipated to support next-generation electrified aircraft.

Efforts to shift to small aircraft electrification include Vermont's own Beta Aviation, which developed an electric vertical takeoff and landing aircraft focused on technological innovation, energy efficiency and cost savings. California-based Ampaire is developing its first commercial product, the Electric EEL, a six-seat Cessna 337 Skymaster retrofitted with the company's hybrid-electric system. The Electric EEL flew for the first time in May 2019. In 2020, Ampaire plans to conduct flight demonstrations of the EEL in Hawaii in collaboration with Mokulele Airlines by tracing a 31-mile commercial route currently flown on Maui by the regional carrier.

Electrified commercial service aircraft are also under development. The E-Fan X, for example, is a hybrid-electric aircraft, currently being jointly developed by Airbus, Rolls Royce, and Siemens. The project is experimenting with replacing one of the turbofans used in a regular aircraft with a 2MW liquid-cooled electric motor. The project's developers hope to boost power for take-off and climb as well as facilitating an electric-only descent, which would significantly lower fuel burn. Continued development of battery density and electric motors are anticipated to keep extending electrified commercial service aircraft range.

Supporting the transition to electrified aircraft at VASP airports will require necessary charging infrastructure. VTrans began the process of evaluating electric charging needs at state-owned airports as identified in *the Feasibility Evaluation of Electric Vehicle Charging Stations, Electric Aircraft Charging Stations, and Renewable Energy Generating Plants at State-Owned Airports (Act*

108 of 2018) Legislative Report - https://legislature.vermont.gov/assets/Legislative-Reports/Feasibility-Study-of-RE-at-State-Airports-H.620-Jan.-15-2019-FINAL.pdf

A combination of Level 2 and Direct-current fast charging (DCFC) would be appropriate for electric aircraft development. Level 2 can charge aircraft overnight without demand charges and could take advantage of time of use rates. DCFC would be needed for quick charges to keep experimental aircraft flying.

VTrans reviewed existing power transmission data to evaluate the potential for electric charging stations at state-owned airports. As summarized in **Table 7-4**, all of the State airports have at least 1-Phase power. Four of the airports (John H. Boylan, Edward F. Knapp, Northeast Kingdom International, and Rutland-Southern Vermont Regional) have 3-Phase power on-site, while three additional airports have 3-Phase power in the vicinity (Hartness, Middlebury, William H. Morse).

Table 7-4: **Summary of Existing Power Distribution at Vermont State-Owned Airports**

Airport	Existing Transmission Lines at or near Airports
John H. Boylan	3-Phase at the airport
Caledonia County	1-Phase at the airport (at least)
Franklin County	1-Phase at the airport (at least)
Hartness	1-Phase at the airport, 3-Phase further out
Edward F. Knapp	3-Phase at the airport
Middlebury	1-Phase at the airport, 3-Phase further out
Morrisville-Stowe	1-Phase at the airport (at least)
William H. Morse	1-Phase at the airport, 3-Phase further out
Northeast Kingdom International	1-Phase and 3-Phase at the airport
Rutland-Southern Vermont Regional	1-Phase and 3-Phase at the airport

Costs associated with providing aircraft charging stations largely consist of physical charging infrastructure and associated software. For 3-Phase power, extending transmission lines well onto airport property to access aircraft areas will be required. VASP airports will also need to install charging infrastructure (both L2 and DCFC) for electric vehicles that support airport operations and for electric passenger, commercial, and transit vehicles that frequent airports.

The Use of Solar to Power Airport Operations

Solar power generation is growing in use at airports across the country. Solar development at VASP airports could be one of the important ways of meeting Vermont's renewable energy and greenhouse reduction goals as noted the *Vermont Agency of Transportation Solar Plan* - https://vtrans.vermont.gov/sites/aot/files/VTrans-SolarPlan-2016-12-08-FINAL.pdf

In addition to meeting energy and greenhouse gas emissions goals, the use of solar energy to power airport operations contributes to their long-range financial sustainability. Expanding solar energy on state lands has been complicated by the fact that the State of Vermont has exceeded its regulatory cap on met metering. Currently, the only VASP airports to use solar significantly to power airport operations is Burlington International Airport and Rutland-Southern Vermont Regional Airport:

- Burlington International Airport installed a 500kW solar array atop the airport's parking garage. Over the anticipated 30-year life of the solar project, the airport expects to generate millions of kWh of energy, and save $3.5 million in power costs at an average cost of approximately $117,000 annually.
- Rutland-Southern Vermont Regional Airport installed a 60 kW DC, fixed, ground-mounted solar system. The system is expected to generate approximately 67,000 kWh annually and estimated to save over $11,000 in its first year and almost $400,000 over a 30-year life span.

Recommendations

- Continue to work with local governments and Regional Planning Commissions to promote best practices in land use planning around airports (FBOs, Airport Sponsors)
- Incorporate airspace protection and other critical land use compatibility tools in relevant statutes (State Agencies)
- Continue to provide technical assistance to airport developers with permitting requirements – Cross-referenced with economic development strategy (State Agencies)
- Continue to work on airport master permitting to facilitate development of airport infrastructure – Cross-referenced with economic development strategy (State Agencies)
- Coordinate with power distribution utilities to expand appropriate power transmission lines to support electric aircraft development – Cross-referenced with economic development strategy (Airport Sponsors)
- Install L2 and DCFC stations to support electric vehicles used for airport operations and private and commercial vehicles that access airports (Airport Sponsors)
- Expand solar power installations at airports and continue to improve the energy efficiency of airport buildings and facilities (Airport Sponsors)

7.5. ECONOMIC DEVELOPMENT

VASP airports are anchors of economic activity, stimulating both on and off-airport aviation businesses. The Economic Impact Study conducted as part of this planning process found that VASP airports collectively account for $525 million in economic benefits and 3,693 direct jobs annually. According to the U.S. Department of Commerce, Vermont's Gross Domestic Product

(GDP) for 2018 was $33.7 billion, which means that VASP airports generate 1.56% of the state's overall annual economic output, a considerable contribution to Vermont's economy. The continued development of VASP airports are critical to supporting local and regional economies, sustaining the airports themselves, and Vermont's aeronautics industry.

A recent study examined the economic development needs of state-owned airports. As part of Act 108 (2017-2018 legislative session), ACCD in cooperation with VTrans completed a legislative summer study report on state-owned airport economic development and marketing - https://legislature.vermont.gov/assets/Legislative-Reports/Aviation-Airport-Economic-Development-Marketing-Report-01-10-19.pdf

The engagement process included meetings with aviation stakeholders (Fixed-Based Operators, Aircraft Owners and Pilots Association, Experimental Aircraft Association, Regional Development Corporations, Regional Planning Commissions, airport users, airport committees, and state tourism officials) both in-person by ACCD but also as part of public meetings held by VTrans at various state airport locations.

Economic development goals articulated by stakeholders included:

- Accelerate development at airports by streamlining plans and permitting
- Workforce growth (aviation and other sectors)
- Workforce training
- Maximize and support state aviation assets
- Business recruitment
- Expansion of the mission and vision for aviation and aerospace cluster
- Attract supporting industries for F35s based in Vermont
- Attract and expand businesses to operate at airports (transport, goods, research)
- Preserve airport and aviation legacies, stories, and histories
- Leverage each airport's strength (i.e. CBP clearance at northern airports to connect more fully to Canadian businesses, Leverage foreign trade zones (e.g. at Coventry)
- Plans for 3 "tiers" (sizes) of airports

Specific recommendations to meet economic development goals included the following:

- Airports need continual growth and attention, like all transportation assets.
    - Ensure that staff assigned to aviation and airports have the expertise to specialize in airport development
    - Consider enhancing the aviation brand by designating State staff to do such things as:
        - Be a primary manager of the airport program
        - Facilitate hangar space expansion, including permitting

- Maintenance and ongoing facility upgrades. Runway maintenance, runway expansion, taxiway expansions and upgrades, and additional hangar space are the most pressing needs expressed by stakeholders
    - Due to limited available land, the State should consider investments in hangar infrastructure that can be scaled up or down for a variety of uses. For example, building one large hangar that can accommodate many general aviation aircraft OR

a smaller number of larger commercial aircraft. Building with construction, maintenance, and other potential aviation uses in mind provides greater long-term flexibility as opportunities arise and uses evolve. Available parcels at each airport should be assessed to ensure highest and best use.
    - Lighting and instrument landing systems, such as modern GPS approaches, are needed at some airports to enable additional traffic.
    - Improved cosmetics to fixed-based operator and terminal lobbies, fencing, facades, gates, etc. to create a welcoming atmosphere for visitors arriving by air.
- Explore partnerships with local Chamber of Commerce, businesses, municipalities, and others to fund upgrades that lead to the best possible presentation of our airports
- Explore options for ground transportation to and from airports. Options range from arrangements with transportation companies, partnerships with businesses, colleges, or others, and courtesy cars common at many general aviation fields.
- Promote economic development, expansion, and basing of aviation-related businesses and innovators.
    - Consider having the State facilitate obtaining master permits for development on airport grounds and waiving State permit fees to attract development and deployment of assets as swiftly as possible. Explore streamlined permitting process for development on State airports including such things as: pre-permitted, reproducible hangar designs, and master permits for development.
    - Ensure a statewide inventory of existing buildings and land available for development on airports is available and up-to-date.
    - Make supportive infrastructure improvements at and around airports including natural gas, underground electrical system upgrades, fiber optic telecommunications, etc.
    - Encourage and promote restaurants and food truck events on airport facilities.
    - Actively recruit new airport-based businesses and promote expansion of existing aviation-related businesses.
        - Re-purpose any underutilized structures.
        - Conduct outreach to aviation businesses and innovators.
            - Ensure that programs like VEGI, VTP and others are well publicized during outreach.
        - Explore below-market-rate leases or other incentives for companies who create new jobs.
        - Evaluate and provide technical assistance to companies developing aviation business plans.

- Expand the number and services provided by fixed base operators (FBOs) and the number of civil aviation aircraft based and operated in Vermont
    - Enhance hours and days of operation.
    - Enhance basic services from fueling to hangar space.
    - Expand the number of avionics shops.
    - Ensure that contract terms between the State and FBOs are of sufficient length as to promote investment by the FBO in equipment and services. Consider performance-based contracts to mitigate risk to the State for FBOs who do not meet safety or performance standards.

  - Ensure awareness by all parties that the profit margins for FBO operation are not robust.

- Consider the operational "imperative" for airports. More directly stated, the economic benefits to the State of airport operations should likely be based on the growth of businesses, jobs, technology, and commerce rather than trying to make the airport assets themselves profitable. Operation of State-owned airports should be done with the stated goal of maintaining them as transportation assets and economic drivers rather than profitable enterprises unto themselves.
- Ensure that rental rates for commercial spaces on airport property are set correctly and competitively to ensure the assets can be maintained, while also attracting and retaining use.
- Continue to work with the federal delegation to expand U.S. Customs availability at more airports to enable additional Canadian business and tourism traffic.
- Pilot and Airframe & Power Plant Mechanic training. The number of pilots and mechanics required to keep pace with commercial airline growth is a national area of focus. Vermont should continue to find ways to expand flight schools and flight training options to help address impending national pilot shortage as well as training for mechanics. Among the strategies that could be embraced are:
  - Support for Vermont Technical College, technical high schools, and other established training entities to expand training options statewide.
  - Promote the Burlington Technical Center's aviation maintenance programs
  - Support for educational programs provided by local pilot groups, Young Eagles, Civil Air Patrol, and others.
  - Find innovative ways to utilize Vermont Training Program funding to facilitate training avionics, airframe and power plant technicians

Three recurring economic development themes resulting from stakeholder discussions included the role of aircraft electrification and technology, business incentives, and master permitting to facilitate capital investments in airports.

Aircraft Electrification & Technological Developments

Like many other industries, aviation and aerospace are in the midst of technological revolution. Innovation in aviation is occurring in a variety of arenas including aircraft design, propulsion systems, and arguably most prominently avionics and aircraft electrification.

Vermont is fortunate to be home to at least one cutting edge aviation company who, in part, is specializing in aircraft electrification. Beta technologies is working in multiple market segments and is poised to deploy infrastructure for electrified aircraft testing and operation. That work, coupled with a general acceleration of interest, research, and development in aircraft electrification could allow Vermont to position itself as a leader in electric aviation. Vermont's airports would be a logical testbed for a variety of reasons, including the varied geography, topography, and seasonal changes; distance to each airport (within range of existing battery technology); and rural nature. If a system of electric aircraft charging facilities were deployed at

state airports (a prototype is under construction at Burlington International) the State's operating environment could attract a variety of key companies in electric aviation to the testbed.

Business Incentives

Incentives to attract startups and small companies in aviation research and development could have significant benefit to communities that host VASP airports. Aviation and aerospace innovation require intensive investment of capital and human resources. Jobs created are concentrated in technology, engineering, and advanced manufacturing. At this early stage, with increasing opportunities for disruptive technology in aviation, Vermont can consider incentives – such as tax-free zones - for innovative companies and startups who choose to grow their workforce and investment at airports. Additionally, there are opportunities to identify airports within New Market Tax Credit or Opportunity Zones and use those designations as additional marketing tools.

Airport Permitting

Unlocking development at airports will enable their growth. Some VASP airports have existing master permits for development while others do not. Developing master permits will help accelerate development as it simplifies the entire permitting process and associated costs.

Consistent with S.162 (2019 legislative session) requirements, the Agency of Transportation, in consultation with the Agency of Commerce and Community Development, is jointly working to obtain State-owned airport master permits necessary for growth, development, and facility upgrades at each State-owned airport. State-owned airport permit master plans shall include charging stations for electrified aircraft and, when practicable, renewable energy generating plants that advance the State's preference to utilize all roof space for photovoltaic installations.

In processing permits in the State-owned airport master permit sought by the Agency of Transportation, State agencies, departments, commissions, and boards may waive permit fees for all permits in the State-owned airport master permit provided that a State-owned airport permit master plan was reviewed and approved prior to the submission of any applications for permits in the State-owned master airport permit.

S.162 Reference:
https://legislature.vermont.gov/Documents/2020/Docs/ACTS/ACT078/ACT078%20As%20Enacted.pdf

Implementation of Economic Development at VASP Airports

As noted in the Act 108 legislative report, airports have different challenges and opportunities. This list of general recommendations should be viewed as a starting point for planning and implementation. Each VASP airport has unique economic development characteristics and appropriate strategies will need to be developed tailored to each airport.

The economic development recommendations contained in the Act 108 legislative report are numerous and will need to be prioritized for implementation. As noted, VTrans, ACCD, local Airport Committees, RDCs, RPCs, FBOs, and airport users all have a role in developing and implementing

economic development strategies. Determining how each entity's role fits in economic development implementation should be the subject of discussion by the Aviation Advisory Council, followed by recommended actions.

Recommendations

- Prioritize ACT 108 report economic development recommendations for implementation (Aviation Advisory Council, FBOs, Airport Sponsors, Regional Development Corporations)
- Define the economic development implementation roles of state and local agencies, fixed-based operators, and airport users (Aviation Advisory Council, FBOs, Airport Sponsors, Regional Development Corporations)
- Continue to provide technical assistance to airport developers with permitting requirements – Cross-referenced with land use & environmental linkages strategy (State Agencies)
- Continue to work on airport master permitting to facilitate development of airport infrastructure – Cross-referenced with land use & environmental linkages strategy (State Agencies)
- Coordinate with power distribution utilities to expand appropriate power transmission lines to support electric aircraft development – Cross-referenced with land use &

7.6. MARKETING

The marketing of VASP airports is critical in attracting aeronautical and related activity, sustaining airport tenants, and striving for financial self-sufficiency. While marketing of Vermont's commercial service airports is a shared effort by sponsors and airlines, marketing of general aviation airports is typically accomplished by airport sponsors, who have limited resources to consistently drive promotion efforts.

As part of the Act 108 report outreach, one of the primary observations from stakeholders regarding marketing is that assistance is needed from the State to better market airports and general aviation in order to expand airport use, grow and attract new aviation and aerospace businesses, and enhance commercial services.

Stakeholders identified the following target markets:

- Canadian market travelers interested in business, foreign direct investment, and recreation/tourism, including many Canadian general aviation travelers who land at northern VT airports and drive to Canada.
- New businesses, including but not limited to those in warehousing, light manufacturing, and intermodal transport.

- MA, NY, CT travelers – including "Epic Pass" ski travelers, as well as mountain, food, and craft beverage tourism.
    - Strategies could include mapping attractions relative to airport location.
    - CT Aerospace recruitments - corporate travelers (UTC - Rockwell Collins)
- Prospective second homeowners interested in property investment.
- Students interested in aviation and aerospace careers ranging from flight training, to aircraft maintenance to aerospace engineering.
- Corporate aviation operators.
- Aerospace manufacturers - supply chain hub work.
- A general aviation awareness campaign for Vermonters illuminating the history, assets, economic benefits, and future possibilities in aviation. This effort should include events at airports to introduce Vermonters to their local facilities.

Specific marketing strategies that could be deployed include:

- Cross promotion with tourism assets, resorts, welcome centers, etc. (including lobby information, displays, etc.) about airport availability to create awareness
- Craft and deploy articles, blog posts, etc. about Vermont aviation in industry, tourism, and aviation magazines, websites, etc.
- Better maps on VT sites about airport options - VermontVacation.com, etc.
- Promote airports through aviation specific events such as fly-ins, hosting general aviation clubs, model clubs (such as the International Cessna 170 club – coming to Vermont) to meet at Vermont airports. Consider cross-promoting other tourism and community assets as part of the "package" of activities that could occur during these events.
- Direct engagement with aerospace companies based in Vermont and in the corridor from Quebec to Connecticut about their needs and opportunities
- An initiative, possibly an extension of the "did you know" segments on thinkvermont.com about airports, aviation, and aerospace in Vermont. This would include general messaging about airports, what happens there, open houses, outreach to community groups including youth groups such as scouting organizations, schools, etc.
- Consider re-establishing the "Airport Passport Program" which encourages visits to airports.
- Digital and print guides to available spaces, assets, and infrastructure for each airport in the system.
- Digital marketing campaign targeted to specific audiences, e.g. New England business travelers.
- Ensure that airports are marketed to the Canadian catchment area.
- Ensure communities are mindful of airports as possible locations for community events (that will not adversely impact airport grounds and maintenance or overly interfere with operations).
- Attendance at key eastern region (and some national) general aviation events and trade shows to explore expansion opportunities, business recruitment, and to develop other innovative strategies to expand aerospace and aviation opportunities at State airports. Consider bringing small delegations from our existing aviation ecosystem.

Think Vermont Fly - ThinkVermont.com/fly/

As part of an effort to promote Vermont as a destination to visit and live, ACCD developed the https://www.thinkvermont.com/fly/ site. The site promotes Vermont's public-use airports and includes an overview of Vermont's aerospace sector, aerospace facts and figures, news on business happenings, and information on airports.

Similar to the economic development recommendations, marketing strategies included in the Act 108 legislative report are numerous and will need to be prioritized for implementation. Various entities have a role in developing and implementing marketing strategies. Determining how each entity's role fits in marketing implementation should be the subject of discussion by the Aviation Advisory Council, followed by recommended actions.

Recommendations

- Prioritize ACT 108 report marketing recommendations for implementation (Aviation Advisory Council, FBOs, Airport Sponsors, Regional Development Corporations)
- Define the marketing implementation roles of airport stakeholders (Aviation Advisory Council, FBOs, Airport Sponsors, Regional Development Corporations)

7.7. FINANCIAL SUSTAINABILITY

Similar to other types of transportation infrastructure, airport infrastructure will need to expand to meet the needs of users. However, expanding airport infrastructure poses the financial risk that maintenance and operations budgets will not keep up with rising costs.

The link between projects recommended in airport master plans and financial sustainability is critical to ensuring cost-effective airport growth. If, for example, a runway expansion is needed to accommodate future traffic growth, the incremental cost of maintaining that runway should strive to approximate the combined contributions of airport revenues and the natural growth in state transportation funds for aviation.

Evaluating capital spending is one way to ensure financial sustainability. Optimizing operating expenses is another. The following summary includes federal guidance related to opportunities for improving revenue generation at airports generated by VTrans Consultant McFarland Johnson:

- **Rates and Charges and Airport Leases Standardization:** Order 5190.6B, *FAA Order Compliance Manual*, sets forth FAA policies and guidance for FAA personnel working to ensure airport compliance. Chapter 17 – Self Sustainability, and Chapter 18 – Airport Rates and Charges, are useful tools for VTRANS to ensure Vermont airports remain as self-sustaining as possible, given each of their unique circumstances.

- ***Self-sustaining Principle:*** The guidance encourages airports to maintain fee and rental structures that make the airports as financially self-sustaining as possible under the particular circumstances at that airport. The requirement recognizes that individual

airports will differ in their ability to be fully self-sustaining, given differences in conditions at each airport. The purpose of the self-sustaining rule is to maintain the utility of federal investments in airports.

- *Airport Circumstances:* At some airports, market conditions may not permit a sponsor to establish fees that are sufficient to recover aeronautical costs, while low enough to attract and retain commercial aeronautical services. In such circumstances, a sponsor's decision to charge rates that are below those needed to achieve self-sustainability in order to assure that services are provided to the public is not inherently inconsistent with the federal obligation to make the airport as self-sustaining as possible given its particular circumstances.

- *Long-term Approach:* If market conditions or demand for air services do not permit the airport to be financially self-sustaining, the sponsor should establish long-term goals and targets to make the airport as financially self-sustaining as possible.

- *Rates Charged for Aeronautical Use:* Charges for aeronautical uses of Vermont airports must be reasonable. For aeronautical users, the FAA considers charges that reflect the cost of the services or facilities as satisfying the self-sustaining requirement. Accordingly, the FAA does not consider the self-sustaining obligation to require airport sponsors to charge fair market value rates to aeronautical users. As explained in more detail in chapter 18 of FAA Order 5190.6B, Airport Rates and Charges, fees for the use of an airfield generally may not exceed the airport's capital and operating costs of providing the airfield. Aeronautical fees for landside or non-movement area airfield facilities (e.g., hangars and aviation offices) may be at a fair market rate but are not required to be higher than a level that reflects the cost of services and facilities. In other words, those charges can be somewhere between cost and fair market value. In part, this is because hangars and aviation offices are exclusively used by the leaseholders while airfield facilities are used in common by all aeronautical users. The FAA will not ordinarily investigate the reasonableness of a general aviation airport's fees absent evidence of a progressive accumulation of surplus aeronautical revenues.

- *Nonaeronautical Rates:* Rates charged for nonaeronautical use (e.g., concessions) of an airport must be based on fair market value (e.g., lease of land at fair market rent subject to the specific exceptions listed in this chapter). If market rent for nonaeronautical uses results in a surplus, that surplus can be used to subsidize aeronautical costs of an airport. It is to the benefit of aviation and the traveling public that aeronautical users be able to use an airport at rates and charges below the cost of providing the aviation facilities and services if these are effectively subsidized by nonaeronautical revenues. See, for example, *Bombardier Aerospace, et al. v. City of Santa Monica, FAA Docket No. 16- 03-11, January 3, 2004*, (available online) where the FAA noted that it promotes the practice of using nonaviation revenues to subsidize aeronautical activities since it reduces the economic impact on aviation users and the aviation public.

Source: McFarland Johnson analysis

Recommendations

- Evaluate financial sustainability when reviewing proposed capital projects as part of the airport master planning process (FBOs, Airport Sponsors)
- Review leases during the renewal period to ensure lease rates for state-owned airports are consistent with area values, cost of maintenance, the availability of fuel, and the characteristics of airport facilities (FBOs, VTrans)
- Continually seeks to lower airport operating costs by consolidating operations and maintenance activities where possible and utilizing appropriate technologies (FBOs, Airport Sponsors)

7.8. STATE POLICIES COMPARED TO NEIGHBORING STATES

The economics of aircraft ownership can be either an attraction or deterrent for aviation in Vermont. In this section, two scenarios are examined comparing Vermont's airport cost structures to surrounding states - costs of ownership for single-engine aircrafts, and costs of ownership for corporate jets.

7.8.1. Aircraft Operating Fees

While there are no aircraft registration fees in Vermont, there is a 6% Sales and Use Tax which is assessed upon the purchase and registration of an aircraft. As detailed in **Table 7-5**, aside from Connecticut, Vermont has the highest fees for the use and possession of light general aviation aircraft in New England.

In 2018, New Hampshire significantly changed their aircraft registration fee structure. Prior to the passage of House Bill 124 which repealed all aircraft registration fees, newer corporate jet aircraft could cost hundreds of thousands of dollars per year to base in the state. With the new cost structure, all based aircraft pay a flat fee based on aircraft gross weight. It is expected that this new fee structure will attract corporate jets to New Hampshire.

Table 7-5: **Cessna 172 Skyhawk SP Registration Fees (2016 Bluebook Value of $402,000)**

Yearly Registration Fee	Description	Sales Tax or Use Tax	Total Year 1	Total Years 1 - 10
Connecticut				
$90.00	Based upon gross weight: greater than 3,000 lbs.	6.35% Use Tax (1x)	$25,617	**$26,427**
Vermont				
N/A	6% Use Tax (assessed one time)	$24,120	$24,120	**$24,120**

Yearly Registration Fee	Description	Sales Tax or Use Tax	Total Year 1	Total Years 1 - 10
Maine				
N/A	Annual Excise Tax	N/A	$3,618	**$17,286**
New Hampshire				
N/A	Flat fee based on weight	N/A	$100	**$1,000**
Massachusetts				
$165.00	Based upon gross weight less than 12,500 lbs.	N/A	$300	**$1,650**
Rhode Island				
$60.00	Based upon gross weight: 2,001 to 3,000 lbs.	N/A	$60	**$600**
New York				
N/A	No registration fees and sales tax exempt	N/A	$0.00	**$0.00**

Source: Aircraft Bluebook, 2016; McFarland Johnson analysis, 2019.

In examining fees associated with larger corporate general aviation aircraft, Vermont is at a disadvantage in attracting and retaining jets. All neighboring states have significantly reduced taxes and registration fees for corporate aircraft in an effort to attract such aircraft. **Table 7-6** illustrates the fees large aircraft owners can expect to pay over ten years.

Table 7-6: **Gulfstream 650 Registration Fees (2016 Bluebook Value of $61,500,000)**

Yearly Registration Fee	Description	Sales Tax or Use Tax	Total Year 1	Total Years 1 - 10
Connecticut				
$2,500	Based upon gross weight: greater than 12,500 lbs.	N/A	$2,500	**$25,000**
Vermont				
N/A	6% Use Tax (assessed one time)	$3,690,000	$3,690,000	**$3,690,000**
Maine				
N/A	Annual Excise Tax Based upon aviation bluebook value price of $61,500,000	N/A	$553,500	**$2,644,500**
New Hampshire				
N/A	Flat fee based on weight	N/A	$3,500	**$35,000**
Massachusetts				

Yearly Registration Fee	Description	Sales Tax or Use Tax	Total Year 1	Total Years 1 - 10
$300.00	Based upon gross weight: great than 12,500 lbs.	N/A	$300	**$3,000**
Rhode Island				
$250.00	Based upon gross weight: greater than 12,500 lbs.	N/A	$250	**$2,500**
New York				
N/A	No registration fees and sales and use tax exempt	N/A	$0.00	**$0.00**

Source: Aircraft Bluebook, 2016; McFarland Johnson analysis, 2019.

Recommendations

- Evaluate the feasibility of aligning aircraft fees and taxes more closely with those of neighboring states (Aviation Advisory Council, Airport Sponsors)

7.9. FUNDING SOURCES AVAILABLE FOR AIRPORT PROJECTS

Funding sources for airport projects come from a variety of state, federal and private funding streams. In addition, there are several federal grant programs available for airport capital improvements.

7.9.1. State Funding for Airport Projects

Through the State Transportation Fund (STF), VTrans receives budget authority for between $4.6 to $5.8 million annually to use for maintaining and operating state-owned airports, as well as matching federally funded airport projects. The actual appropriation of state funds from year to year is dependent on the amount of FAA funds obtained which require matching funds. Lease revenue from FBOs, license fees and airport fuel taxes are deposited into the STF.

Burlington International Airport maintains its own annual budget, which includes FAA funds as well as airport generated revenue such as leases, parking fees, other fees, and Passenger Facilities Charges (PFCs).

7.9.2. Federal Aviation Funding

The FAA has three primary funding sources for VASP airports, all authorized under the *FAA Reauthorization Act of 2018 (H.R. 302, P.L. 115-254)* and annual Congressional appropriations. Some of this funding is provided in the form of general-purpose entitlement funds, while other funding programs are competitive. FAA funding is provided to support a network of more than 3,300 eligible airports throughout the nation.

The majority of FAA funding is provided to further the implementation of national aviation goals and policies, and not necessarily the priority capital needs of individual airports. As such, recipients of FAA funds often have limited input over the types of projects funded by the FAA on an annual basis.

Airport Improvement Program Entitlement Funds

VTrans receives approximately $1.91 million in FAA Airport Improvement Program (AIP) entitlement funds annually to maintain state-owned airports. Burlington International Airport receives approximately $3.5 million annually in FAA entitlement funds. These funds are used to undertake various engineering and design requirements, capital improvements at airports and also serve to supplement other and larger FAA funding streams described below.

Airport Improvement Program Discretionary Funds

FAA AIP Discretionary funds account for the largest source of airport capital improvement funds. These funds are available on a competitive basis for projects that implement federal goals as defined by the FAA. As detailed in **Table 7-7**, VASP airports have been awarded over $66.7 million in discretionary funds in the last 5 years. Most of these funds have been used for land acquisition, runway, apron and taxiway improvements.

Table 7-7: **FAA Discretionary Funded Projects by Airport, 2015-2020**

Federal Fiscal Year	Airport	Project	Funding
2020	Burlington	Noise Mitigation	$3,149,924
2020	Burlington	Noise Monitoring Equip.	$305,032
2019	Burlington	Taxiway Reconstruction	$13,531,648
2019	Morrisville-Stowe	Runway Extension	$1,153,833
2018	Burlington	Apron Rehabilitation	$3,356,971
2018	Burlington	Apron Rehabilitation	$2,943,299
2017	William H Morse	Runway Recon / Taxiway	$3,504,306
2017	Burlington	Taxiway Reconstruction	$8,602,245
2017	Rutland	Taxiway Reconstruction	$2,340,778
2016	Middlebury	Runway Extension	$2,762,949

2016	Burlington	Apron Rehabilitation	$2,105,856
2016	Burlington	Land Acquisition	$16,085,226
2015	Northeast Kingdom	SRE Building	$729,000
2015	Northeast Kingdom	Runway Ext / Taxiway	$7,623,196
2015	Burlington	Land Acquisition	$1,101,150
2015	Burlington	Taxiway Construction	$874,736
Total			$70,170,149

Source: FAA

Airport Improvement Program Supplemental Funds

In 2019, the *Further Consolidated Appropriations Act, 2020 (Public Law 116-94)* included a Supplemental amount of $400 million for discretionary grants under the AIP Program. The Supplemental funds are available for award through September 30, 2022 and the FAA is using its established Airport Capital Improvement Plan (ACIP) process to develop a proposed list of eligible projects. So far, three VASP airports have received Supplemental AIP funding:

- Franklin County - Runway Reconstruction ($2,222,222)
- Burlington - Terminal Building Construction ($10,000,000)
- Morrisville-Stowe – Taxiway Construction ($3,100,000)

7.9.3. Other Federal Grant Programs Which Allow for Airport Capital Investments

Some non-aviation federal grant programs allow airport projects as eligible activities. These programs usually support economic development initiatives, and in some cases, allow their funding to serve as components of larger financing packages for projects.

Northern Borders Regional Commission Economic & Infrastructure Development Grants

The Northern Borders Regional Commission (NBRC) is a federal agency tasked with supporting economic development initiatives in northern parts of New England and New York, primarily through an Economic & Infrastructure Development Investment grant program. Approximately $4.5 million is made available annually to support projects in Vermont. Capital projects (including airports) are eligible to receive up to $1,000,000 in grant funds with a non-federal matching requirement that ranges from 20%-50% depending on the region within the State. In 2015, the Northeast Kingdom International Airport received $250,000 in NBRC funds for wastewater improvements.

Economic Development Administration Public Works and Economic Adjustment Grants

The Economic Development Administration's (EDA) Public Works and Economic Adjustment Assistance (EAA) programs provide economically distressed communities and regions with comprehensive and flexible resources to address a wide variety of economic needs. Projects

funded by these programs support initiatives leading to the creation and retention of jobs and increased private investment, advancing innovation, enhancing the manufacturing capacities of regions, providing workforce development opportunities, and growing ecosystems that attract foreign direct investment.

EDA accepts applications on a rolling basis and non-federal matching fund ratios are dependent on a project's location and level of economic distress. The following examples highlight the various types of airport projects funded with EDA grant funds across the country:

- Shenandoah Valley Regional Airport Commission Hangars and Training Center - $2,060,000, matched by $2,060,000 in local investment, to the Shenandoah Valley Regional Airport Commission, Weyers Cave/Augusta County, Virginia, to fund construction of new airport hangars and training space to support increased aviation activity in Augusta County. The hangars will serve as the anchor for the development of a broader aviation technology business park to accommodate additional aviation-related business investment and job creation throughout the area.

- City of Deer Park, Deer Park/Spokane County, Washington Resilience Infrastructure - $4,723,423, matched by $1,180,856 in local investment, to the City of Dear Park, Deer Park/Spokane County, Washington, to fund construction of critical infrastructure to serve the Deer Park Business and Industrial Park along Cedar Road in Spokane County. The project will support the development of 11 acres of private property and approximately 16 acres within the municipal airport, which will help the community become more resilient and recover from seasonal flooding.

- City of Weslaco, Weslaco/Hidalgo County, Texas Hangars and Runway Extension - $850,000, matched by $566,667 in local investment, to the City of Weslaco, Weslaco/Hidalgo County, Texas, to fund the construction of two new hangars and the extension of the runway and apron at Weslaco Mid Valley Airport in Hidalgo County, located in the city of Weslaco's Foreign Trade Zone.

- Eastern Slope Airport Authority Hangars Construction - $1,200,000, matched by $946,146 in local investment, to the Eastern Slope Airport Authority, Fryeburg/Oxford County, Maine, to fund the construction of a new airport hangar in a designated Opportunity Zone in Oxford County. Once completed, this transportation infrastructure project will support increased aviation activity, provide accessibility, and drive regional economic growth.

- City of Pendleton, Pendleton/Umatilla County, Oregon UAS Test Facilities - $3,000,000, matched by $3,000,000 in local investment, to the City of Pendleton, Pendleton/Umatilla County, Oregon, to fund the construction of Unmanned Aerial Systems test range facilities that includes a T-Hangar infrastructure, to allow access to roads leading to the city of Pendleton's Eastern Oregon Regional Airport in Umatilla County.

- Lafayette Airport Parking Facilities - $2,000,000, matched by $3,379,888 in local investment, to the Lafayette Airport Commission, Lafayette/Lafayette County, Louisiana, to fund rehabilitation and construction of parking facilities at Lafayette Airport in Lafayette

County. Once completed, the upgrades will increase capacity for parking at the airport, which will help meet the growing demand in the area.

United States Department of Agriculture Rural Business Development Grants

The United States Department of Agriculture (USDA) provides grants for technical assistance and training to small rural businesses. Applicants must be a governmental entity, nonprofit corporation, institutions of higher education or rural cooperative, and businesses offered support must have fewer than 50 new workers and less than $1 million in gross revenue. Grant funds must be used for projects that benefit rural areas or towns outside the urbanized periphery of any city with a population of 50,000 or more.

This grant program does not have a maximum grant amount; however, smaller requests are given higher priority. There is no cost sharing requirement. Opportunity grants are limited to up to 10% of the total Rural Business Development Grant annual funding. Eligible activities include:

- Training and technical assistance, such as project planning, business counseling and training, market research, feasibility studies, professional or/technical reports or producer service improvements.
- Acquisition or development of land, easements, or rights of way; construction, conversion, renovation of buildings; plants, machinery, equipment, access for streets and roads; parking areas and utilities.
- Pollution control and abatement.
- The capitalization of revolving loan funds, including funds that will make loans for start-ups and working capital.
- Distance adult learning for job training and advancement.
- Rural transportation improvement.
- Community economic development.
- Technology-based economic development.
- Feasibility studies and business plans.
- Leadership and entrepreneur training.
- Rural business incubators.
- Long-term business strategic planning.

United States Department of Agriculture Economic Impact Grants

This program provides funding to assist in the development of essential community facilities in rural communities with extreme unemployment and severe economic depression. Public entities and nonprofit organizations are eligible to receive grant funds and the following conditions apply:

- The project must be located in rural areas including, cities, villages, townships, towns and federally-recognized Tribal Lands, with no more than 20,000 residents that have a “Not Employed Rate” greater than 19.5%.
- The median household income of a community being served must be below 90% of the state non-metropolitan median household income for grant eligibility.

Grant assistance is based on a graduated scale determined by population, median household income, total project costs and financial need. An essential community facility is one that provides an essential service to the local community, is needed for the orderly development of the community, serves a primarily rural area, and does not include private, commercial, or business undertakings. Examples of essential community facilities include city/town/village halls, courthouses, airport hangers, and street improvements. Grants may be made in combination with other financial assistance such as a Community Facilities direct or guaranteed loan, applicant contribution or funding from other sources.

SCORE.org/Vermont Small Business Centers

SCORE and Vermont Small Business Development Centers are nonprofit organizations supported by the Small Business Administration (SBA) that promotes free tools and mentorship for American small business owners. They are a free resource for entrepreneurs looking for help or expertise and connect entrepreneurs to local experts. A critical function of these organizations is assistance with finding business grants.

7.9.4. Assessment on Funding Sources

Airport project needs exceed available funding. In the current State Fiscal Year 2021-2026 Aviation Capital Improvement Program, VTrans has identified $46 million in airport project needs. Similarly, Burlington International Airport continues to search for funding to fully develop a new terminal as well as other needed projects.

The NBRC, EDA, and USDA funding sources identified in this section offer an opportunity to leverage private, state, and federal funding sources to implement projects that would not normally obtain funding through FAA grant programs.

Recommendations

- Apply for NBRC, EDA, and USDA funding to implement needed projects that fall outside the scope of FAA funding priorities (State Agencies with support from FBOs)
- Explore SCORE.org and Vermont Small Business Development Centers' business network programs and tools to develop financing ideas of airport projects (FBOs, Private Developers, Regional Development Corporations)

7.10. PROJECT PRIORITIZATION FOR STATE-OWNED AIRPORT PROJECTS

The prioritization of projects occurs at several levels for VASP airports:

- VTrans receives direct entitlement, discretionary, and supplemental FAA funds as well as a state appropriation to match FAA funds for state-owned airports, and undertake

maintenance and operations activities. It similarly prioritizes projects included in airport Master Plans and in the Capital Investment Plan submitted annually to the FAA.

- Burlington International Airport receives direct entitlement, discretionary, and supplemental FAA funds, in addition to airport user fees and passenger facility charges. The airport prioritizes projects according as detailed in its Master Plan and Capital Investment Plan.
- Privately-owned VASP airports prioritize their capital improvements according to their individual airport needs.

For state-owned airports, VTrans is responsible for implementing airport projects consistent with national priorities through FAA AIP.

The national Airports Capital Improvement Plan (ACIP) is an internal FAA document that serves as the primary planning tool for identifying and prioritizing critical airport development and associated capital needs for the National Airspace System. It also serves as the basis for the distribution of grant funds under the AIP. The FAA identifies airports that are significant to national air transportation through the development of the National Plan of Integrated Airport Systems (NPIAS). The NPIAS identifies the composition of a national system of airports together with the airport development and costs necessary that will be needed over the ensuing ten years to expand and improve the system in order to anticipate and meet the present and future needs of civil aviation, to meet requirements in support of national defense, and to meet the special needs of the U.S. Postal Service. The ACIP provides additional details including the anticipated sources of funds for specific NPIAS development expected to be undertaken within the next 3 to 5 years and considered likely to be funded by the AIP.

In addition to administering federal aviation priorities, VTrans is also responsible for developing state-owned airports based on their multi-faceted needs which may not always align with FAA priorities. For example, the master plan for an airport may point to the need for a terminal building or a fuel farm, projects which may rank low in the FAA prioritization system. Or an economic development project proposed by an FBO or private developer may trigger the need for runway or taxiway infrastructure that may similarly not rank high in the FAA prioritization system. These types of projects still need to move forward, even without FAA funding, and VTrans needs to have a method of prioritizing them.

Projects for state-owned airports therefore require a prioritization method which accounts for the following needs:

- The system-level top, mid-term and long-term priority projects included in Chapter 6 of the VASP to bring airport categories up to their respective facilities and service objectives. The prioritization of these projects will be incorporated into the VTrans CIP and submitted to the FAA for AIP funding.
- Other airport project needs that arise during the 20-year planning period. The prioritization of these projects will be incorporated into the VTrans CIP and submitted to the FAA for AIP funding.

- Airport project needs that do not fit within existing FAA priorities which will need to be prioritized for FAA entitlement funding, state-only funded projects, or NBRC / EDA / USDA grant funding.
- Privately funded projects by FBOs or private developers which will require some companion public infrastructure.

The proposed project prioritization methodology for state-owned airports is presented in **Table 7-8**. The functional criteria of the prioritization include the following:

- Safety: A transportation project enhances safety by reducing the risk.
- Asset Condition: A transportation project enhances the condition of multimodal infrastructure by maintaining it to preserve its current condition, by rehabilitating it to improve the condition and extend service life, and/or replacing it to improve its condition and service.
- Mobility & Connectivity: A transportation project enhances mobility by increasing the reliable connectivity to jobs and other destinations and/or increasing the number of mode choices available for people and goods.
- Economic Access: A transportation project enhances economic access by increasing the ability of a region to attract and retain businesses and the workforce by providing better access to jobs.
- Resiliency: A transportation project enhances the resiliency of the system by minimizing the impacts of planned and unplanned events (i.e. floods and extreme weather)
- Regional: A transportation project enhances the community by conforming to the goals and objectives defined in local and regional plans, and by supporting the outcomes of a robust public process.
- Environment: A transportation project enhances the natural environment by reducing the negative impacts of travel (e.g., reducing greenhouse gas emissions, improving air quality, enhancing safe wildlife passage, and/or improving water quality)
- Health Access: A transportation project enhances public health by increasing the opportunity for physical activity and increases access to destinations that improve health (i.e., healthcare, education, and healthy food).

The proposed project prioritization methodology is based on VTrans' efforts to develop an agency-wide prioritization process for all modes but adapted to airport projects. The weighting of the criteria reflects input from Agency staff, the Aviation Advisory Council, and the VASP goals.

Table 7-8: **Project Prioritization Methodology for State-Owned Airport Projects**

Category: Safety Examples ▪ Obstruction removal, avigation easements ▪ Lighting & other critical maintenance ▪ Fencing ▪ Safety areas	**Safety Category Methodology** ▪ Equal priority, should all be submitted for funding
Category: Airport Asset Preservation Examples ▪ Runway rehabilitation / reconstruction ▪ Taxiway rehabilitation / reconstruction ▪ Apron rehabilitation / reconstruction ▪ Fuel farm replacement ▪ SRE Buildings ▪ Terminal building rehabilitation	**Preservation Category Methodology** ▪ Asset Condition (40%) ▪ Mobility / Connectivity (20%) ▪ Economic Access (15%) ▪ Regional (10%) ▪ Resilience (5%) ▪ Environment (5%) ▪ Health Access (5%)
Category: Airport Growth & Development Examples ▪ Runway extension / expansion ▪ Taxiway expansion ▪ Apron expansion ▪ Fuel farms (new) ▪ Hangars ▪ Terminal buildings (new or expanded)	**Airport Growth & Development Methodology** ▪ Economic Access (40%) ▪ Mobility / Connectivity (35%) ▪ Regional (10%) ▪ Resilience (5%) ▪ Environment (5%) ▪ Health Access (5%)

Safety projects are at the top of the prioritization list and will continue to be the major focus of the VASP. The FAA's *Advisory Circular (AC) 150-5300-13A – Airport Design*, provides guidance on the design of airports, focusing on safety and efficient operations. The FAA has, over the past several years begun to focus on certain areas of airports that must meet FAA standards; Runway Safety Areas (RSA) and Runway Protection Zones (RPZ).

Runway Safety Area (RSA)

The RSA is a rectangular area surrounding the runway and enhances the safety of aircraft that undershoot, overrun or veer off the runway and provides access for firefighting and rescue equipment. The FAA no longer provides a modification of standards for a non-compliant RSA; thus, all airports must meet RSA dimensional standards for their runways.

Runway Protection Zones (RPZ)

The RPZ is a trapezoidal shaped area beyond the end of the runway that enhances the protection of people and property on the ground. The FAA recommends ownership or control within the RPZ, and has continued to provide guidance on land uses within the RPZ.

Given the FAA's focus on these two areas, airport sponsors should conduct continuous reviews to determine if their RSAs are in compliance and the airport has a current RSA determination from the FAA. The new guidance for land uses within the RPZ has created concern among airports regarding ownership and potential incompatible land uses within the RPZs. The FAA is allowing the current uses in the RPZ until an action, be it a runway rehabilitation or some other project would trigger a review of the RPZ. Airport sponsors should continue to evaluate their RPZs against the current guidance to determine the land uses within their RPZs. If there are issues found, airport sponsors should determine the best strategy to address the issue. The FAA recently modified their regulations to allow land use within an RPZ to be exempted from the environmental review process, making the process of address incompatible land uses within the RPZ more streamlined.

Obstruction Mitigation & Clearance

Approaches used by pilots in adverse weather greatly enhance the utilization of Vermont's airports, and airports developed or improved with federal funds are obligated to maintain safe approaches. Whether on an instrument approach or in visual meteorological conditions airport sponsors are responsible for providing safe approaches to, and clear departure surfaces from runways. As such, airport sponsors should continually evaluate and remedy obstructions consistent with FAA regulations.

Recommendations

- Continuously evaluate the status of RSAs and RPZs and develop action plans to remedy any deficiencies (Airport Sponsors)
- Continuously evaluate the status obstructions to airport approaches and develop action plans to remedy any deficiencies (Airport Sponsors)

7.11. EMERGENCY RESPONSE & TRAINING PLANNING

Emergency response and training for potential airport accidents are coordinated through the Vermont Department of Public Safety's Emergency Management Program, local responders, and airport sponsors. The following four plans form the core emergency and hazard mitigation requirements at the state and local levels:

- State Emergency Management Plan - Vermont's State Emergency Management Plan serves as the framework for the coordination of Vermont capabilities to support local jurisdiction response with state-level resources in compliance with Federal guidelines.
- State Hazard Mitigation Plan - The State Hazard Mitigation Plan (SHMP) identifies the natural hazards that could potentially affect the State. The SHMP assesses risk and vulnerability to these hazards and identifies top priority mitigation actions at the State level.
- Local Emergency Management Plan - In accordance with 20 V.S.A. § 6(c), municipalities must develop all-hazard plans to guide municipal emergency management operations. A current local emergency plan is also required for municipalities to receive increased state reimbursement through the Emergency Relief and Assistance Fund.
- Local Hazard Mitigation Plan - Local Hazard Mitigation Plans are used to identify policies and actions that can be implemented over the long term to reduce risk and future losses. Mitigation Plans form the foundation for a community's long-term strategy to reduce disaster losses and break the cycle of disaster damage, reconstruction, and repeated damage.

In the case of Burlington International Airport, an additional plan (Airport Emergency Plan) is required as part of Federal Aviation Regulations (FAR) Part 139 Airports.

With trends in aviation shifting towards larger jet aircraft, and recommendations for longer runways for certain categories of airports included in the VASP, emergency and hazard mitigation plans at the state and local levels will need to be reviewed to ensure these trends are incorporated into plans and training.

Commodities Points of Distribution (COPD)

Airports are an important component of emergency or disaster response and recovery. The occurrence of an emergency or disaster presents a wide variety of needs that must be addressed including the possible need for supplies. Emergency management officials are responsible for coordinating such requests. If a disaster incident requires resources which are beyond the capability of a local community, the municipality may request assistance through the State Emergency Operations Center (SEOC).

In order to meet the logistical demands of a major disaster response the SEOC must be prepared to provide disaster resources to requested areas of the state. This may necessitate the opening of a pre-designated or alternate distribution point (CPOD).

Included below are the ten pre-identified state-owned airports which serve as CPOD sites:

- Caledonia County State Airport (CDA), Lyndonville
- Edward F. Knapp State Airport (MPV), Berlin
- Middlebury State Airport (6B0), Middlebury
- Hartness State Airport (VSF), Springfield
- John H. Boylan State Airport (5B1), Island Pond
- Morrisville-Stowe State Airport (MVL), Morristown
- William H. Morse State Airport (DDH), Bennington
- Northeast Kingdom International (EFK), Coventry
- Rutland-Southern Regional Airport (RUT), North Clarendon
- Franklin County State Airport (FSO), Highgate

Recommendations

- Review local and state emergency plans and hazard mitigation plans to ensure they incorporate response and training requirements for longer VASP airport runways and trends in aircraft type (State and Local Agencies)

7.12. AVIATION EDUCATION SUPPORT

By far the largest number of comments received from aviation stakeholders as part of the public outreach process for the VASP were related to educating, training and preparing the next generation of aviators – both pilots and support services such as aircraft operations and maintenance.

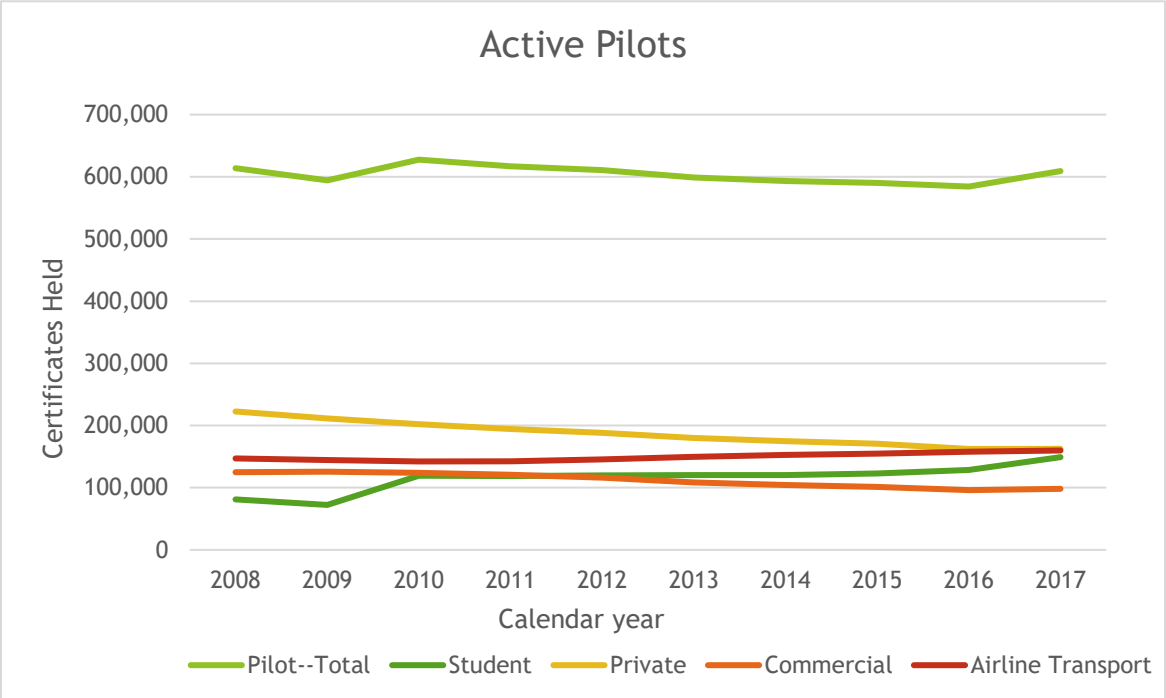
Nationally, the pilot and certified pilot instructor populations have been steadily declining, with 2017 marking the first increase in the total pilot population since 2008. Many of the current generation of pilots who received their training in the post-World War II period will be retiring

from flying in the coming years, and many have already done so. The FAA publishes the U.S. Civil Airmen Statistics annually. **Figure 7-1** shows the trend among pilot certificates issued in the U.S. An interesting note here is the active Airline Transport Pilot Certificates nearly outnumbered the active private pilot certificates in 2018 which illustrates that the pilot population is trending toward more professional pilots and away from recreational pilots. This is a trend that some have argued spells trouble for the future of aviation.

Additionally, a worldwide pilot shortage has been forecasted, which will continue to have impacts on general aviation and commercial service airports and their activity. Boeing's Commercial Market Outlook for 2018-2037 predicts the global commercial jet fleet will double in size in the next 20 years, generating a major demand for qualified pilots, instructors, and mechanics. While the effects of COVID-19 have resulted in a significant decline in commercial service operations, the long-term trend of continued growth in aviation has held historically.

Similarly, the increase in active commercial aircraft over the next 20 years, coupled with modest growth in general aviation fleets will drive the need for more airframe and powerplant (A&P) mechanics through the planning period. These are quality jobs that pay good wages that would serve Vermont's economy well beyond fulfilling the needs of airports.

Figure 7-1: Historical U.S. Pilot Population, 2008-2017



Several VASP airport FBOs and flying organizations, such as the Civil Air Patrol and Young Eagles, reported offering flight training to young people while these same groups also assisted in organizing and hosting fly-in events, and engaging students audiences at the elementary and high school levels. These efforts represent the most direct way of engaging and preparing future

aviators. A coordinated statewide effort to continue the expansion of education and promotion of aviation led by FBOs and flying organizations, with funding support, was continually noted as the single most important policy recommendation for education support.

Recommendations

- Support the education efforts of FBOs and flying organizations with funding, including outreach efforts and fly-in events (FBOs, Flying Organizations, State Agencies)
- Foster partnerships with colleges offering programs in flights operations and aircraft maintenance (FBOs, Flying Organizations, State Agencies)

Vermont Airport System Plan

Prepared for:

VTrans Working to Get You There
Vermont Agency of Transportation

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