FINAL REPORT

Bennington County Regional Commission
WH Morse State Airport
Benefit-Cost Analysis

October 2005

Submitted by:
Wilbur Smith Associates
4076 Shelburne Road, Suite 7
Shelburne, VT 05482
802-985-2530(p)
802-985-8175(f)
www.wilbursmith.com

ENGINEERS
PLANNERS
ECONOMISTS
Wilbur Smith Associates
50 Years

TABLE OF CONTENTS

1.0 INTRODUCTION

Background

The Bennington County Regional Commission (BCRC) commissioned Wilbur Smith Associates (WSA) to prepare a benefit cost analysis for the WH Morse State Airport. This study is a follow-up analysis to the Runway Length Analysis, conducted for the WH Morse State Airport in 2002 and updated in 2003. The Runway Length Analysis concluded that the runway should be extended to 5,000 feet. Justification for the longer runway was largely based on potential economic development benefits.

Despite these previous analyses, a lack of consensus remains in the community. Parts of the community feel that the full impact of the airport improvements have not been fully researched nor are they completely understood. This study was prepared in conjunction with the BCRC and steering committee (the Airport Committee) comprised of community representative and stakeholders.

Study Organization

The study has been organized into nine chapters. Immediately following this introductory statement, the text includes the following sections:

Section 2.0 – presents an overview of existing conditions at the WH Morse State Airport in Bennington, including a review of community goals, existing literature, stakeholder interviews and an introduction to airport funding programs;

Section 3.0 – sets out a guiding planning statement and evaluation criteria for the Airport;

Section 4.0 – describes the air transportation improvements to be considered;

Section 5.0 – presents the comments and opinions expressed during a public meeting;

Section 6.0 – provides an overview of the general aviation industry, including industry trends;

Section 7.0 – lays out a set of forecasts for future operations and fleet mix;

Section 8.0 – highlights the benefits and costs associated with each alternative; and,

Section 9.0 – presents study findings and recommendations.

2.0 WH MORSE STATE AIRPORT

Facilities and Current Operations

The William H. Morse State Airport, located in the Town of Bennington, is a general aviation facility owned by the State of Vermont. The airport has a single asphalt runway (13-31) that is 3,704 feet long and 75 feet wide. A copy of the current airport layout plan is attached as **Figure 2.1**.

The Airport initially started as a grass strip used by hobby pilots and recreational aircraft. While the airport is still used by recreational pilots, it now includes a much wider range of operations including executive travel, freight forwarding, and community/recreation uses such as public safety, emergency health care, and occasional military use.

At present, the airport has one tenant, AirNow, a local company that operates as the airport fixed based operator (FBO) as well as runs a national air freight charter service from Bennington. AirNow has 60 employees, 37 of whom are based in Bennington. There are also approximately 41 privately owned aircraft at the facility. Services provided at the airport include a WSI weather briefing system, fuel services, vending machines, a pilot's lounge, restroom, telephone, and surface transportation (rental car and taxi).

The Airport's geographic service area extends from Pownal, Vermont to the south, to the year round resort areas of Bromley and Stratton Mountain Village, Vermont in the north and into New York as far west as Hoosick Falls and Eagle Bridge. The location of the airport and existing runway is shown in **Figure 2.2.**

The WH Morse Airport is not currently a non-towered airport, meaning it has no air traffic control facilities and therefore, aircraft movements are not recorded. Likewise, there is limited information on individual aircraft trips, including time of day, trip purpose, type of aircraft, number of passengers, etc. The Vermont Agency of Transportation (VTrans) does, however, use aviation acoustical counters to track aircraft movements. The accuracy of these acoustical counters was recently improved; consequently, the quality and reliability of the information has been enhanced.

The most recent data collected by the VTrans acoustical counters was recorded during the six week (48 day) period between June 3 and July 21, 2005; during this time 979 aircraft take-offs were recorded, or about 20.4 operations per day. Based on this information, the number of annual operations is estimated to be approximately 14,000. This estimate is roughly consistent with estimates prepared in 2002 as part of the Economic Impact of Vermont's Public Use Airports Study which estimated operations at approximately 12,000 and estimates of 15,000 annual operations (2001) prepared in the WH Morse Airport Master Plan Update dated March 2003.

Community Goals

Guiding principals for community planning in the Bennington region are clearly articulated in the 2002 Bennington Regional Plan. We refer to existing regional goals as guides to understanding existing regional priorities associated with future planning, growth and development and shape the context within which the airport operates as part of the community infrastructure. The goals articulated in this document reflect wider regional

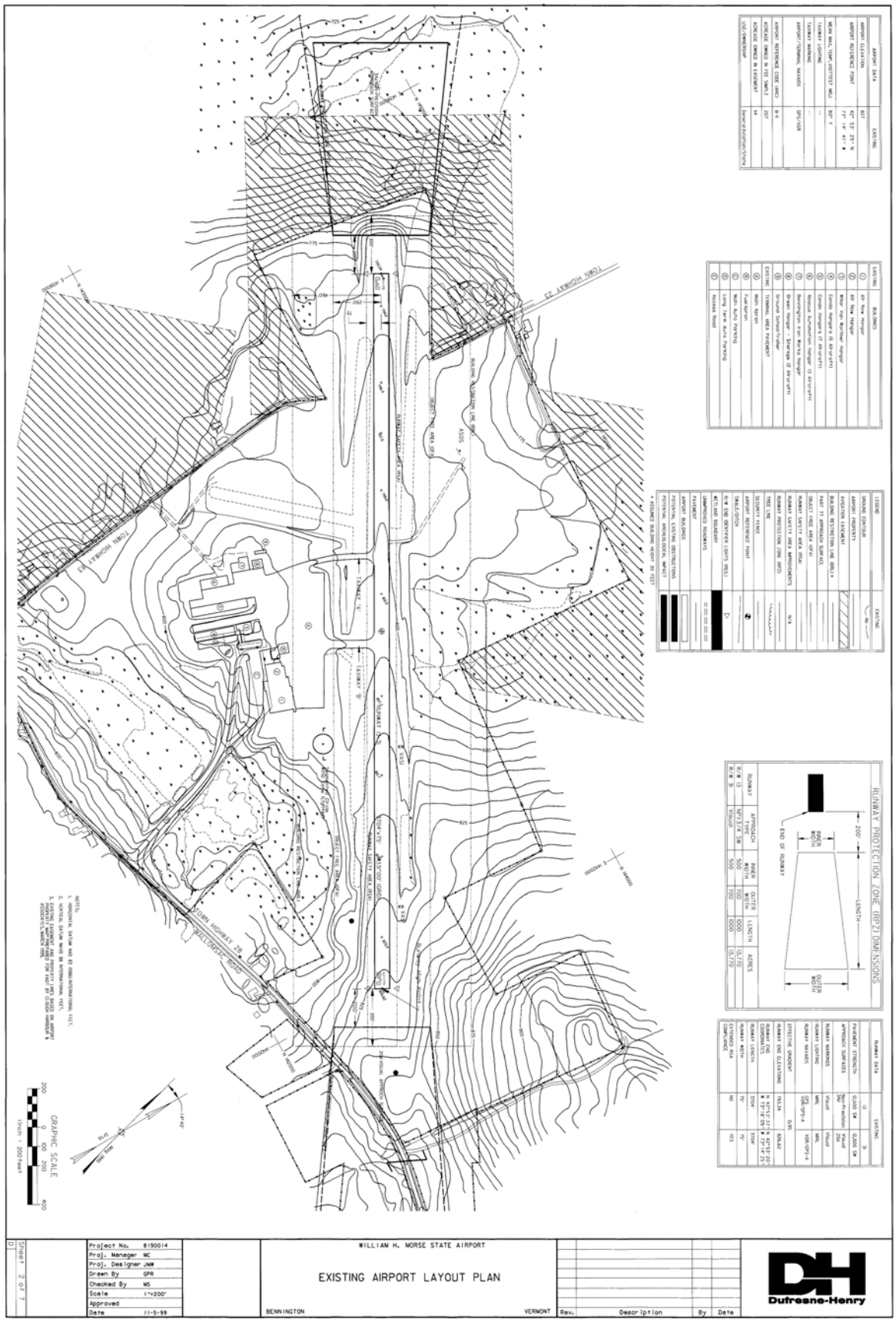


Figure 2.1:
Existing Airport Layout P lan

WH Morse State Airport Benefit Cost Analysis

Wilbur Smith Associates
ENGINEERS
PLANNERS
ECONOMISTS

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 2.2:
Location of WH Morse Airport and Existing Runway

priorities and are largely consistent with area municipal planning objectives and other regional planning studies. The eleven goals articulated in the regional plan are:

1. Plan future growth to reinforce historic development patterns, and to provide desirable housing and economic opportunities.
2. Protect important natural and historic resources.
3. Encourage development of a strong and diverse economy.
4. Maintain and enhance recreational opportunities.
5. Provide for safe, convenient, economic, and energy efficient transportation systems.
6. Plan for, finance, and provide an efficient system of public facilities and services.
7. Encourage excellence in educational and vocational training services.
8. Provide opportunities for affordable housing to meet the needs of all residents of the region.
9. Encourage the efficient use of energy and the development of renewable energy resources.
10. Strive for close coordination of policies in the Regional and municipal plans.
11. Continually assess the effectiveness of regulatory provisions.

Literature Review

In addition to reviewing local plans, WSA also conducted a literature review to ascertain the experience of similar sized and types of communities evaluating potential improvements to local air transportation services. A list of key sources referenced as part of this study in included in **Appendix A**. This research included reports and studies on the relationship between general aviation and economic development, community impacts of general aviation airport development and other general aviation benefit-cost analyses. In addition, relevant aviation studies carried out for the State of Vermont were also examined.

The majority of the literature about general aviation airports strongly supports a positive relationship between general aviation airports and regional economies. The relationship is measured in terms of economic impact (i.e., existing economic benefits) and economic development (i.e., the ability to generate future economic activity). A recent study published by the Wisconsin Department of Transportation (WisDOT), for example, shows that between 1997 and 2001, over 85 percent of new or expanded manufacturing businesses were located within 15 miles of an airport capable of handling corporate jets**.** The literature also shows that the majority of all activity at general aviation airports is by corporate aircraft, underscoring the use of general aviation facilities to support business activity and economic development.

In addition, most of the studies reviewed to date define 'costs' associated with general aviation development as primarily consisting of construction costs and environmental impacts, which are typically measured in terms of noise and impacts associated with airport construction. Most studies do not discuss or include impacts on the local community character nor do they provide a broad assessment of impacts to the overall environment. In some cases, however, newspaper articles and public meeting proceedings provided the perspective and concerns of communities trying to evaluate benefits and costs associated with airport facility expansion. While not formal studies, these sources do provide insight

into community discourse and the range of concerns expressed by the community with regards to airport facility expansion.

One study of particular relevance to the WH Morse Benefit Cost Analysis is the Vermont Agency of Transportation (VTrans) commissioned study, The Economic Impact of Vermont's Public Use Airports. This study, completed in April 2003, listed economic impacts of the 17 public use airports in the State of Vermont at nearly $612 million. About $276 million of the economic impact was expressed in business sales (revenue) including wages at airports. Another $336 million in economic impact was generated by aviation-dependent businesses in Vermont.

In terms of economic impact resulting from business sales and wages at airports, the Burlington International Airport was responsible for the largest portion of these benefits; about $243 million or 88 percent of all of the economic impact. The second largest airport in Vermont in terms of business sale impacts was WH Morse State Airport in Bennington with $11.1 million or about 4 percent of the statewide economic impacts.

Stakeholder Interviews

As a tool to understand the role the WH Morse Airport plays in the greater Bennington community, WSA carried out interviews with members of the community. These interviews were used as a technique to include the perspective of community stakeholders, ascertain how they use and rely on the Airport and encourage them to articulate the primary arguments for and against air transportation improvements. A list of organizations and individuals interviewed during this process is included in **Appendix B**.

Stakeholders largely fell into three distinct groups:

- Opponents of additional development at the airport were largely comprised of people concerned that additional development would result in more harm than good for the community at large. This group primarily centered their arguments around three main points:
    - The need and demand for additional development of the airport has not been clearly demonstrated or documented and there is a lack of evidence that such projects would be a prudent use of public resources. This group of stakeholders felt that this argument is supported by the fact that the private sector has not expressed a willingness to fund the development itself.
    - Additional development at the airport will likely have direct negative impacts on the quality of life in Bennington, including the community's historical character, village ambience and consequently, its tourism appeal. These negative impacts are anticipated to result from increases in vehicular traffic, airplane noise and loss of property values.
    - These stakeholders also fear benefits resulting from airport expansion would be realized by a very small portion of the community.

- Proponents of future development of the airport view improvements as an essential tool to retain and attract business interests in the community. Main arguments voiced by this group of stakeholders include:

    - The ability of an expanded and more modern airport to play an important role in regional economic development activities, ensuring the community remains competitive and supporting regional goals of creating a technology hub in Bennington.

    - Airport development will improve the region's accessibility by ensuring safe, up-to-date facilities, permitting access by a larger pool of modern aircraft and ensuring the community retains the current airport tenant, AirNow.

    - A sense that Bennington is undergoing an economic renaissance of sorts and would benefit from an airport that can cater to larger private jets, including business class or corporate fractional/single owner jets.

- Individuals with a strong interest in aviation who are primarily interested in making improvements to the airport so that the facility can play a greater role in the aviation and transportation infrastructure. These individuals recognize the concerns and interests of the other groups but approach the problem from a more technical perspective. Their support is based on the following:

    - Extending the runway to at least 4,000 feet will give the airport more flexibility. It would increase the range of aircraft that could use the facility and would more safely accommodate aircraft landing under a wider range of weather conditions.

    - Potential changes in federal regulations for fractional ownership of aircraft taking not-for-revenue flights may restrict runway lengths to 60 percent of available runway. These regulations would mean for these aircrafts and flights, the Bennington runway would effectively be 2,700 feet, making it impossible for business class aircraft to use the facility.

Airport Funding Programs

The Airport and Airway Trust Fund, which was established by the Airport and Airway Revenue Act of 1970, provides the revenues used to fund many of the improvement projects at public use airports across the country. The trust fund concept guarantees a stable funding source whereby users pay for the services they receive. Taxes or user fees are collected from the various segments of the aviation community and placed in the trust fund. These taxes include an airline ticket tax, freight waybill tax, international departure fee, and taxes on the sale of aviation gasoline and jet fuel.

The Federal Aviation Administration (FAA) divides the trust funds into several different types. The two types that are used for the state airports are Apportionment Funds and Discretionary Funds. Apportionment Funds are allocated to each state based on their population. Each federal fiscal year, Vermont earns a certain amount of apportionment monies based on the language in the Federal Transportation Bill. Vermont can either use

these monies for an eligible airport project, or save the monies for up to three years to use on a future project. Discretionary Funds can be used by any state in the New England Region of FAA. The availability of discretionary funding for a given project depends on the amount of available discretionary funds, and the priority ranking of a project. Projects that are safety related would stand a better chance of receiving discretionary funds, than a project which is not safety related. Discretionary Funds are only valid for a given fiscal year.

It is important to note that FAA Funds can only be used for eligible airport projects. These funds cannot be used for highway, railroad or enhancement projects. For eligible projects, the FAA Funds will pay for 95% of the cost of the project. The remaining 5% will come from the State Aviation Program. The State Transportation Budget largely consists of funds used for the highway system; however, there are small portions of the budget used to fund non-highway projects such as airports, railroads, recreation paths, etc. that are also a part of the State Transportation System.

3.0 PLANNING STATEMENT AND EVALUATION CRITERIA

Planning Statement

One of the initial tasks of this Study was to prepare a planning statement for air transportation improvements. This statement was prepared by the Airport Committee and is based on the experience of the advisory group members, review of local plans, stakeholder interviews and the broader literature search.

The plan for and purpose of the WH Morse State Airport in Bennington, Vermont is to maintain and operate a facility that functions in harmony with the greater Bennington community, and supports the safe and efficient air transport of people and goods.

The airport exists in order to:

- *Support on-going and planned economic development efforts;*
- *Serve existing local business and commerce;*
- *Improve access to and from the region for residents and visitors; and*
- *Contribute to the quality of life in Vermont.*

The plan of and purpose for air transportation improvements, if justified by a careful cost assessment, would be to:

- *Improve the safety and reliability of air access to Bennington County;*
- *Strengthen the region's preferred and planned economic and development activities;*
- *Enhance the airport's ability to support regional businesses; and*
- *Serve as a showcase, small town airport/facility of integrated, community purpose, design and operation.*

Evaluation Criteria

In addition to preparing a planning statement, the Airport Committee also prepared a list of evaluation criteria to be used in conjunction with the benefit cost analysis as a tool to evaluate the appropriateness of the alternatives under consideration. The evaluation criteria are based on regional goals and shown in **Table 3.1**.

Table 3.1 Proposed Evaluation Criteria

Evaluation Criteria (Goals)	Definition
Protect important natural, historic and community resources	Impact significant natural or fragile ecological areas
	Impact important features of the landscape, including scenic roads waterways and views
	Impact historic structures, sites and districts
	Impact water, forests, prime agricultural soil and air quality
	Impact existing noise levels in the community
Encourage development of a strong and diverse economy	Support important existing local and regional business clusters (health/social services, manufacturing/technology, tourism (retail/leisure) and education
	Increase quality employment opportunities for residents
	Meet transportation needs of existing businesses
	Support businesses that utilize local natural resources
	Provide ready and efficient access to suppliers and markets. (Encourage desirable businesses to relocate to area.)
Provide for a safe, convenient, economic and energy efficient transportation system	Improve safety
	Preserve function of existing transportation infrastructure
	Enhance access to/from region for residents and local businesses
	Enhance access to/from region for visitors and businesses
Plan for, finance, and provide an efficient system of public facilities	Cost
	Portion of alternative costs borne locally
Direct growth to existing/designated growth centers	Encourage growth to existing centers and support revitalization of downtowns
Encourage excellence in educational and vocational training services	Provide educational and training opportunities in line with employment needs
Encourage the efficient use of energy and the development of renewable energy sources	Support efficient use of energy resources
Strive for close coordination of policies in the Regional and municipal plans	Support other regional and municipal plans

4.0 POTENTIAL AIR TRANSPORTATION IMPROVEMENTS

Base Case

Drawing from materials and plans published by VTrans, WSA prepared a base case or 'do nothing' scenario that describes the lowest cost set of improvements that are required to preserve the existing function of the Airport. The base case includes improvements scheduled for both short and medium term.

Short Term 2005-2009

The following improvements programmed for the WH Morse State Airport include:

- Installation of a transponder landing system (TLS) that will provide a landing guidance system for aircraft under instrument approaches. The system will improve landing precision under a variety of weather conditions
- Installation of a precision approach path indicator (PAPI) on Runway 13 to provide visual vertical guidelines for day or night operations.
- Runway Reconstruction and Safety Area Design and Construction:
  - Reconstruction of runway surface
  - Removal of obstructions, such as trees, brush and flattening the mound at the end of Runway
  - Improving the runway safety area, repositioning runway about 100 feet to the East (safety area on the W end is not big enough)
  - Add drainage and replace lights

In addition, a new security fence will also be constructed. This will likely be a chain link fence to prevent wildlife and other intruders from entering the runway.

Each of these improvements has been approved by VTrans and is included in the Fiscal Year 2005-2009 Capital Improvement Program. The estimated costs for the improvements are $4,445,000.

VTrans is currently working with the FAA to determine if an Environmental Assessment (EA) is required for the minor runway position change associated with the Short Term improvements.

Medium Term 2009-2014

In the medium terms, i.e. approximately within the next five to ten years, improvements to the airport will include:

- Construction of a runway turn around; and
- Expanding the aircraft parking system.

There are no cost estimates for these improvements at this time.

Proposed Alternatives

Assuming the base case, the following preliminary alternatives are under consideration as air transportation improvements for Bennington County. These alternatives will be defined in more detail in subsequent analyses.

Alternative 1. A runway extension of between 4,000 and 4,200 feet that can be developed within the existing airport property;

Alternative 2. A runway extension to approximately 5,000 feet as discussed in previous studies and articulated by airport planners and professionals as the preferred length; and

Alternative 3. Improve surface transportation connections and access to regional airports and increased collaboration with other regional aviation facilities, such as Rutland State Airport. This alternative may include transportation access improvements at Rutland State Airport and/or shuttle services to Albany and/or Bradley (Hartford) International Airports.

5.0 INPUT FROM THE PUBLIC

Two public meetings were held to meeting to present and discuss the on-going Benefit Cost Analysis being prepared for the WH Morse State Airport. Both meetings were held at the Career Development Center at the Mount Anthony Union High School in Bennington. The first meeting was held on July 14 with the purpose of the meeting to further define and refine alternatives under consideration by the Study and to develop a list of benefits and costs to be considered in the analysis. The second meeting was on September 22; this meeting was used to present and discuss report findings.

Overview of July 14 Meeting - Development of Alternatives

After a brief introduction from the BCRC and WSA, participants at the public meeting were divided into smaller groups to discuss ideas for air transportation improvements. Most groups developed several ideas, which have been condensed into eight potential alternatives. The alternatives suggested in the public hearing are shown together with associated next steps developed in **Table 5.1**.

Table 5.1 Ideas Resulting from Public Hearing

Ideas proposed by Community	Response/Next steps
Move the airport to different location	*Not considered to be a feasible alternative at this time.*
Change alignment/direction of runway	*Can be explored if future study is undertaken, initial reaction is that it may not be feasible given prevailing winds and topography.*
Expand runway both directions within airport boundaries	*Can be explored if future study takes place, initial reaction is may not be financially feasible given prevailing winds and topography*
Increase connections to regional airports including Albany and Bradley (Hartford); connections may include shuttle for people and goods	*Incorporated into Alternative 3*
Widen runway	*Aircraft landing and take-off requirements are primarily determined by runway length not width; a wider runway, therefore, would not significantly increase WH Morse Airport to cater to aircraft trends.*
Other general aviation improvements, such as additional hangar space & maintaining/paving the cross-strip runway	*Would like be considered as part of master planning activity; would not increase airport operation capabilities.*
Improvements to Rutland State Airport	*Incorporated into Alternative 3*
Improve airside transition	*Incorporated into Alternative 3*

Benefits and Costs

After discussing potential air transportation improvements, attendees at the public hearing reconvened to comment on potential benefits and costs associated with improvements at the airport. Rather than brainstorm as small groups, the community opted to remain as one large group and share their concerns with the larger audience. This exercise was also used to create a preliminary list of benefits and costs (or impacts) associated with additional development at the airport.

Potential costs (negative impacts) associated with runway expansion:
Members of the community who attended the public meeting brainstormed the following list of potential costs or negative impacts that may be associated with runway expansion:

- Quality of life impacts
  - Noise, negative impact on property values, increased planes and lower flight paths
  - Decreases in property values will reduce municipal budgets
- Noise abatement policy already – there is already a noise abatement policy suggesting that noise is already a problem
- The community cannot control the airport's hours of operation, therefore lose control over their community
- Visual impacts
- Impacts to wildlife - loss of habitat
- Impact on nearby wetlands
- Impact on Walloomsac Road, including transportation and recreation uses
- Opportunity cost of capital/resources needed to develop airport
- Lack of demonstrated need for airport
- Question the reliability of benefits forecasts
- Traffic impacts associated with increased use of the airport, including and especially truck traffic
- Negative impact on Rutland Airport in terms of loss of patronage
- Obstruction removal requirements associated with flight path (removal of trees)
- Potential to displace existing recreational users of the airport

List of potential benefits (positive impacts) associated with runway expansion:
The community members at the public meeting also brainstormed a list of potential benefits or positive impacts that may be associated with runway expansion:

- Economic development for the community
- Support future developments in the air transportation sector
- Safety improvements

Other recommendations/considerations:
Individuals at the July 14 public meeting also suggested the following recommendations and considerations for the benefit cost analysis:

- Clear identification of who receives benefits and who pays costs
- Prepare high/medium/low scenarios to reflect uncertainty in demand forecasts
- Consider if there is a better way to spend the money
- Evaluate requirements of new generation of planes
- Consider the recent Williamstown airport case

Overview of September 22 Meeting – Presentation of Findings

The second public meeting was organized in a traditional town meeting format. It was well attended with an estimated 75 people. BCRC opened the meeting with a brief introduction followed by members from the WSA team, who presented an overview of study findings. After the presentations, the floor was open to public comment.

The public comment period included nearly two hours of comments, questions and dialogue between members of the community opposing airport development and those in support of it. The main concerns voice by those against expansion of the airport, related to increased noise, depreciation of property values and loss of community character. Individuals and organizations in support of additional airport development cited the potential to support on-going economic development activities and to increase economic opportunities for the wider community.

During the meeting, WSA was asked several questions about the report and its content. In addition, written questions were submitted to the BCRC after the meeting. These questions and the consultant team's response to the comments are attached to this report as **Appendix C**.

6.0 GENERAL AVIATION TERMS, TRENDS AND CONSIDERATIONS

Overview

General aviation (GA) includes all segments of the aviation industry except commercial air carriers and military; it includes training of new pilots, sightseeing, movement of loads by helicopter, flying for personal, business or corporate reasons, emergency and medical purposes, etc. GA aircraft range from one-seat, single-engine piston aircraft to long range corporate jets and include gliders and kit aircraft.

There are two types of general aviation operations at GA airports: local and itinerant. Local operations are typically shorter, day-trip flights, involving landing and taking-off at the same base airport. Itinerant operations, on the other hand, are those performed by aircraft with a specific origin or destination away from the airport. Itinerant operations generally will increase with business and commercial use, since business-use aircraft tends to operate at a higher frequency than personal use aircraft.

Runway length requirements for individual aircraft are based on aircraft performance models, FAA guidelines and insurance requirements. Generally-speaking, the FAA and insurance set more stringent requirements as compared with aircraft performance specifications. In particular, flights that carry passengers for hire are subjected to more operational restrictions from both the FAA and insurance industry; these restrictions are intended to protect passengers.

According to FAA regulations, airport facility design is based on the critical, or design aircraft. This is the largest and most demanding aircraft to make 500 operations per year at the facility. **Table 6.1** shows the FAA recommendations for runway length for an airport similar to WH Morse by broad aircraft category. Note that small planes referenced in this analysis will not typically include jet aircraft.

Table 6.1 FAA – Airport and Runway Length Airport Design Model

Airport and Runway Data	**Input**
Airport Elevation	827 feet
Mean daily maximum temperature of the hottest month	80.0 F.
Maximum difference in runway centerline elevation	10 feet
Length of haul for airplanes of more than 60,000 pounds	500 miles
Recommended Primary Runway Length	
Small planes with less than 10 passengers	
75 percent of these small airplanes	2,680 feet
95 percent of these small airplanes	3,200 feet
100 percent of these small airplanes	3,810 feet
Small planes with 10 or more passengers	4,250 feet
Large airplanes of 60,000 pounds or less	
75 percent of these large airplanes at 60 percent useful load	4,700 feet
75 percent of these large airplanes at 90 percent useful load	6,120 feet
100 percent of these large airplanes at 60 percent useful load	5,290 feet
100 percent of these large airplanes at 90 percent useful load	7,820 feet

Source: Chapter 2 of AC 150/5325-4A, Runway Length Requirements for Airport Design
Note: Small planes are typically single and multi-engine piston but not jet aircraft; Turbo prop aircraft: 6,000 lbs or less are considered light turbo aircraft; more than 6,000 to 12,000 lbs considered medium turbo aircraft; Greater than 12,000 lbs are heavy turboprop aircraft

General Aviation and Local Conditions

Locally, the key factors affecting GA are the general economy, airport location and population, surrounding airports and regional surface transportation and traffic. Aircraft based at the facility is also an important determinant of GA airport feasibility.

Many airport planners believe a GA airport catchment area will typically encompass about 30 miles/30 minute radius – on the longer end for personal use aircraft (30 miles) and shorter end for business travel (30 minutes).

Trends in GA

From a national perspective, GA usage and aircraft sales experienced a difficult period in the early to mid 1990s, as well as from 2001 to 2003. The downturn in GA flights and sales is primarily blamed on poor economic conditions together with rising aviation fuel prices and reduced demand for aviation services in general, especially in the high-end market for business/corporate jets.

The market for general aviation has staged a relatively strong recovery in 2004, primarily based on strong economic growth and accelerated depreciation allowances for operators of new aircraft. This recovery is measured in terms of operations and aircraft sales. Current national trends suggest that business use of general aviation is increasing faster than personal use aviation. Data from the National Business Aircraft Association (NBAA) shows that many of the top U.S businesses use general aviation aircraft. The NBAA's Business Aviation Fact Books indicates that approximately 70 percent of all businesses included in the Fortune 500 operate general aviation aircraft.

Likewise, the use of more expensive and sophisticated jet aircraft is growing faster than piston aircraft categories. Recent trends in GA aircraft and usage, as prepared by the FAA, are shown in **Table 6.2** (active aircraft) and **Table 6.3** (hours flown). These tables show the importance of piston aircraft in the existing fleet but also indicate an emerging trend towards jet aircraft.

Table 6.2 General Aviation Active Aircraft by Aircraft Type (in thousands)

Aircraft/Engine Type	1998	1999	2000	2001	2002	2003
Piston	164.0	171.9	170.5	163.1	161.1	161.1
Turboprop	6.5	5.7	5.8	6.7	6.8	7.2
Turbojet	6.2	7.1	7.0	7.9	8.4	9.2
Rotorcraft	7.3	7.4	7.2	6.5	6.6	6.8
Other	5.0	6.8	6.7	6.7	6.4	6.2
Experimental	16.3	20.5	20.4	20.3	21.9	20.6
Total All Aircraft	**205.7**	**219.5**	**217.5**	**211.4**	**211.2**	**210.6**

Source: 1998-2003 General Aviation Activity and Avionics Surveys, FAA

Table 6.3 General Aviation Hours Flown by Aircraft Type (in thousands)

Aircraft/Engine Type	1998	1999	2000	2001	2002	2003
Piston	20,402	22,529	21,493	19,194	18,891	18,791
Turboprop	1,765	1,797	1,986	1,773	1,850	1,787
Turbojet	2,226	2,721	2,648	2,654	2,745	2,709
Rotorcraft	2,342	2,630	2,191	1,953	1,876	2,192
Other	295	309	362	287	333	275
Experimental	1,071	1,246	1,280	1,157	1,345	1,296
Total All Aircraft	**28,100**	**31,231**	**29,960**	**27,017**	**27,040**	**27,050**

Source: 1998-2003 General Aviation Activity and Avionics Surveys, FAA

Market Trends

Fraction Ownership

Fractional ownership of aircraft refers to shared ownership, usually by corporations or businesses and operates similar to a condominium time share, whereby corporations or individuals purchase a certain number of aircraft hours. Use of fractional aircraft has increased significantly in recent years. In 2004, 4,765 individuals and companies in U.S. owned a fractional share of an airplane, an increase of 5.4 percent over the previous year and 65.6 percent since 2000. In addition, fractional flights are up 5.5 percent and hours flown are up 14.6 percent as compared with 2000.

Fractional ownership provides corporations travel time savings and convenience associated with personal aircraft but with lower startup costs. Accordingly, market analyses suggest fractional users are typically individuals and corporations moving from commercial air services to general aviation; research suggests many will become aircraft owners.

Fractional service started in earnest about 15 years ago, during which time it was governed under Federal Aviation Regulation (FAR) Part 91 which governs general aviation. As of

October 2004, however, fractional ownership aircraft operates under FAR Part 91 (K). This legislation sets more stringent requirements for fractional aviation; among the important new regulations include considerably more strict requirements for runway lengths.

Jet Aircraft

The fastest growing segment of GA fleet is jet aircraft, indicating importance of business utilization. Indeed, travel by jet aircraft has grown considerably in the past few years with the use of jet aircraft outpacing traditional piston engine aircrafts for GA services for the past couple of years. Underlying reasons for the trend are likely to be increased speed, comfort and perceived safety associated with jet airplane travel. In addition the price differential between jet and piston aircraft has narrowed considerably in the past few years.

Jet aircraft are typically categorized into light or small, medium and large jets, based on weight. The WH Morse Airport already has a limited number of light jet aircraft using the facility.

Micro or Very Light Jets

An emerging trend in GA aircraft is micro or very light jets. These aircraft are based on a combination of new jet engine technology, which uses sophisticated avionics equipment. Micro jets typically hold between 4 to 6 passengers and can be used for trips of about 500 miles or less. To date there are varying opinions about the future potential for this market of aircraft.

FAA General Aviation Forecasts

The FAA prepared 13-year forecasts for GA usage for the period between 2004 and 2016. Generally speaking, aviation forecasts believe that general aviation industry activity lags US economy by about one year. Accordingly, low to moderate growth was forecast (and achieved) in 2004 and 2005, with stronger growth expected in 2006.

Overall, the general aviation segment of the industry is expected to experience moderate annual growth (0.9% to 1.5%) during the next 13 years and within the 3 to 5 year period, is projected to reach and sustain activity levels experienced prior to the mid-1980s general aviation decline. It is important to note, however, that these forecasts were prepared assuming lower fuel prices. If and when the price of fuel stabilizes, the short and longer term impact of fuel prices on GA activity can be estimated with more confidence.

7.0 DEMAND FORECASTS

Understanding and estimating future usage of the WH Morse State Airport for each of the proposed alternatives is essential to determining associated benefits and costs. WSA, therefore, prepared indicative forecasts for the number and type of aircraft likely to be based at WH Morse as well as future aircraft operations (i.e. the number of take-offs and landings). ***These forecasts are intended as indications of future airport use and were prepared only to be used in support of this benefit cost analysis.***

Forecasts for Based Aircraft

WSA first prepared estimates of the number and type of aircraft that would likely be based at WH Morse State Airport and subsequently estimated the number of aircraft operations for the same period and under consistent assumptions. WSA prepared estimates of the future number and type of aircraft based at WH Morse using the following information:

- Existing fleet size and composition;
- Anticipated trends in GA and GA aircraft;
- Discussions with AirNow; and
- Forecasts based on aircraft at other similar airports including Rutland State Airport (VT), Saratoga County Airport (NY) and Lebanon Municipal Airport (NH).

Recognizing the challenge associated with forecasting future conditions, WSA prepared low, medium and high scenarios for each alternative. These scenarios are intended to reflect uncertainty associated with events that will influence future conditions, such as fuel prices, national growth trends, and local economic conditions.

WSA estimates for based aircraft are shown in **Tables 7.1 – 7.3**. These tables show total based aircraft, an estimate of fleet mix and the underlying growth associated with each set of forecasts. **Table 7.1** presents the estimated future fleet size and mix of based aircraft at WH Morse, **Table 7.2** represents estimates for Alternative 1 and **Table 7.3** represents forecasts for Alternative 2. Alternative 3 is not presented separately as there are assumed to be no changes in based aircraft resulting from Alternative 3 (regional collaboration and coordination) as compared with the Base Case.

Table 7.1 Forecast Based Aircraft for Base Case

	2005	2015		
	Actual	**Low**	**Medium**	**High**
Total Based Aircraft	41	43	46	48
Piston - single engine	28	30	32	33
Piston – multi engine	2	2	3	3
Turbo Prop	7	7	7	8
Light Jet	0	0	0	0
Other (ultra light, helicopter, etc.)	4	4	4	4
Total Growth (10-year period)		4.9%	12.2%	17.2%
Average annual growth rate		0.5%	1.2%	1.7%

Source: WSA

Table 7.2 Forecast Based Aircraft for Alternative 1: Runway Length = 4,100'

	2005	2015		
	Actual	**Low**	**Medium**	**High**
Total Based Aircraft	41	45	47	51
Piston - single engine	28	32	33	33
Piston – multi engine	2	2	3	4
Turbo Prop	7	7	7	8
Light Jet	0	0	0	2
Other (ultra light, helicopter, etc.)	4	4	4	4
Total Growth (10-year period)		9.8%	14.6%	24.4%
Average annual growth rate		1.0%	1.5%	2.4%

Source: WSA

Table 7.3 Forecast Based Aircraft for Alternative 2: Runway Length = 5,000'

	2005	2015		
	Actual	**Low**	**Medium**	**High**
Total Based Aircraft	41	46	49	53
Piston - single engine	28	32	32	34
Piston – multi engine	2	2	4	4
Turbo Prop	7	7	7	8
Light Jet	0	1	2	3
Other (ultra light, helicopter, etc.)	4	4	4	4
Total Growth (10-year period)		4.9%	19.5%	29.3%
Average annual growth rate		0.5%	2.0%	2.9%

Source: WSA

Aircraft Operations

Building on estimates of the future number and type of aircraft based at WH Morse Airport, WSA also prepared forecasts for estimates for the number of aircraft operations. Similarly, with the case of based aircraft, these forecasts include low, medium and high case scenarios. WSA estimates of the future number and type of aircraft operations at WH Morse are based on the following information:

- Existing and forecast fleet size and composition;
- Anticipated trends in GA and GA aircraft;
- Forecasts for similar sized airports in the region; and
- Forecasts for similar sized airports with similar community characteristics in Virginia.

The relevant forecast data from regional and comparable airports in Virginia are attached with this document as **Appendix D**. The estimates for future aircraft operations are shown in **Tables 7.4 – 7.6**. These tables show future aircraft operations for Alternatives 1 and 2, together with growth rates and assumptions of based aircraft. Forecast operations for Alternative 3 are assumed to be the same as for the Base Case.

Table 7.4 Forecast Aircraft Operations for Base Case

	2005	2015		
	Actual	Low	Medium	High
Current Operations	14,000	16,000	17,000	21,000
Local	50%	8,000	8,500	10,500
Transient/Itinerant	50%	8,000	8,500	10,500
Total Growth (10-year period)		15.0%	23.5%	49.5%
Average annual growth rate		1.5%	2.4%	5.0%
Total Based Aircraft	41	43	46	48
Ave flights/day/based aircraft	0.56	0.51	0.51	0.51
Average flights day	38	44	47	57

Source: WSA

Table 7.5 Forecast Aircraft Operations for Alternative 1: Runway Length = 4,100'

	2005	2015		
	Actual	Low	Medium	High
Current Operations	14,000	17,000	19,000	23,000
Local	50%	8,500	9,000	11,600
Transient/Itinerant	50%	8,500	9,000	11,600
Total Growth (10-year period)		20.0%	33.0%	65.6%
Average annual growth rate		2.0%	3.3%	6.6%
Total Based Aircraft	41	45	47	51
Ave flights/day/based aircraft	0.56	0.51	0.54	0.62
Average flights day	38	46	52	64

Source: WSA

Table 7.6 Forecast Aircraft Operations for Alternative 2: Runway Length = 5,000'

	2005	2015		
	Actual	Low	Medium	High
Current Operations	14,000	18,000	19,600	25,000
Local	50%	7,000	8,000	10,000
Transient/Itinerant	50%	11,000	11,760	15,000
Total Growth (10-year period)		25.0%	40.0%	80.0%
Average annual growth rate		2.5%	4.0%	8.0%
Total Based Aircraft	41	46	49	53
Ave flights/day/based aircraft	0.56	0.42	0.44	0.52
Average flights day	38	48	54	69

Source: WSA

Comparison of Previous Forecasts with Actual Experience

Recognizing that forecasting future use of transportation facilities is a challenging exercise, WSA compared previously prepared forecasts with actual experience to broadly ascertain the level of confidence in forecast data. This comparison focused on two regional airports, Rutland State Airport and Saratoga County Airport. Accordingly, WSA reviewed forecasts prepared in previous master plan studies with more recent planning studies and compared with actual activity levels.

Table 7.7 compares forecasts for based aircraft made in conjunction with three studies for the Rutland State Airport: the 1989 Master Plan Update, the 2001 Master Plan and the on-going 2004 Runway Safety Area Study. This table reveals significant differences between forecasts made in 1989 for 1997 and the actual number of aircraft based at Rutland in 1997. Greater than realized forecasts may be the result of an unanticipated economic downturn experienced in the early 1990s.

Table 7.7 Forecasts for Based Aircraft at Rutland State Airport

Forecast Document	**1997**	**2004**	**2010**	**2015**	**Forecast Annual Growth Rates (%)**
1989 Master Plan Update	*78*	*94*			7.6%
2001 Master Plan	**43**	*46*	*52*	*57*	2.0%
2004 Recommended		**44**	*48*	*53*	2+%

Notes: Italics represent forecast data. Bold (but no italics) is actual experience.
Source: 1989 Master Plan; 2001 Master Plan Update: Runway Safety Area Study

Table 7.8 compares forecasts for based aircraft and annual aircraft operations made as part of the 2003 Saratoga County Airport Master Plan. As shown, the actual number of based aircraft is nearly consistent with forecasts. Forecasts for airport operations, however, are less accurate and approximately 22 percent greater than actually experienced.

Table 7.8 Saratoga County Airport Master Plan

	1999	**2005**	**2010**
Based Aircraft			
Master Plan Update	**58**	*66*	*76*
Published airport data		**69**	
Airport Operations			
Master Plan Update		*47,050*	
Published airport data		**38,500**	

Notes: Italics represent forecast data. Bold (but no italics) is actual experience.
Source: 1989 Master Plan; 2001 Master Plan Update: Runway Safety Area Study/WSA

Review of this information suggests that forecasting based aircraft and future use of a GA airport has liabilities. The WSA approach, as recommended in the public hearing and supported by the Airport Committee, to develop a series of low, medium and high forecasts should help account for likely variations between anticipated activity levels and those realized at the airport.

8.0 BENEFIT COST ANALYSIS

Introduction

The BCRC, the Airport Committee and WSA identified three potential alternatives for improvements to air transportation in Bennington County. Each of these alternatives is presented in the following section and evaluated for their relative benefits and costs to the local and regional community. Alternatives are evaluated in terms of their ability to generate benefits and costs beyond the base case. The evaluation process is based on a combination of technical evaluation, professional judgment and review by the Airport Committee. In cases where rankings are based on background information or assumptions, this information is shown included in the appendices.

Benefits/Advantages

For purposes of this Study, the following benefits were considered:

- **Safety** – the likelihood and scale of additional safety improvements at the airport;
- **Economic Impact** – the likelihood and scale of additional economic benefits;
- **Economic Development** – the likelihood and scale of potential improvements to economic development resources and opportunities; and
- **Travel Time Savings** – the likelihood and scale of travel time savings.

Costs/Impacts/Advantages

For purposes of this Study, the following costs were considered:

- **Construction Costs** – order of magnitude development/construction costs;
- **Environmental/Natural**– the likelihood and scale of negative impacts to the environment and natural landscape;
- **Traffic**– the likelihood and scale of vehicular traffic impacts;
- **Noise** – the likelihood and scale of noise impact; and
- **Property Values** – the likelihood and scale of changes in property values.

Other Impacts and Considerations

In addition to the above mentioned benefits and costs, potential impacts on the following aspects of life in Bennington were also considered and discussed:

- **Tourism;**
- **Impact on Rutland Airport;**
- **Walloomsac Road;**
- **Quality of Life/Community Character; and**
- **Opportunity Cost of Investment.**

Background –Runway Length and Airport Development

An airport runway length is the key determinant of the type and size of aircraft that can use an airport as well as the conditions under which they can operate. Runway length, for example, determines acceptable weather conditions for take-off and landing, permissible

loads for fuel and/or the number of passengers carried. Accordingly, a longer runway means more aircraft can use the facility and operate under a wider variety of conditions. **Figure 8.1** shows aircraft landing requirements for a fleet of aircraft that includes aircraft currently based at the WH Morse State Airport and commonly flown turboprop, light jet and medium jet aircraft.

Runway length requirements for individual aircraft are set and regulated through three primary sources; aircraft manufacturers, the FAA, and insurance requirements. Aircraft manufacturers set performance standards, including recommended landing and take-off runway lengths based on their operational testing and experience. These landing and take-off specifications will typically include specifications under different operating conditions such as aircraft load and weather.

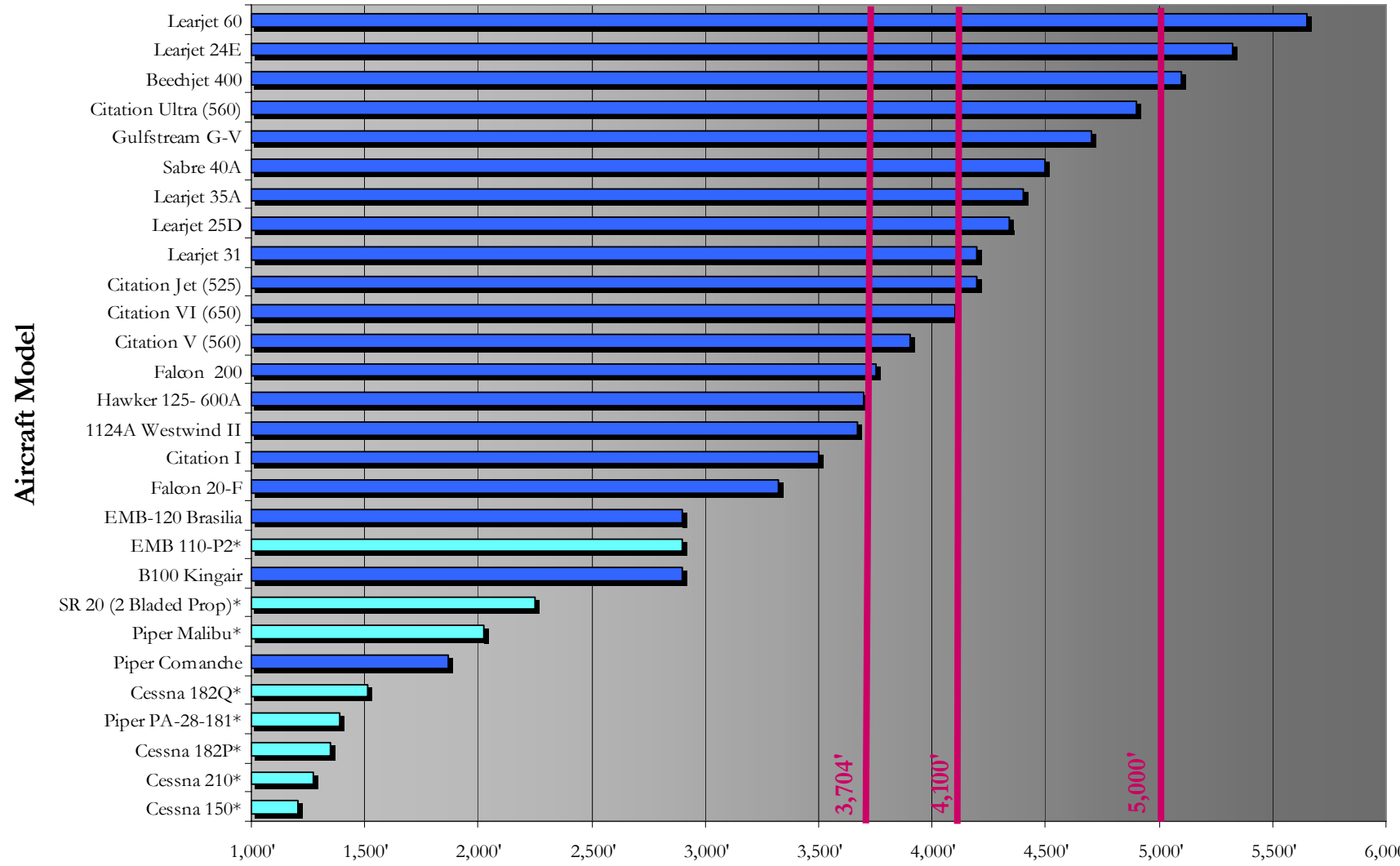
The FAA also sets landing and take-off runway requirements that take into account aircraft performance records, manufacturer recommendations and type of operations. As part of passenger protection regulations, the FAA sets more stringent requirements for aircraft carrying passengers, and increased requirements for aircraft carrying passengers for hire (i.e. commercial, charter and fractional flights). Insurance requirements also set standards by aircraft for runway lengths and similar to the FAA, are typically more stringent for aircraft carrying passengers for hire.

For planning purposes, the FAA will support runway extensions in two cases: to alleviate capacity constraints and/or to meet requirements of the most demanding aircraft making at least 500 annual operations at the facility, i.e. the design aircraft. Industry rule of thumb suggests the majority of general aviation airports have capacity for approximately 230,000 annual operations. With current operations on the order of 14,000 annual operations, WH Morse does not currently nor will it likely face capacity concerns in the short or medium term.

Setting airport facility requirements such as runway lengths according to a design aircraft (i.e. largest and most demanding aircraft making at least 500 annual operations), however, also creates planning challenges. WH Morse State Airport is an un-towered airport; consequently, there is no air traffic control tower. This limits the data on operations, passengers and types of aircraft using the airport. Identifying the design aircraft, therefore, is challenging. In addition, planning for a design aircraft based on existing airport design can limit planning for trends or anticipated levels or types of activity.

In addition to being a key determinant of an airport's physical size, an increase in runway length and an associated larger design aircraft, will also require an airport to increase runway safety areas and flight paths/navigable airspace. Increases in either of these requirements will likely increase impacts on the local environment and landscape.

- **Runway Safety Areas (RSA)** - WH Morse currently has an Airport Reference Code (ARC) of B-II, an FAA category system representing the operational and physical characteristics of an aircraft using or intending to use a given airport. B-II aircraft have wingspans of less than 79 feet. Accordingly, the WH Morse ARC is 150 feet wide centered on the runway and extending to 300 feet beyond each end of



Legend

- Aircraft Model Landing Requirements
- Aircraft Model Landing Requirements for Aircrafts Using Current Runway

Assumptions:

1. Aircraft manufacturers' data
2. Standard day conditions
3. 60-80 percent maximum load

Source: RisingUp Aircraft/Private Jet Service Group/WSA

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 8.1:
Aircraft Landing Requirements by Runway Length

WH Morse State Airport Benefit Cost Analysis

the runway. A longer runway may or may not change WH Morse's ARC and subsequently result in requirements for both a wider and longer runway safety area.

- **Obstructions to flight paths/navigable airspace** – Navigable airspace refers to the space required by pilots during take off and landing. This airspace is regulated by the FAA to ensure safety. According to FAR Part 77, an obstruction to navigable airspace is defined as a constructed or natural object, including a mobile object that is greater than allowable heights and penetrates protected airspace surfaces. In accordance with these regulations, obstructions to navigable airspace should be removed, or if removal is not practical, to identify via hazard beacons, in order to maintain safe operating conditions. Clearing obstructions can involve cutting trees, removing structures and/or lowering hills.

Overview of Alternatives

Base Case

Alternative:	Base Case
Physical Description:	No major changes to airport or runway. Short-term enhancements include runway reconstruction, safety area and navigation improvements. Medium term improvements include adding taxiway and expanded parking apron.
Estimated Cost:	$4.5 million
Ultimate Runway Length:	3,704'

Base Case and Forecast Airport Operations and Based Aircraft

	2005	2015		
		Low	Medium	High
Airport Operations				
Total Annual	14,000	16,000	17,000	21,000
Operations per average day	38	44	47	57
Based Aircraft – Fleet Mix				
Total Base Aircraft	41	43	46	48

Source: Vermont Agency of Transportation/AirNow/WSA

Benefits/Advantages of Base Case:

- Permits slow but steady growth in airport traffic and based aircraft
- Airport remains a viable component of community infrastructure
- Provides reasonable access for piston-engine, turbo prop and some light jet aircraft
- No additional disruption to community in terms of land use or consumption
- Minimal additional disruption in terms of noise, environmental and property value impacts
- Provides most general aviation benefits – emergency service health care, public safety, disaster and emergency response, community purpose

Costs/Disadvantages of Base Case:

- Limits ability to cater to anticipated trends in aircraft and general aviation air travel, especially with corporate jets and fractional jet operations
- May restrict some local and regional corporate/business activity
- Limits financial feasibility of fixed based operator (FBO)

Alternative 1: Abbreviated Runway Extension

Alternative:	Abbreviated Runway Extension
Physical Description:	Runway extension to 4,000' – 4,200' Improvement listed in base case
Estimated Cost:	$to be determined
Ultimate Runway Length:	4,000'

Forecast Airport Operations and Based Aircraft

	2005	2015		
		Low	Medium	High
Airport Operations –associated with Alternative 2				
Total Annual Operations	14,000	17,000	19,000	23,000
Operations per average day	38	46	51	64
Airport Operations – change from Base Case				
Total Annual Operations	14,000	700	1,330	2,250
Operations per average day	38	2	4	6
Based Aircraft –associated with Alternative 2				
Total Based Aircraft	41	45	47	51
Based Aircraft –change from Base Case				
Total Based Aircraft	41	2	1	3
Changes in fleet mix		+2 *piston engine aircraft*	+1 *piston engine aircraft*	*+1 turbo prop; +2 light jets*

Source: Vermont Agency of Transportation/AirNow/WSA

Benefits/Advantages of Alternative 1:

- Permits slow but steady growth in airport traffic and based aircraft
- Airport remains a viable component of community infrastructure
- Provides reasonable access for piston-engine, turbo prop and some light jet aircraft
- Runway improvements remain within existing airport property
- Minimal additional disruption to community in terms of land use or consumption
- Minimal additional disruption in terms of noise, environmental and property value impacts
- Provides most general aviation benefits – emergency service health care, public safety, disaster and emergency response, community purpose

Costs/Disadvantages of Alternative 1:

- Limits ability to cater to anticipated trends in aircraft and general aviation air travel, especially with corporate jets and fractional jet operations
- May restrict some corporate/business activity

Alternative 2: Runway extension to 5,000'

Alternative:	Runway extension to 5,000'
Physical Description:	Runway extension to 5,000' Improvements listed in base case
Estimated Cost:	$to be determined
Ultimate Runway Length:	5,000'

Forecast Airport Operations and Based Aircraft

	2005	2015		
		Low	Medium	High
Airport Operations –associated with Alternative 3				
Total Annual Operations	14,000	18,000	20,000	25,000
Operations per average day	38	48	54	69
Airport Operations – change from Base Case				
Total Annual Operations	14,000	1400	2310	4270
Operations per average day	38	4	6	12
Based Aircraft –associated with Alternative 3				
Total Based Aircraft	41	46	49	52
Based Aircraft –change from Base Case				
Total Based Aircraft	41	3	3	4
Changes in fleet mix		+2 single engine; +1 light jet	+1 multi engine; +2 light jet	+1 single engine; +1 multi engine; +2 light jet

Source: Vermont Agency of Transportation/AirNow/WSA

Benefits/Advantages of Alternative 2:

- Permits growth in airport traffic and based aircraft
- Airport expands as a viable component of community infrastructure
- Provides access for piston-engine, turbo prop and most light jet aircraft
- Enables airport to cater to anticipated trends in aircraft and general aviation, including corporate jets and some fractional jet operations
- Encourages economic development and corporate jet traffic
- Provides most general aviation benefits – emergency service health care, public safety, disaster and emergency response, community purpose

Costs/Disadvantages of Alternative 2:

- Airport will expand beyond airport boundaries
- Will likely result in relocation or diversion of Walloomsac Road
- Changes land use in area surrounding airport boundaries
- Negative environmental and community impacts resulting from construction of impervious surfaces, increased noise and changes to community character

Alternative 3: Coordination and collaboration of Regional Aviation Resources

Alternative:	Coordination and collaboration
Physical Description:	Increased investment at Rutland State Airport Improved surface connections between Bennington, Rutland, Albany and Hartford, involves road works with potential for regularly scheduled shuttle service No addition changes to airport beyond Base Case
Estimated Cost:	$10m (over 10 years)
Ultimate Runway Length:	3,704'

Base Case and Forecast Airport Operations and Based Aircraft

	2005	2015		
		Low	Medium	High
Airport Operations				
Total Annual	14,000	16,000	17,000	21,000
Operations per average day	38	44	47	57
Based Aircraft – Fleet Mix				
Total Base Aircraft	41	43	46	48

Source: Vermont Agency of Transportation/AirNow/WSA

Benefits/Advantages of Alternative 3:

- Permits slow but steady growth in airport traffic and based aircraft
- Airport remains a viable component of community infrastructure
- Provides reasonable access for piston-engine and turbo prop aircraft
- Minimal additional disruption to community in terms of noise, land use, land consumption, environmental or property impacts
- Provides many general aviation benefits – emergency service health care, public safety, disaster and emergency response, community purpose

Costs/Disadvantages of Alternative 3:

- May be difficult for Bennington to influence investment decisions at and around Rutland State Airport
- Surface connection improvements generate additional impacts and costs
- Funding on-going transportation services is challenging
- Limits ability to cater to anticipated trends in aircraft and general aviation air travel, especially with corporate jets and fractional jet operations
- May restrict some corporate/business activity
- Limits financial feasibility of fixed based operator (FBO)

Benefits

Safety

Improving safety for pilots and people on the ground is an important consideration in any airport project. Generally speaking, general aviation is a safe activity. Accident rates and fatalities have been decreasing steadily for more than twenty years. According to the National Transportation Safety Board (NTSB), in 1985 there were 9.63 recorded accidents and 1.74 fatalities per 100,000 flight hours. These rates have decreased to 6.22 recorded accidents and 1.2 fatalities per 100,000 flight hours in 2004. Despite impressive statistics, the FAA, together with all levels of the aviation industry, continues to work towards decreasing aviation related accidents and fatalities.

According to recent statistics published by the Aircraft Owners and Pilots Association (AOPA), the majority of all accidents occur for one of the following four reasons:

- Descent and landing (including taxi to parking) (36 percent);
- Take-off and taxi to take-off position (18 percent);
- Mechanical problems (15 percent); and
- Fuel mismanagement (10 percent)

According to this data, slightly more than half (54 percent) of all general aviation accidents occur during landing and take-off operations. Runway improvements that make the airport safer during these critical flight stages, therefore, have the greatest potential to realize safety improvements and benefits.

In the five year period between July 1, 2000 and July 1, 2005, there has been one reported accident at WH Morse State Airport. This accident took place on March 31, 2002 while a novice pilot attempted to land his aircraft. The probable cause for the accident, as determined by the NTSB, was the pilot's failure to maintain directional control while landing. The crosswind was also listed as a factor in the accident.

In addition, there have been reports of aircraft hitting flying geese while trying to land and take-off from WH Morse Airport. Such incidents are typically not categorized as accidents by the NTSB.

There are currently several short term improvements projects included in the base case that will improve safety at WH Morse. These include new navigational systems, removal of obstructions and improving the runway safety areas. In addition, in the medium term scheduled improvements include building a parallel, separated taxiway so that aircraft do not have to back-taxi to enter or exit the runway. This project will improve landing and take-off safety at the airport by providing separated access/egress routes for aircraft taxing to a landing or take-off position.

Extending the runway length would also likely increase safety during the most dangerous flight stages by providing additional space for a pilot during landing and take-off, thereby increasing operator margin of error. A longer runway may also support a greater variety of flight paths, both during landing and take-off, giving pilots more choices for adapting to

changes in weather conditions. Safety benefits would accrue to aircraft already permitted to use the facility increasing landing and take-off safety margins for these aircraft. Larger aircraft would also benefit, in proportion to the difference between their landing and takeoff requirements and the runway length. **Table 8.1** provides an assessment of the relative safety benefits by alternative.

Table 8.1: Potential for Safety Improvements (over Base Case)

	Alternative 1 (Runway to 4,000')	**Alternative 2 (Runway to 5,000')**	**Alternative 3 (Coordination & Collaboration**
Potential for Safety Improvements			
Existing Users	High	High	None
Potential Users	Medium	Medium	None

Source: WSA

Economic Impact

Economic impact refers to economic value added to the local economy and essentially is the change in gross domestic product (GDP) in the local economy that occurs with or without development at the airport. Economic impact is comprised of:

- ***Direct impacts*** are economic activity or spending associated with the airport such as wages for airport employees, freight shipments, and spending by pilots and passengers at the airport (i.e., purchase of jet fuel, etc.);

- ***Indirect impacts*** are "second round" expenditures made by businesses and employees involved in supplying commodities or services (i.e., telephone services, tool suppliers, etc.) to front line business at the airport; and

- ***Induced impacts*** are additional impacts generated by spending of wages and salaries made by employees directly or indirectly touched by the initial spending.

Sources of economic impact at the WH Morse Airport are:

- Freight shipments, management and operations;
- Spending at the airport and in the community by pilots and passengers;
- Fuel sales; and
- Repair and maintenance work at the FBO.

Other economic benefits are created through travel time savings; these benefits are addressed in a subsequent section. In addition, any building or construction activity at the airport associated with the alternative would generate short-term economic benefits for the community.

An April 2003 study sponsored by the Vermont Agency of Transportation, The Economic Impact of Vermont's Public Use Airports, estimated the total economic impact of the WH

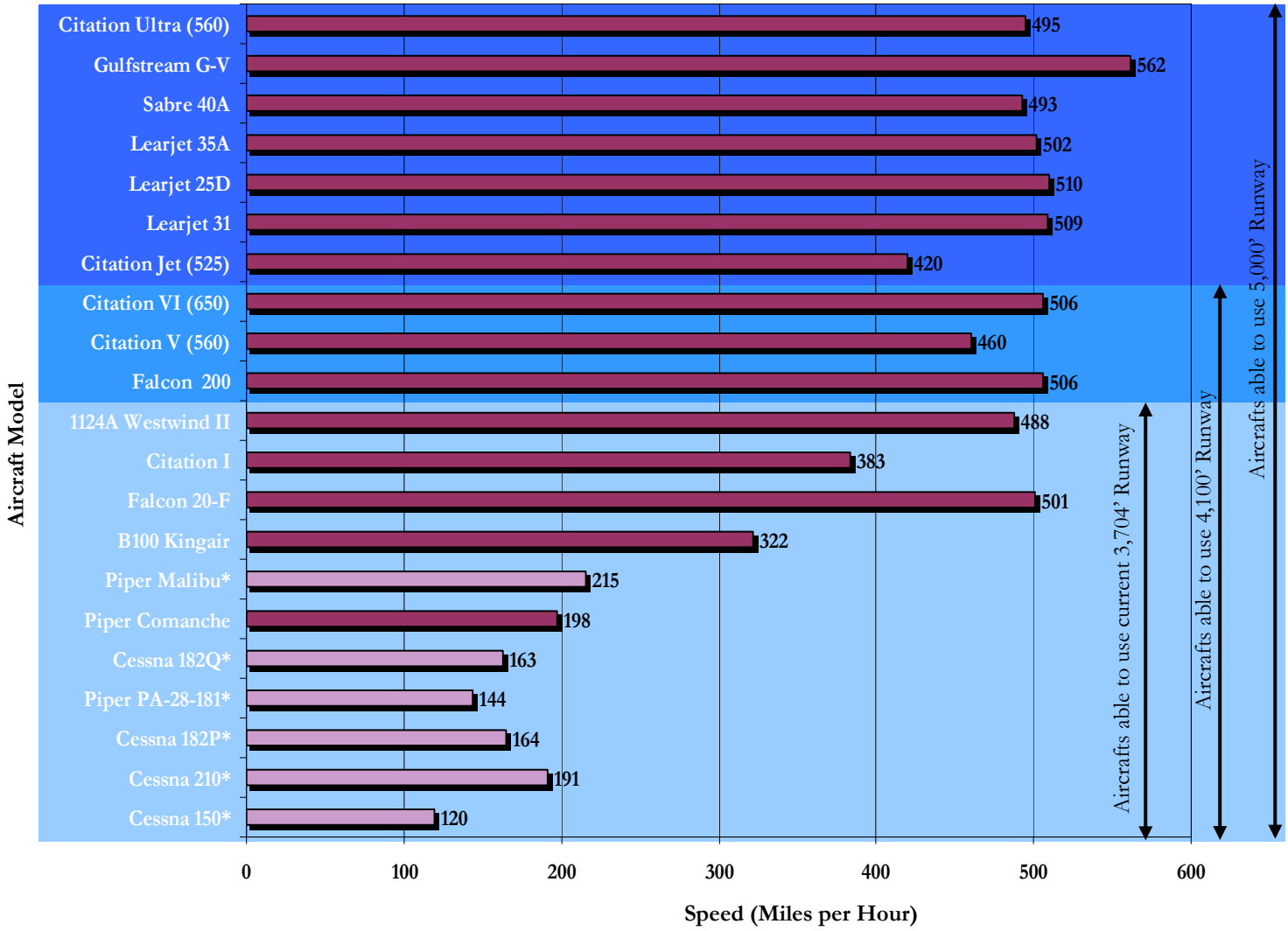
Morse State Airport at $10.4 million on the local and regional economy. According to this study, economic benefits primarily result from the airport's tenant, AirNow, which accounted for the majority (nearly 90 percent) of the airport's direct economic impact. These benefits accrue directly to the local and regional economy and include some 30 full time positions.

Other airport economic benefits are derived from the use of the airport by existing local industries and manufactures, such as NSK Steering, to ship and receive time sensitive products. The airport helps these types of local industries by increasing shipping and receiving options, reducing transportation costs associated with importing materials and exporting finished product, and enhancing accessibility to and from markets. In addition, a significantly smaller portion of the local tourism and second home economy, especially the highest–end elements of these groups will benefit from increased accessibility to the airport.

Each of the three alternatives has potential to generate increased economic activity and benefits for the community. Extending the runway to either 4,000' or 5,000' will permit a larger and more diverse aircraft fleet to use the facility, thus potentially enabling increased economic activity associated with the airport FBO operations such as fuel sales and maintenance operations. It would also increase the ability of AirNow to respond, as deemed necessary, to trends in the aviation industry. Access to a larger and more diverse fleet of aircraft can increase opportunities for time sensitive manufacturing operations and tourism based industries by expanding accessibility to existing and new markets. **Figures 8.2 and 8.3** show aircraft travel ranges and speeds according to runway length requirements.

The third alternative, which would increase coordination and collaboration among regional aviation resources, especially with the Rutland State Airport, would also likely generate economic benefits. By investing in regional aviation and increasing access to/from regional airports, many regional industries, especially less time sensitive industries, would potentially benefit. There would not, however, likely be increased economic benefits beyond the base case associated with FBO operations at WH Morse State Airport. Instead any benefits in FBO activity would accrue to the Rutland State Airport FBO.

In an attempt to broadly quantify relative economic benefits potentially associated with each of the alternatives, the consultant team created an index of potential benefits based on existing levels of economic impact and forecasts for future aircraft operations and fleet mix. Assumptions supporting the index are shown in **Appendix E**. The relative performance of each alternative associated with forecasts for low, medium and high operations is shown in **Table 8.2** (the base case has a value of 1). **Table 8.3** provides a relative ranking of potential economic benefits by alternative.



Legend

- Aircraft Model Range
- Aircraft Model Range for Aircrafts Using Current Runway

Assumptions:

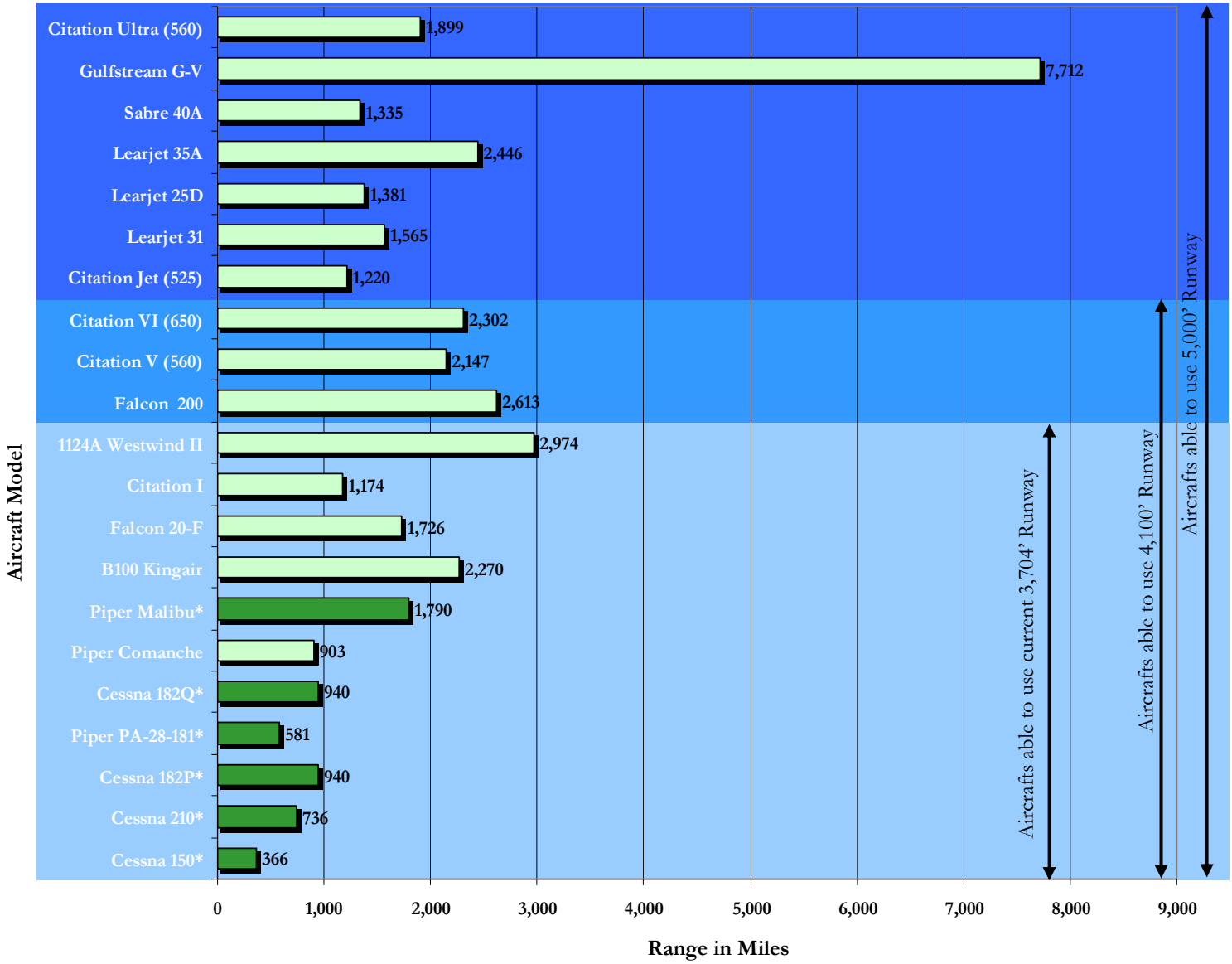
1. Aircraft manufacturers' data
2. Standard day conditions
3. 60-80 percent maximum load

Source: RisingUp Aircraft/Private Jet Service Group/WSA

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 8.2:
Aircraft Speed by Runway Length

WH Morse State Airport Benefit Cost Analysis



Legend

- Aircraft Model Range
- Aircraft Model Range for Aircrafts Using Current Runway

Assumptions:

1. Aircraft manufacturers' data
2. Standard day conditions
3. 60-80 percent maximum load

Source: RisingUp Aircraft/Private Jet Service Group/WSA

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 8.3:
Aircraft Range by Runway Length

WH Morse State Airport Benefit Cost Analysis

Table 8.2: Index of Economic Benefits over Existing Conditions

	Low	Medium	High
Base Case	1.0	1.0	1.0
Alternative 1 (Runway 4,000')	1.04	1.08	1.11
Alternative 2 (Runway 5,00')	1.09	1.13	1.20
Alternative 3 (Coordination)	1.03	1.03	1.03

Source: WSA

Table 8.3: Potential for Economic Benefits (over Base Case)

	Alternative 1 (Runway to 4,000')	Alternative 2 (Runway to 5,000')	Alternative 3 (Coordination & Collaboration
Potential for Economic Benefits	Medium	High	Low

Source: WSA

Economic Development

Transportation infrastructure is an essential component of a community's economic development portfolio and a key resource to help communities attract and retain local businesses. Indeed, economic development is important for Bennington. As reported in the US Census, the average wage in the Town of Bennington and Bennington County is lower as compared with the Vermont State average. Median family income is likewise lower than the State average and the poverty rate is higher. Income and poverty statistics for Bennington are shown in **Table 8.4**.

Table 8.4: Average Wage, Family Income and Poverty Rate Comparison

	Town of Bennington	Bennington County	State of Vermont
Average Wage (2001)	$27,219	$27,044	$30,239
Median Family Income	$40,615	$45,565	$48,625
Poverty Rate	14.6%	10.0%	9.4%

Source: Bennington Town Plan, Draft 2005

Despite sobering statistics, the local and regional economic development community in Bennington is successfully working to position itself to capitalize on emerging economic trends, including the technology and health and social services sector. Among Bennington's most important assets are an existing excellent quality of life comprised of good health services; and natural, cultural and recreational resources as well as highway, air and rail transportation infrastructure.

GA airports are considered important economic development assets because they decrease travel time for goods and people and increase accessibility. GA airports are most highly valued in cases where value of time is the highest, e.g., when highly paid employees need to travel between destinations and the most time sensitive goods move between markets. In

such cases, being able to transport personnel, materials, or finished goods more quickly creates operational efficiencies by reducing travel times and costs. GA airports provide increased connectivity to a wider range of markets and, therefore, make a region more attractive.

The ability or perception of access to such service is often as highly valued as the service itself. Accordingly, many national and international corporations view access to a GA airport as a major factor in determining where to locate executives, operations or manufacturing facilities, regardless of whether they use the service or not.

There is no empirical data directly linking economic development benefits to a community that has extended a runway at a general aviation airport. The consensus among the economic development and business community, however, is that general aviation airports have proved to be effective assets when businesses make location decisions. **Table 8.5** shows the estimated economic development benefits associated with individual alternatives.

Table 8.5: Impact of Economic Development Benefits (over Base Case)

	Alternative 1 (Runway to 4,000')	**Alternative 2 (Runway to 5,000')**	**Alternative 3 (Coordination & Collaboration**
Potential for Economic Development Benefits	Medium	High	Low

Source: WSA

Travel Time Savings

Travel time savings refer to time savings that accrue to current/existing users of the facility and are frequently used to justify transportation projects. Current users of the facility may include travelers or goods/freight. The value of travel time savings or reductions over existing travel times, involves estimating the current number of users, existing and new travel times and an estimated value of time associated with each user. Travel time savings typically accrue directly to individual travelers and/or corporations, although many economists argue that the community as a whole benefits from increased efficiency associated with overall time savings.

In the case of this project, however, limited data makes quantifying travel time savings difficult. It is likely, however, that each of the alternatives would generate travel time savings for both goods and people. Alternatives that increase the runway length would permit a larger, faster and more diverse fleet to use the airport, thereby increasing access and permitting faster flight times. In addition, longer runways would enable aircraft to travel with more fuel, reducing or eliminating refueling stops and reducing point-to-point travel times. A longer runway also generates potential time savings benefits by increasing the range and type of operations.

Improving coordination and collaboration with regional airports would also likely improve travel times for some traveler and goods movements, by increasing operational flexibility at some regional airports and creating more efficient surface transportation links between the local community and these regional airports. Travel time savings, however would likely be

considerably less as compared with improvements associated with longer runways. **Table 8.6** shows the relative ranking of potential benefits associated with travel time savings.

Table 8.6: Potential for Time Savings Benefits(over Base Case)

	Alternative 1 (Runway to 4,000')	Alternative 2 (Runway to 5,000')	Alternative 3 (Coordination & Collaboration
Potential Time Savings	Medium	Medium	Low

Source: WSA

Summary of Benefits

Based on the preceding analysis, the greatest benefits accrue to Alternative 2, which involves extending the runway length to approximately 5,000'. A longer runway permits a larger, faster and more diverse fleet of aircraft to use the WH Morse Airport, thereby allowing for the greatest potential to generate economic benefits and provide economic development opportunities. Safety benefits are also greater in Alternative 2 because the longer runway increases safety for a larger portion of the fleet. The relative potential benefit of each of the three alternatives is shown in **Table 8.7**.

Table 8.7 Summary of Potential Benefit by Alternative

	Alternative 1	Alternative 2	Alternative 3
Safety	Medium	Medium	Low
Economic Impact	Medium	High	Low
Economic Development	High	High	Low
Travel Time Savings	Medium	Medium	Low

Costs

Construction Costs

Among the most standard costs to weigh against potential benefits are costs associated with building a new facility. Costs associated with improvements listed in the base case are based on the Vermont Agency of Transportation's 5-year capital improvement program as published on their web-site.

The Study team estimated initial order of magnitude costs for the two alternatives associated with runway extensions using the existing airport layout plan (ALP) and industry averages for associated works. Assumptions used in the estimation of costs are included as **Appendix F**.

Costs associated with Alternative 3, which is based on increased collaboration and coordination with regional airports. While this alternative is anticipated to involve a variety of strategies that improve connections between Bennington and other regional airports, for purposes of this analysis, costs were limited to surface transportation. WSA assumed a daily shuttle service would be available from Bennington to the Albany International Airport, and the Rutland State Airport. Costs for the shuttle are based on industry averages of $4.0 per revenue mile and assume the shuttle is operated over a ten-year period.

Table 8.8 lists both the study team's estimate of initial order of magnitude costs for the two alternatives together with the Study team's assessment of the potential for cost impact. In this case, Alternative 1 is assumed to have a low impact and Alternative 2 a medium impact, in part because the local impact of providing these costs are low. Costs associated with Alternative 3, on the other hand, are estimated as having a high impact. While a shared-cost arrangement between the public and private sector may be possible, a considerable portion of the Alternative would require State or local funding.

Table 8.8 Estimated Order of Magnitude Construction/Development Costs by Alternative

	Base Case	Alternative 1	Alternative 2	Alternative 3
Estimated Cost	$4.5 m	$2.9m	$7.7m	$10.0m
Potential for Cost Impact	N/A	Low	Medium	High

Source: WSA/VTrans

Environmental/Natural Impacts

Environmental and natural impacts associated with each of the alternatives relate to expansion of the airport facilities and an increase in airport operations. Accordingly, a partial list of impacts includes:

- Changes to the natural landscape;
- Changes to existing land uses;
- Wetland and stormwater/drainage impacts;
- Loss of wildlife and plant habitat; and
- Noise (presented and discussed later).

The limited scope of this study prevents a detailed assessment of potential local environmental impacts such as wetlands, stormwater, etc. associated with each of the alternatives. The Study team recognizes, however, that increases in airport facility size and length and increased airport operations will have a corresponding impact on the local natural environment.

An expansion of airport facilities will increase the amount of impervious surface degrading the natural environment and increasing the potential for wetland and stormwater impacts. Likewise, expanded airport facilities and increased noise associated with operations will have negative impacts on wildlife and plant habitats and existing land uses.

Alternative 2 is assumed to have the greatest impact on the local environment because it would require runway construction of some 1,300', extending beyond the exiting airport boundary, impacting agricultural land and very likely impacting wetlands. There would also be environmental impacts associated with Alternative 1, although most of these would be confined within existing airport boundaries.

Environmental impacts associated with Alternative 3 would be associated with expansion of the facilities at Rutland State Airport, improved surface transportation access to the Rutland Airport and improved connections to/from regional airports including those at Rutland,

Albany, North Adams and Hartford. These improvements would most likely result in environmental impacts but not to the scale of those likely with Alternatives 1 and 2. **Table 8.9** shows the relative ranking of potential environmental and natural impacts by alternative.

Table 8.9 Potential Environmental and Natural Impact (compared with Base Case)

	Alternative 1	Alternative 2	Alternative 3
Potential for Environmental and Natural Impacts	Medium	High	Medium

Source: WSA

Traffic

Increased operations at the airport would likely result in increased traffic to and from the airport. Using the Institute of Transportation Engineer's (ITE) trip generation manual (7th edition), the trip generation rate for general aviation airports is .24, meaning every aircraft operation results in an increase of .24 vehicle trips. According to the ITE manual, these trips are equally split between access and egress.

To indicate relative traffic impacts, the Study team estimated additional trips generated based on forecast airport operations (see Section 7) by alternative including the associated low, medium and high scenarios (i.e. the number of forecast aircraft operations multiplied by .24). These additional trips, as shown in **Table 8.10**, broadly indicate potential traffic impacts in terms of the potential increase in daily trips.

Table 8.10 Potential Traffic Impact (Average Increase in Daily Trips)

	Low	Medium	High
Base Case	0	0	0
Alternative 1 (Runway 4,000')	.47	.90	1.5
Alternative 2 (Runway 5,00')	.9	1.6	2.9
Alternative 3 (Collaboration)	0	0	0

Source: WSA

Table 8.11 Potential Traffic Impact (compared with Base Case)

	Alternative 1	Alternative 2	Alternative 3
Potential for Traffic Impacts	Low	Medium	None

Source: WSA

Noise

Noise is one of the most common and most significant environmental issues associated with aircraft operations. There are many factors affecting the perception of noise and actual noise levels resulting from airport activity, including the fact that individuals have a varying sensitivity to noise. Among the factors affecting airport noise are:

- **Aircraft type and size**– an aircraft's engine type and size is a primary determinant of how loud the aircraft is and how the noise is perceived; larger and faster aircraft are typically louder than smaller and slower.
- **Aircraft load** – typically heavier planes are louder than lighter planes and heavier loads can slow aircraft, increasing exposure to communities near flight paths. Aircraft loads including passenger, fuel and cargo loads therefore affect noise levels.
- **Aircraft age** –technological improvements in engine design means that older aircraft typically are louder than new aircraft, at all stages of operations.
- **Operational stage** – the nosiest stages of flight are during take off/departure and approach/landing.
- **Time of day** – people are often more sensitive to noise during normal hours; aircraft operations during night-time or early morning may have a larger impact.
- **Season** – aircraft noise is often a greater nuisance during seasons where residents leave windows open.

Airport Noise Measurement

Airport and aircraft noise is measured in different ways. Noise is often referred to in terms of decibels(dB or dBA), typically A-weighted decibels, which is a logarithmic measure of the magnitude of sound as the average person hears it (noise frequency) and measures sound level. Decibels can measure noise associated with a single event, such as a siren, alarm clock or motorcycle. **Table 8.12** shows a range of typical A-weighted sound levels for common sounds.

Table 8.12 A-weighted Sound Levels for Common and Familiar Sounds

Sound Level (in dB)	Common Sounds
140	Jet Engine at 10 feet
130	Threshold of Pain
110	Accelerating Motorcycle at 15 feet
80	Garbage Disposal
70	Vacuum Cleaner at 10 feet
60	Two Person Conversation
40	Quiet Urban Nighttime
30	Bedroom at Night
15-20	Recording Studio
0-10	Threshold of Hearing

Source: FAA

Table 8.12 also lists sound levels for a single incident of noise. In reality, however, the impact of sound or noise also needs to take into consideration how long it lasts; long duration noises are more annoying than short ones. The Sound Exposure Level (SEL) attempts to take into consideration the total sound energy of a single noise event, taking into account both intensity and duration. In the case of an individual aircraft flyover, for example, this would include the increasing noise as an airplane approaches, reaches a maximum and then falls away to blend into the background. The total noise exposure can be normalized into a one-second duration for comparison purposes and reported in A-weighted decibels (dBA)

Presently, the most widely used sound measurement technique with regards to noise impact resulting from airports and aircraft is the day-night average sound level (DNL). This measurement is used in airport noise studies funded by the FAA. DNL represents the 24 hour average sound level, in decibels, obtained from the accumulation of all events, with the addition of 10 decibels to sound levels from 10 P.M. to 7 A.M. The weighting of nighttime events accounts for the usual increased interfering effects of noise during the night, when ambient levels are lower and people are trying to sleep. The 24 DNL is annualized to reflect noise generated by aircraft operations for an entire year and are identified by "noise contours" showing levels of aircraft noise.

While the FAA relies on DNL to estimate and consider noise impacts, it has been noted in past studies that several communities feel DNL underestimates or does not accurately account for the impact associated with a large single noise incident, e.g. a military jet flying overhead. Authors of most airport noise studies remain confident in the use of DNL to measure noise impacts and dispute such complaints. DNL remains the standard tool modeling and measuring noise impact.

Typical DNL levels in a community with an airport can range from highs of 70 to 75 dBA in a noisy urban environment to lows of 40 to 45 dBA in very quiet rural areas. A DNL of 65 dBA is considered by the FAA to be the onset of significant impact on residential land use near an airport. Exposure levels less than 65 dBA are acknowledged to cause people to be highly annoyed, but levels greater than 65 dBA are considered great enough to qualify for mitigation measures such as sound insulation treatment. **Table 8.13** shows a selection of land uses and DNL taken from the FAA Noise/Land Use Compatibility Guidelines.

Table 8.13 Select FAA Noise/Land Use Compatibility Guidelines

	Yearly Day-Night Average Sound Levels in Decibels (DNL)					
	<65	65-70	70-75	75-80	80-85	>85
Residential other than mobile homes and transient lodging	Y	N (1)	N (1)	N	N	N
Schools	Y	N (1)	N (1)	N	N	N
Hospitals and nursing homes	Y	25	30	N	N	N
Churches, auditoriums and concert halls	Y	25	30	N	N	N
Offices, businesses and professional	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y (2)	Y (3)	Y (4)	Y (4)	Y (4)
Livestock farming and breeding	Y	Y (2)	Y (3)	N	N	N

Notes:
Y = yes – land use and related structures compatible without restrictions
N = no – land use and related structures are not compatible and should be prohibited.
23,30 or 35 – land use and related structures generally compatible; measures to achieve NLR of 25, 30 or 35 dB must be incorporated into design and construction of structure.
(1) when the community determines that residential or school uses must be allowed, measures to achieve outdoor to indoor noise level reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, reduction requirements are often stated as 5, 10 or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
(2) Residential buildings require an NLR of 25
(3) Residential building require an NLR of 30
(4) Residential buildings not permitted.
The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable or unacceptable under federal, state or local law.
Source: FAR Part 150

There are no DNL modeled noise analyses for WH Morse. As part of a master planning process conducted in the mid-1980s, noise impacts were modeled for the Rutland State Airport. At that time, the airport level was around 50,000 operations per year and the noise contour levels of 65 dBA were entirely within the airport property. Since operations at Rutland have fallen since that time, noise levels have not been re-modeled, i.e. it has assumed that noise levels are not greater as compared with previous levels. For comparison purposes only, copies of the existing and future noise contours prepared for the Rutland State Airport are included in **Appendix G.**

Noise in the areas surrounding the WH Morse State Airport will increase in the future, even in the base case, as the number of aircraft operations at the airport increases. A longer

runway will most likely lead to a further increase in the number of operations at the airport and therefore, will generate more and different noise. In addition, a longer runway will enable a larger, more diverse fleet of aircraft to use the airport and operate with heavier loads, thereby, further increasing noise levels. **Figures 8.4** and **8.5** show noise levels for landing and take-off for a sample of aircraft by required runway lengths; these figures are intended to indicate noise levels by aircraft, they do not show relative impacts associated with different dBA levels.

Relative Noise Impact by Alternative

In order to estimate the relative noise impact of each alternative and associated scenario, the Study team developed a noise index. Shown in **Table 8.14**, the noise index broadly indicates the relative change in general noise levels taking into account total operations and fleet mix as estimated by the forecasts presented in Section 7. The Base Case, while higher than existing conditions, represents baseline future circumstances with currently planned changes to the airport only and, therefore, is presented in as 1.0.

Noise levels by aircraft type are based on noise levels reported by the FAA according to a group of common aircraft that relate to the existing and forecast fleet mix. For purposes of this analysis, all aircraft are assumed to be new and changes in noise are based on noise levels associated with landing/approach and take-off/departure only. Details on the composition of each group of aircraft used in the analysis have been included as **Appendix H**.

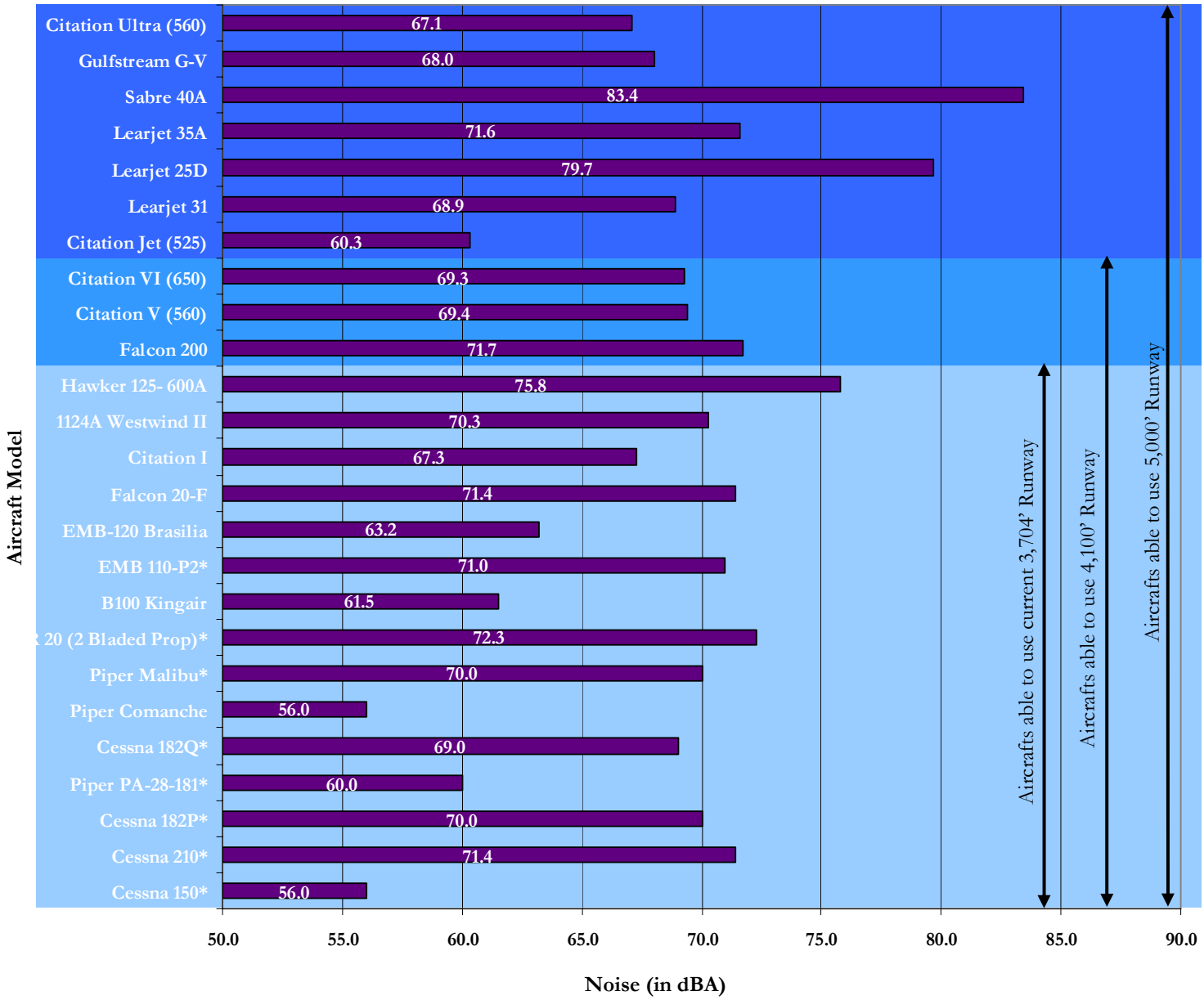
Table 8.14: Index of Potential Relative Noise Impact

	Low	Medium	High
Base Case	1.0	1.0	1.0
Alternative 1 (Runway 4,000')	1.05	1.08	1.11
Alternative 2 (Runway 5,00')	1.10	1.15	1.22
Alternative 3 (Collaboration)	1.0	1.0	1.0

Source: WSA

Increases in noise will primarily be felt by individuals living closest to the airport and directly in the flight path. There are, however, techniques available that can help mitigate noise. The WH Morse State Airport currently does have a noise abatement policy that identifies recommended flight paths (weather permitting) and departure procedures that minimize noise impacts to residential areas. In addition, a longer runway may permit alternative flight paths and provide opportunities for plans to approach and take off from the east rather than the west. Repositioning the runway is another option frequently raised during public meetings as a possible way to mitigate noise.

It should be noted, however, that the Airport Noise and Capacity Act of 1990 limits the restrictions public-use airports can impose on aircraft operations, including curfews and operations in proximity to residential areas. Any sort of access restrictions, such as airport curfews, must be approved by the FAA. To date (since 1990) no such curfews have been approved. **Table 8.15** shows the estimated potential for noise impact by alternative.



Assumptions:

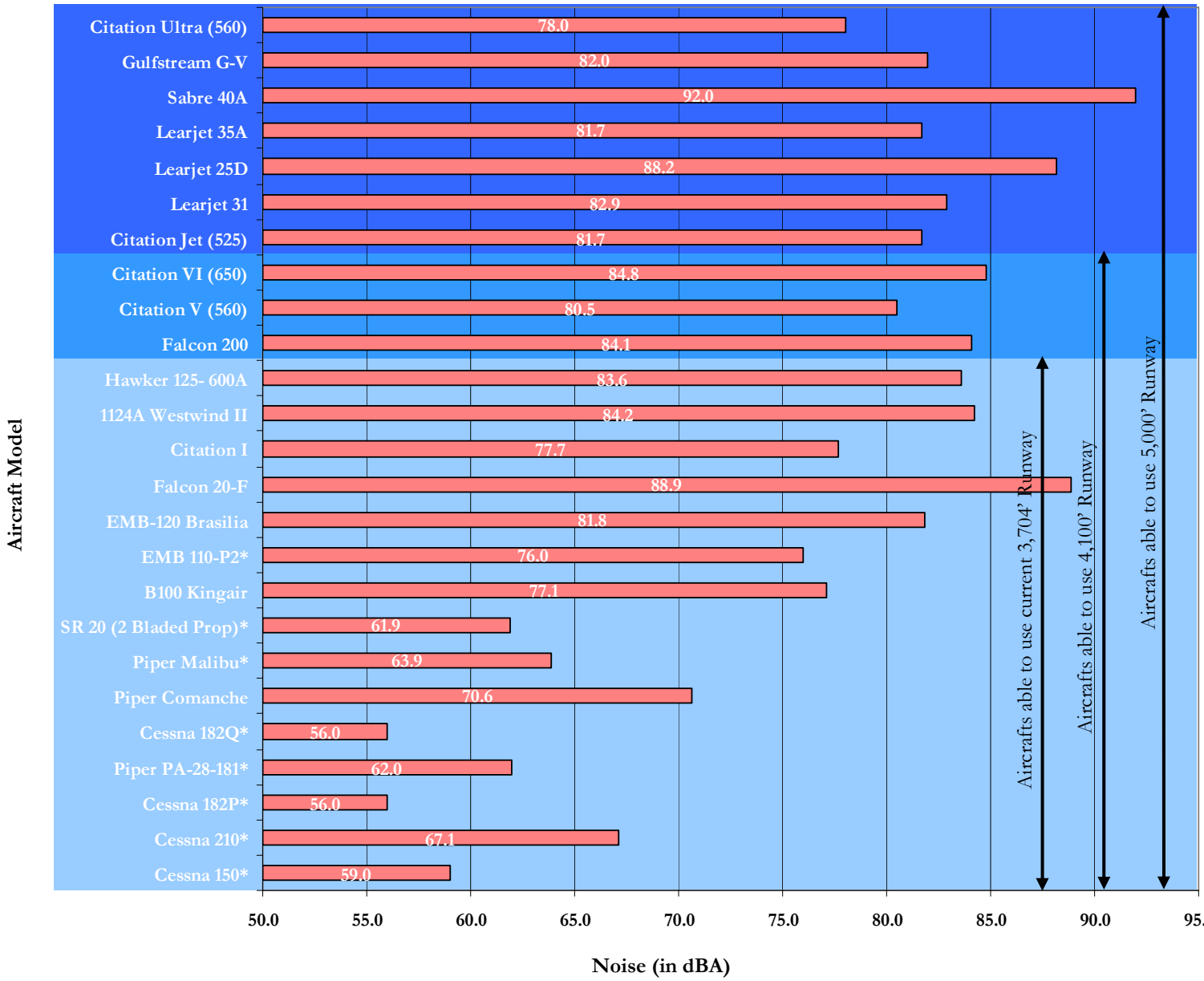
1. Aircraft manufacturers' data
2. Standard day conditions
3. 60-80 percent maximum load

Source: RisingUp Aircraft/Private Jet Service Group/WSA

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 8.4:
Aircraft Take-off Noise Summary by Runway Lengths

WH Morse State Airport Benefit Cost Analysis



Assumptions:

1. Aircraft manufacturers' data
2. Standard day conditions
3. 60-80 percent maximum load

Source: RisingUp Aircraft/Private Jet Service Group/WSA

Wilbur Smith Associates
ENGINEERS PLANNERS ECONOMISTS

Figure 8.5:
Aircraft Approach Noise Summary by Runway Lengths

WH Morse State Airport Benefit Cost Analysis

Table 8.15 Potential Noise Impact (compared with Base Case)

	Alternative 1	Alternative 2	Alternative 3
Potential for Noise Impacts	Medium	High	Low

Source: WSA

Property Values

Studies have shown that aircraft noise may decrease the value of residential property located around airports and under flight paths. Property values in the wider community, especially those with increased access to an airport but not abutting airport property, on the other hand, may increase in value in line with airport activity. The relationship between decreases in property values adjacent to or abutting airports and increases in property values with access to an improved airport tend to be stronger in connection with larger commercial airports with high volumes of operations.

A report published by the FAA in March of 1985 on Aviation Noise Effects, discusses and documents the relationship between property values and airport operations. According to this research, property values may realize a decrease in value between a 0.6 to 2.3 percent per decibel change (increase) in DNL. This study does not mention a noise threshold, which once crossed, has a significant impact. The FAA study also observed a decline in the noise depreciation index over time (i.e. the negative impact on property values declines over time). This may be due to either noise sensitive people being replaced by those less bothered by noise or enhanced commercial value of land near airport. Research supports both findings.

In an attempt to broadly gauge the impact of increased airport operations and fleet mix, an estimated change on average property values in the vicinity of the WH Morse airport was tabulated and is shown in **Table 8.16.** This estimate is based on current assessed values for 110 properties randomly selected as representative properties near the existing airport boundaries (see **Appendix I**). These properties are not identified as the full list of properties which could or may be impacted by airport development but rather a random sample used to estimate average property values in the vicinity of the airport.

WSA also recognizes that the potential impact would affect individual properties in different ways; properties closer to the airport or directly in the flight path would likely experience greater impact than those further away. The scope of this study, however, prevents a detailed inventory of the estimated impact on individual properties. The 110 selected properties have a combined assessed value of these properties is $19.3 million or $191,370 per property, considerably higher (about 65 percent) than the Town of Bennington average of $115,500. It is noted that Bennington is currently under-going a reassessment process and some property values may change.

No DNL information is available for the WH Morse State Airport; therefore, WSA can not feasibly tie any change in dBA to increased aircraft operations associated with any of the alternatives, i.e. we are unsure if any or which of the alternatives will increase the DNL by how much. We do know, however, that Alternative 2 will likely result in the most increased operations and therefore, will be associated with the greatest increase in DNL.

Table 8.16: Potential Property Value Impact Based on Range DNL Noise Increases

Increase in DNL Reduction in Property Value	1 dBA	3 dBA	5 dBA
0.6%	$1,100	$3,400	$5,700
1.5%	$2,900	$8,600	$14,400
2.3%	$4,400	$13,200	$22,000

Source: WSA

Property values would likely be affected by airport expansion. For many this impact will likely be negative, but in some cases the impact may be positive. In particular, properties abutting the airport, the runway or directly in the flight path would more likely lose a portion of their value. On the other hand, other properties further away from the airport may experience marginal gains value, due to increased access to the airport. For purposes of this study only, WSA assumed that there would be no change in property tax revenues based on a generalized assumption that decreases to some residential properties may be offset by increases in property values elsewhere.

WSA recognizes that in cases where an expanded runway brings properties closer to the runway, those properties will likely lose value with or without increases in noise because they will likely lose value merely based on increased proximity to the airport, e.g., the presence of the facility. The greatest loss in property value is expected to accrue to those properties that become significantly closer to airport property, flight paths or airport facilities as a result of an expansion. The potential relative order of magnitude impact on property values by alternative is shown in **Table 8.17**.

Table 8.17 Potential Property Value Impact (compared with Base Case)

	Alternative 1	Alternative 2	Alternative 3
Potential for Property Value Impacts	Medium	High	Low

Source: WSA

Summary of Costs

Based on the proceeding analysis, the greatest costs or negative impacts accrue to Alternative 2, which involves extending the runway length to approximately 5,000'. Negative impacts are more likely to accrue to the alternative that requires the greatest development by extending the runway and accordingly, has a greater impact to the environment and the natural landscape, especially where development extends beyond airport property boundaries. Increased airport development also results in an increase in aircraft operations and thereby has additional associated impacts such as traffic, noise levels and subsequent impacts on property values. The relative potential benefits of each of the three alternatives are shown in **Table 8.18**.

Table 8.18 Summary of Potential Costs by Alternative

	Alternative 1	Alternative 2	Alternative 3
Construction Costs	Low	Medium	High
Environmental/Natural	Medium	High	Low
Traffic	Low	Medium	None
Noise	Medium	High	Low
Property Value	Medium	High	None

Source: WSA

Additional Impacts and Considerations

Additional impacts associated with the alternatives under investigation include impacts to the local tourism industry, the Rutland State Airport and Walloomsac Road. Each of these potential impacts are presented and discussed in the following text.

Walloomsac Road

Walloomsac Road is the roadway running along the southern boundary of the airport. The road is an important part of the local road network and also plays a recreational role in the community and is frequently used by walkers, runners and cyclists. If the runway were to be extended beyond the existing airport property boundaries, Walloomsac Road would likely require reconstruction, either moved to a different location or potentially directed underneath the runway extension. It is unlikely, however, that the road would be terminated. Expansion of the airport facilities beyond the existing airport property would result in negative impacts to the recreational users of the roadway.

Rutland State Airport

If the airport facilities WH Morse Airport in Bennington are expanded, it will likely draw passenger and freight operations from the Rutland State Airport. Rutland State Airport's existing air traffic operations include passengers traveling to tourism and recreational destinations in Manchester and Stratton Mountain. While Bennington and Rutland are nearly equal distance from Manchester, some travelers perceive Bennington to be easier to travel to and from, and therefore, be the preferred option for some air travelers.

Alternative 3, on the other hand, would direct future airport improvements to regional facilities such as Rutland and therefore likely result in facility and operational improvements.

Impacts to Tourism Industry

Potential improvements or development at the airport would have both positive and negative impacts on the tourism industry. Depending on the actual location and length of runway extensions and impacts associated with removing flight path obstacles, physical expansion of the airport, may or may not be visible to local tourists using Route 9 and visually encroach upon some of the community's most important tourism resources such as the Bennington Center for Arts, the Bennington Museum and Bennington Monument. Increased aircraft operations at the airport will likely, however, increase noise levels and potentially diminish the rural, small town environment of the community valued by many tourists.

Regional tourism resources, however, such as the Equinox Hotel, Manchester Outlet Shopping and Stratton Mountain Resort could possibly to benefit from development at the

WH Morse Airport. These areas would not be directly affected by potential negative impacts associated with airport development but may benefit from the airport's increased ability to accommodate a more diverse fleet of aircraft.

The alternative based on increased coordination and collaboration of regional aviation resources has potential to benefit both the local and regional tourism industries. Bennington may benefit from improved connections between airports and potential increased operations at Rutland. The regional tourism resources located between Rutland and Bennington, such as Manchester and Stratton, currently use the Rutland State Airport and would potentially benefit from any improvements at that facility.

Quality of Life/Community Character

An additionally significant concern, as expressed by members of the community at public hearings held as part of this study, is the potential impact of an expanded airport on the existing high quality of life and rich community character in Bennington. Concern is that an expanded airport, increased air traffic and ancillary impacts (landscape changes, noise, pollution, etc.) are not consistent with Bennington's rural character, landscape and atmosphere. It is difficult, if not impossible, to measure or quantify quality of life and likewise equally difficult to determine the impact of incremental changes at the WH Morse State Airport on these attributes. The potential for the airport to have a negative impact on Bennington's existing quality of life, however, is recognized as a significant concern.

Opportunity Cost of Investment

There is also a question about the opportunity costs associated with investing in the WH Morse State Airport, namely if resources used to improve the WH Morse State airport could achieve greater community benefits with lower costs to the community in a different public project.

9.0 SUMMARY OF BENEFITS AND COSTS

As discussed in the benefit cost analysis, the main benefits associated with additional runway length:

- Economic impact – more jobs, increased income, more economic activity; and
- Economic development – increased infrastructure and assets to attract future employers and businesses.

While the main costs associated with additional runway length:

- Environmental concerns – impact on land, landscape and noise levels; and
- Perceived impact on the community and sense that the airport doesn't need to be bigger.

In addition, WSA and the Airport Committee, re-examined the initial set of evaluation criteria laid out in the beginning of this report and compared each alternative in conjunction with that criteria. The results of this analysis are shown in **Table 9.1**.

Table 9.1 Draft Evaluation Criteria for Potential Air Transportation Improvements

Evaluation Criteria (Goals)	Definition	Alt. 1 – Runway extension to 4,000'	Alt. 2 – Runway extension to 5,000'	Alt. 3 – Collaboration & Coordination
Protect important natural, historic and community resources.	Impact significant natural or fragile ecological areas	Medium	High	Low
	Impact important features of the landscape, including scenic roads waterways and views	Low	High	Low
	Impact historic structures, sites and districts	Low	High	Low
	Impact water, forests, prime agricultural soil and air quality	Medium	High	Low
	Impact existing noise levels in the community	Medium	High	Low
Encourage development of a strong and diverse economy	Support important existing local and regional business clusters (health/social services, manufacturing/technology, tourism (retail/leisure) and education	Medium	High	Low
	Increase quality employment opportunities for residents	Medium	High	Low
	Meet transportation needs of existing businesses	Medium	High	Medium
	Support businesses that utilize local natural resources	Unknown	Unknown	Unknown
	Provide ready and efficient access to suppliers and markets. (Encourage desirable businesses to relocate to area.)	Medium	High	Low
Provide for a safe, convenient, economic and energy efficient transportation system	Improve safety	High	High	Medium
	Preserve function of existing transportation infrastructure	Medium	High	Low
	Enhance access to/from region for residents and local businesses	Medium	High	Medium
	Enhance access to/from region for visitors and businesses	High	High	Low
Plan for, finance, and provide an efficient system of public facilities	Cost	Medium	High	Medium
	Portion of alternative costs borne locally	Low	Low	High
Direct growth to existing/designated growth centers	Encourage growth to existing centers and support revitalization of downtowns	Unknown	Unknown	Unknown
Encourage excellence in educational and vocational training services.	Provide educational and training opportunities in line with employment needs	Medium	High	Low
Encourage the efficient use of energy and the development of renewable energy sources	Support efficient use of energy resources	Unknown	Unknown	Unknown
Strive for close coordination of policies in the Regional and municipal plans	Support other regional and municipal plans	Medium	Low	Medium

Appendix A: Bibliography of Sources Referenced

Local Plans Consulted:

Bennington Town Plan, Hearing Draft, 2005 (Bennington Planning Commission)
(2004 Bennington County Strategic Economic Development Plan)

Bennington Regional Plan, Adopted May 23, 2002

Bennington County Regional Transportation Plan, September 2002. Bannon Engineering and Van Grossman & Company

Economic Impact of Vermont's Public-Use Airports, SH&E, April 2003

Lebanon Municipal Airport, Master Plan Update and Business Park Feasibility Study; Executive Summary, Dufresne-Henry and Applied Economic Research, October 2001.

Lebanon Municipal Airport, Airport Business Plan, 2004.

Rutland State Airport, Runway Safety Area Study, Preliminary Draft for Review, URS, April, 2005

Saratoga County Airport Master Plan Update, Edwards and Kelsey

Vermont Airport Systems Policy Plan, Public Review Draft, Technical Report, Wilbur Smith Associates and Air Tech, January 1998

WH Morse State Airport, Bennington Vermont, Master Plan Update, Dufresne-Henry, March 2003.

William H. Morse State Airport Runway Length Analysis, Dufresne-Henry, April 2003 (update)

Rutland Airport Considers Expansion, Burlington Free Press, May 18, 2005.

Rutland Renews Air Service, Vermont Business Magazine, December 2003.

List of Sources from National Arena:

Aircraft Noise: How We Measure It and Assess Its Impact, FAA

Aircraft Specs: Executive Jet Management website: Aircraft Available for Charter; Private Jet Services Group website and Risingup website: Aviation Manufactures Database

Airports and Economic Development, Wisconsin Bureau of Aeronautics

Airports & Economic Development, Alternative Views and Methods, Glen Weisbrod, Economic Development Research Group

Airports in the Southeastern Regional Planning and Economic Development District, Massachusetts, Regional Transportation Plan..

Benefit-Cost Analysis for the Rock County Airport (JVL) Runway Extension, Janesville, Wisconsin, Wisconsin Department of Transportation

Determining Infrastructure Needs for Rural Mobility: Functions and Benefits of Rural Airports in Washington, Department of Agricultural Economics, Washington State University, Jon Newkirk and Ken Casavant, July 2002

Economic Impacts of Improving General Aviation Airports, Transportation Research Record 1274, Glen Weisbrod, Economic Development Research Group.

Environmental Impacts of Aviation, Task Force on Environmental Impacts of Aviation, Edward and Kelcey, Inc.

Effect of Aircraft Noise on Real Estate Values, Noise Pollution Clearinghouse, March 1985

FAA Report to Congress, National Plan of Integrated Airport Systems (NPIAS), (2005-2009), Vermont Reliever and General Aviation Airports

Fort Collins Loveland Master Plan Update; Study Committee Meetings, 2004-2005.

Airport Master Plan Update, Port of Port Townsend, Washington, Jefferson County International Airport, BWR, 2002.

Mid-Valley Airport, Master Plan Development, Weslaco Texas, 1998.

National Transportation Safety Board (NTSB), Aviation Accident Statistics and General Aviation Accident Database and Synopses, WH Morse State Airport (www. ntsb.gov/aviation/aviation.htm)

Westchester County Airport Aircraft Noise Study, TAMS Consultants Inc. August 2002.

What's Your Airport Worth – Guide to Obtaining Community Support for Your Local Airport, Aircraft Owners and Pilots Association, 2005.

Virginia Airport Systems Plan, Virginia Department of Transportation, 2003.

Appendix B: List of Stakeholders Consulted

AirNow
AppleJack Art Partners
Bennington County Industrial Corporation
Bennington Microtechnology Center
Bennington Visitor's Bureau
Equinox Hotel
NSK Steering Systems
Mt. Snow Chamber of Commerce
Rutland Regional Airport (VTrans)
Village at Fillmore Pond
Village of Old Bennington
VTrans – Aviation Planning and Policy
West End Neighborhood Group

Appendix C: Consultant Response to Comments Raised at September 22, 2005 Public Meeting

Comment	Consultant Response
From Citizens for Bennington's Future	
1. You reference a pair of prior Runway Length Analyses (p. 1). Can you please attach copies to the report as an exhibit?	1. A single runway length analysis was conducted in 2002. It is available for review from the Bennington County Regional Commission but will not be attached as part of the Benefit-Cost Analysis.
2. Your draft report references (p.2) an airport layout plan, but does not include it. Can your final report include an airport layout plan and proposed expansions? Can any airport plan included show a layout of the airport in relationship to the entire town of Bennington, not simply the airport property? Can you also attach maps showing current landing and take-off flight paths, as well as flight paths for larger aircraft created by the proposed expansions?	3. An airport layout plan will be included in the final document. An ortho photo/map indicating the airport in relationship to the wider community will be included in the final document. Designs and/or layouts for potential runway extensions have not been prepared, nor have potential concepts been fully vetted, therefore, any indication or mapping of potential impacts may be misleading and therefore have not been included in the report.
4. You quote VTrans estimates of airport traffic (p. 2). Given the limited nature of this survey, what level of accuracy would you assign to your estimate of annual operations? What percentage of these operations would you estimate to be "touch and go"? How does your estimate of annual operations compare to the prior consultants' estimates of Morse airport operations in 2005? (e.g. the WSA technical report for the Vermont Airport System Policy Plan, 1998; the draft Airport Master Plan, Dufresne-Henry, May 2000, etc.) Can you please attach copies of these reports in your appendix? What is an FAA 5010 form? Are there 5010's filed on Morse? Can you attach Morse 5010's (or the relevant traffic count section) for the past 10 years?	3. No statistical studies were conducted to determine the level of accuracy for the estimate of airport operations. By most accounts, however, given consistency with previous counts and estimates made by airport personnel, an estimate of approximately 14,000 annual operations is reasonable. No estimates are available for "touch and go" operations. The 1998 WSA Vermont Airport Systems Policy plan states that annual operations at the Bennington State Airport are listed as 27,500 on the FAA 5010 form but acknowledge that airport staff believe the true number to be below this estimate. The WH Morse Master Plan Update (Dufresne-Henry) prepared in March 2003, shows total operations in 2001 as 15,000.

Comment	Consultant Response
	An FAA 5010 form is an airport inspection form reporting on airport facilities. The Vermont Agency of Transportation (VTrans) conducts the inspections for the FAA; 2-3 airports are inspected per year and reports are updated approximately every 5 years. According to the current FAA 5010 form, WH Morse Airport was last inspected on October 23, 1998. At this time, there were an estimated 50 aircraft based at the airport and annual operations listed as 26,530 (all types).
5. In your draft report, you repeatedly reference a "review of literature" and then proceed to offer conclusions. (p.3, p.40, etc.)Can you please provide a bibliography for the specific published reports, research, or articles you used in reaching these conclusions?	4. A bibliography will be included in the final report.
6. Your reference Stakeholder interviews (p. 4). What criteria did you use to select Stakeholders? How do you define the term? Did you use a standard form of questions for each interview? What information was provided to the Stakeholder prior to the interview?	5. A list of stakeholders was prepared together with the Airport Committee. In most cases, all requests were accommodated. A standard set of questions were asked to most stakeholders; individuals were given an opportunity to provide additional information as deemed appropriate. In most cases no information was provided to Stakeholders in advance of the interview. In all cases, however, individuals were given the opportunity to schedule the interview at their convenience.
7. You mention that FAA funds cannot be used for highway projects.(p. 5). Does this mean that any highway changes necessitated by airport expansion will have to be paid for from other fund sources? Could those other fund sources be used for any highway project? Are those highway change costs included in your	6. FAA funds cannot be used for roadway projects, unless the roadway will be directly impacted as a result of an airport project. Typically, FAA will not pay for surface access to an airport facility. Accordingly, the WSA report includes rough costs associated with

Comment	Consultant Response
estimates?	changes/impacts to Walloomsac Road that result from changes to the airport facility. The report does not include changes to the wider surface transportation network.
8. You mention the Williamstown (North Adams) airport case. (p. 12). The draft report, however, does not include any data, discussion, or evaluation of this airport and its communities' experience. Why not? There is no evaluation of the extent to which the North Adams airport is used by Bennington area businesses or individuals? You have also not included any data for Albany International. Why not? Are there any other similar airports within a 30-40 mile radius of Bennington that should be considered in our evaluation?(p. 14) Do any of those airports have expansion plans?	7. Very limited published information is available on the North Adams Airport, therefore, it was not evaluated to the same extent as other regional airports. The Albany International Airport is considered a regional resource but because it is a commercial airport, it is not a comparable facility. An attempt was made to include information on all regional airports where documents or information was easily and readily available.
9. Your report includes GA flight data and comments about the negative impact of economic and fuel factors on GA activity. (p. 14-16). The data you cite shows that GA operations have actually declined over the pact 5 years. The price of aviation fuel, a potential negative factor you cite, has increased by nearly 100% over the past 18 months. Despite this, your estimates for expected growth in operations at Morse (as a result of the expansion) are 2 to 5 times higher that the FAA GA estimates. Why? How do these numbers compare to prior consultants' estimates for Morse?	8. FAA forecasts for GA activity show an overall decline in hours flown (1998 – 2003) and an increase in the number of GA active aircraft (1998-2000), albeit still below a peak experience in 1999. FAA forecasts suggest a moderate increase, nation-wide, in GA activity on the order of 0.9 to 1.5 percent. Forecasts for WH Morse are higher than those estimated by FAA to reflect regional knowledge and experience. For alternatives that would improve the facility, facility, especially in a way that would allow the airport to cater to the fastest growing segment of the industry, higher that average growth would be expected. To the consultant's knowledge, no prior forecasts of future usage for the WH Morse Airport have been prepared.
10. You report contains forecast levels of operations under various assumptions. (p. 19). You admit that the input data for your model	9. Agreed. Numbers will be rounded in the final version of the document.

Comment	Consultant Response
is problematic. (p. 15, 16, 17, etc.) However, your predictions are stated to single digit accuracy in some places and to two decimal places in others. Is this "false accuracy"? To put it another way, can you project such accurate numbers from such fuzzy inputs? Are there ways to present this data in order to insure that any lay reader will not be mislead by the "accuracy" of the forecast's numbers?	
11. Your report mentions reviewing prior estimates to gain perspective and ascertain a "level of confidence in forecast data." (p. 19, 20). Both prior reports show actual results deviated significantly below consultants' forecasts. Based on this, and on your preparation of new forecasts for an expanded Morse airport, what level of confidence (or probability) do you assign to you projections? In other words, how likely do you think it is that the actual results at an expanded Morse will fall within your stated ranges? Why do you assign this level of confidence?	10. No level of confidence or probability can be assigned to the forecasts as they were modeled or derived from a statistical analysis. Low, medium and high forecasts were estimated in order to demonstrate a range of potential scenarios.
12. Your report mentions safety issues in a variety of places. (p. 20) What is the 5year safety record at Morse? In particular, you cite landing and take-off operations are of critical importance. The U.S. Government (Department of Defense) agrees with that assessment and publishes information on Accident Potential Zones (APZ) around airports, including compatible land use guidelines. Have you reviewed their document on this issue? Would you agree with their assessments? Why or why not? Can you attach a rough plot of current and prospective APZs for Morse airport? What does the runway expansion increasing "navigable airspace" (p.22) mean in layman's terms?	11. According to the National Transportation Safety Bureau, a single accident has been recorded at WH Morse between January 1 2000 and August 2005, involving a novice pilot. The accident resulted in 1 serious injury (the pilot). This data has been included in the final report. A plot of current and prospective APZs for Morse state airport is out of the scope of this study. Practically speaking, the term "navigable airspace" refers to airspace used by pilots during takeoff and landing. The FAA regulates navigable airspace to ensure safety.

Comment	Consultant Response
13. You describe Morse as and uncontrolled airport. (p. 2) You also mention that the FAA has not granted a nighttime aircraft curfew since 1990. (p. 39) Will the base case and expansion plans permit more nighttime operations at Morse? Can the BCRC, the Bennington Selectboard, Bennington County, or the State of Vermont, expect to limit or control, in any way, the hours of operation, the types of aircraft, or the noise levels of aircraft at Morse? Please be specific.	12. WH Morse is an "untowered airport" and will be referred to as such in the final version of the document. As a public use airport, local governing authorities have limited control over the hours of operation, the type of aircraft or the noise levels of aircraft at Morse. This is true under the base case as well as for all proposed alternatives.
14. In your draft report you mention GA safety statistics, expressed in accidents and fatalities/flight hour. (p.28) Can you provide a source for this data? The extended runway will make landing and taking off safer for some planes that use the airport. However, will greatly expanded traffic in your high estimates increase risk for the community as a whole? In other words, if accident frequency is a function of total flight hours (and mainly pilot error) does a substantial increase in both at Morse fundamentally change the overall risks to the community?	13. Accident and fatality data, as cited, was taken from the National Transportation Safety Board. The risk level, i.e. accidents per hours flown remains constant regardless of the number of hours flown. As the number of flight hours increases, the exposure to accident potential may increase depending on future risk levels.
15. What is an "avigation easement"? Do you include the costs of any necessary avigation easements in your cost estimates?	4. An easement is the right granted to a third person to use your real property in a specified manner. An easement may be given, for example, for overhead wires, underground gas, power, sewer or storm drain lines, for sidewalk or street purposes, for neighbors to maintain their views, or even for airplanes to fly over your home on a regular basis. The latter refers to an avigation easement, which is sometimes called an air easement or aircraft easement. These costs are not included in the analysis.

Comment	Consultant Response
16. You mention AirNow as a local business affected by an expanded airport. Can your provide a record of the average AirNow's daily flight operations to/from WHMorse over the past 10 years? Has AirNow's daily average of flight operations to/from WHMorse increased, stayed about the same, or decreased over this time period?	15. Data on AirNow's daily flight operations has been requested….
17. Is there any data relating the current airport and/or an expanded one, to industries leaving or not coming to Bennington?	16. There is no empirical evidence suggesting that the current airport has caused industries to leave Bennington or would de facto lead to economic development.
18. In your report you refer to the expansion of the runway as "increasing navigable airspace". (p. 22) What does this mean in layman's terms? Could you please add a map to the final report that indicates the new or "increased" flight paths that would result from any runway expansion?	17. By permitting larger aircraft to use the airport, an extended runway would result in longer and wider flight paths. Designs and/or layouts for potential runway extensions have not been prepared, nor have potential concepts been fully vetted, therefore, any indication or mapping of potential impacts may be misleading and therefore have not been included in the report.
19. Are the charts that purport to show comparisons of aircraft noise in you appendix E and the graphical representations you provide adequate? Can an average person reading that material understand the log scale nature of the underlying noise comparison data? Should another graphical measure be used?	18. Graphic displays of aircraft range, speed and noise (take-off and landing) were prepared to compare associated changes and impacts associated with different aircraft types and runway lengths. These charts do not, nor are they intended to show, a logarithmic noise comparison.
20. You mention property effects that could go beyond the boundaries of WHMorse airport if the runway is extended. (p. 23) Could you indicate, on a map of the local area, where these changes could affect private property beyond the current boundaries of WHMorse airport?	19. Refer to response to Comment #17.
21. An experienced transportation planner, speaking at last week's public hearing, said the airport could be easily moved to another site	20. This option was not included in the study scope.

Comment	Consultant Response
for the projected costs of a 5,000-foot runway. Why was that option never considered?	
From Mary DeBell – sent by email to BCRC	
21. I am opposed to any runway extension. My first concern is that more air traffic will endanger the lives of the geese migrating in the spring and autumn as they use the pond to the north of the west end of the runway (Singing Pond) as a resting place. Also we have several families who stay at Singing Pond and my pond to raise their young during the summer. Obviously, more and larger planes would be detrimental to them. To make matters worse the airport has apparently sanctioned the killing of geese flying over their lands as they try to land on the Singing Pond to rest. I have heard the argument that the geese are a hazard to planes landing, they are a 'danger', perhaps then these people should stay on the ground and leave the flying to the birds as the Creator intended. Also, the added noise will not be appreciated as I already have to listen to the constant traffic on the bypass to the north. Another concern is that many of the pilots ignore flight paths. I am not opposed to the airport as it exists now, though I do hope that some method for protecting the geese can be devised.	21. If a runway extension is carried forward, a more formal and detailed environmental assessment of impacts to wildlife and habitat together with potential mitigation measures will be conducted. The consultants acknowledge that some geese have been hit by aircraft in the recent past.
From Charles R. Putney, Emailed comments 9/29	
22. I think the consultants had a very difficult job with this proposal. There is little base information about the economic impact of the airport. Just about everyone involved has said it's difficult to quantify the economic benefit of an airport. That seems very strange to me because tourism agencies can tell you what tourists spend and highway agencies can tell you how much freight is moved by trucks. In our case, even the base figures for local airport usage are vague	22. Economic impact associated with a runway expansion is difficult to quantify, in part, because there is only limited information about airport usage (operations) and no information about the trip purpose of flights, the number of passengers carried, the amount of freight carried, etc. Tourism agencies and the freight industry are able to estimate impact by tracing spending habits and with actual numbers of visitors, freight deliveries, etc. That said, the

Comment	Consultant Response
and poorly documented. We don't know how much traffic is for pleasure and how much is for business use. We do know that AirNow is a $10 million-plus business.	Vermont Agency of Transportation (VTrans) commissioned a study, The Economic Impact of Vermont's Public Use Airport. This report was vetted with the public and accepted by VTrans. WSA relied on this report for its estimate of economic impact. Agreed. We do not know how much air traffic is for pleasure and how much is for business. Accordingly, we can only estimate the associated economic impact from each.
23. Property values will be affected in the areas with noise (which will be much larger with jet traffic and with a longer runway). Citizens for Bennington's Future contracted with an independent appraiser from Montpelier–an individual who has been recognized as an expert witness in land appraisal issues related to transportation projects. After spending two days in Bennington looking at properties and the grand list, he found: 1) the drop in property values will be much more significant that the 2-3% projected in the report; in some cases it may be up to 20%; and 2) the ***fear*** of a possible extension will begin to lower values even before the extension occurs because potential buyers will not know how bad it will be. This study, which used national data and specific data on Bennington properties, was not considered relevant by my colleagues on the BCRC Steering Committee.	23. The report prepared by the independent appraiser was broadly reviewed by members of the Airport Committee and generally determined to be inappropriate for inclusion in this research, in part because much of the analysis focused on large, commercial airports. WSA checked some of the sources cited in this report and included this information, as relevant, to the Benefit Cost Analysis. Indeed WSA's estimate of property values, as documented in the FAA's Aviation Noise Effect report, was also referenced in the Friihauf study.
24. The report says there will be economic benefits. Business at AirNow may grow. However, there has been a decrease in the number of planes based at Morse Airport and the number of annual operations since 2001. Up until this morning's Banner AirNow officials have said publicly said on a number of occasions that this project will not make a major difference to their business. Much of AirNow's	24. AirNow's freight forwarding business may or may not be enhanced by a runway extension. A longer runway will, however, make it easier for them to remain in Bennington as more of their fleet will be able to fly into Bennington for servicing, likely increasing internal operating efficiencies.

Comment	Consultant Response
business, in fact, isn't even located in Bennington, although its headquarters office is. Then there is the economic development potential. The report suggests there is high potential for growth. ***There is no local validation of this projection.*** The projection is based on national data and airport trends, and the consultant's best estimate of what will happen.	AirNow as the airport FBO, however, potentially would benefit from a runway extension as it would increase their fuel sales and mechanic/service operations. Agreed. There is no empirical evidence suggesting that a longer runway would de facto lead to economic development. On the other hand, most business leaders and economic developers agree that improved infrastructure, especially transportation infrastructure, makes a community more attractive for existing and potential business development.
25. The development trend in Bennington, however, suggests otherwise. What are our largest new employers in town. The Village of Fillmore Pond, close to the airport, has 50 employees. I doubt if Church Insurance and Vermont Country Store don't depend on the airport. NSK seems to have done quite well with the airport as it is. Bennington's largest employer is the Medical Center, which has the capacity to airlift patients elsewhere without benefit of the airport. Other large employers are Bennington College, Southern Vermont College, United Counseling Service, the school district and state government. There is no indication that the airport is critical to their operations. We have no evidence in this report that any of the area's major employers require expansion of the airport. John and Susan Wright, who have located their doll business in the old Hemmings building on West Road, say just the opposite.	25. A key concern of economic developers is ensuring enough "base industries" are active in the regional economy. These industries serve final demand outside the region, which means that they produce goods and services within the region and sell these goods and services outside the region. They act as the economic engines of a regional economy and are responsible for generating personal incomes that goes on to support other regional economic activity, such as hospitals, schools and government services. A vibrant regional economy must encourage and support these strategic base industries. Church Insurance, the Vermont Country Store, Bennington College and NSK all qualify as base industries.
26. Throughout the discussion of extension of the runway the question has been: "Is there a significant economic benefit or potential?" The fact that this report cannot point to any single economic development benefit–only a generalized benefit–suggests that the	26. See response to question 24.

Comment	Consultant Response
case can't be proven at this point and that expansion is not justifiable.	
From Bill Reichblum, Email Received 9/29	
27. The most startling moment came when the Professor of Economics from Williams College asked his two questions. These questions were at the most basic level for this impact study: Why didn't they play out the percentage decrease in value to the housing market to better reveal the cost benefit analysis to future expansion; and, why didn't they include any comparison/study of the airport expansion project in North Adams, MA which had no impact on that town's economic development?	27. Housing values would potentially lose value in proportion to their location to the runway and flight path.
28. What was so troubling in the response to these questions (and similar ones from the first meeting) was the fact that Wilbur Smith did not seem to be interested in doing the most basic economic analysis, nor were they interested in looking at any other models of airport expansion. Even more, nowhere in their study - not in their presentation last week, nor the one before -- did they point to one example of a comparable airport expansion that had a positive economic impact on a local community.	28. See response to comment #24.
29. Moreover, the economics professor pointed out that their cost figures were at the absolute lowest end of such projections. (In the draft study it is not clear how these figures are placed in comparison to comparable projects, nor how these figures were derived. Perhaps, that is in a part we did not see.)	29. The WSA reports references the FAA report on Aviation Noise Effects which suggests that property values may experience a decrease in value between 0.6 and 2.3 percent. Other data on the relationship between changes to property values and airport noise, typically are associated with large, commercial airports that have frequent take-offs and landings by heavy jets (i.e. DC-10s, 747, etc.). Economists generally agree that property near to or around small, general aviation airports with fewer operations would be at the low end of the measured scale.

Comment	Consultant Response
30. Surely if one is thinking in terms of a viable business plan one would have accomplished due diligence to have all the basic economic facts to inform projections, and be able to point to comparable airport expansions to gain confidence in the success of these projections.	30. The cost benefit analysis is not intended to be a viable business plan but rather an inventory of likely, or potential, benefits and costs.
31. The Chair of BCIC promoted the "compromise" option of the smaller expansion. He added, if there were to be empirical evidence that a longer runway would have a positive effect, then they would support that, as well. My question is, what was the empirical evidence that makes the argument for the smaller expansion? No one, as far as I know, has spoken to current businesses in town (apart from the stakeholders Air Now and BCIC), those businesses considering coming here, and those who decided not to come here to find out if the airport issue has been a calculation in their plans. Your committee must know that BCIC does not speak for all current and potential businesses.	31. See response to comment #24. Also note several local and regional businesses were contacted as part of this study. A list of stakeholders consulted and the results of this inventory are included in the full report.
32. Indeed, there are many businesses here who value the quality of life as more important than quick access to a bigger airport. David Kelso was quite articulate on the negative impacts should the airport expand. It does seem counterintuitive to think businesses would want to come here if the quality of life (including significant property values) were to decrease.	32. Agreed.
33. The airport can currently accommodate corporate jets with eight passengers. Is the argument that we need to attract those corporations that need to fly more than eight executives? (Has anyone learned how many corporations fly more than eight executives or clients in the same private plane at the same time?)	33. The airport currently has limited ability to accommodate corporate jets. According to runway length models, 95 percent of small planes with less than 10 passengers can land on a runway of at least 3,200 feet. These requirements are exclusive of insurance requirements, which are greater for airplanes carrying passengers for hire. In addition, corporate jets typically are larger than the referenced small planes in this modeled analysis.
34. There is no doubt the expansion plans are good for the growth of	34. Noted.

Comment	Consultant Response
AirNow, as they stated at the first public meeting. There is also no doubt, however, that the airport expansion has a negative impact on the quality of life of the surrounding community. Although an expansion may allow for "quieter" jets to land, it will not prevent those loud planes that currently use the airport from continuing to do so. Indeed, any expansion of the runway would also allow for other "loud" planes -- that currently cannot use the facility -- to land. Such planes include the kinds of refurbished cargo planes that could easily be a part of Air Now's future.	
35. In sum, those promoting the expansion believe the equation: longer runway results in more corporate jets and cargo planes results in more jobs results in better community. However, there does not appear to be any evidence. There are no projections based on comparable examples. There is not even a demonstrated common sense frame to support this equation. In terms of a business plan -- or for that matter a coherent and comprehensive cost/benefit analysis -- this is an unfortunately simplistic and unreal document.	35. Noted.

Appendix D: Comparisons with Similarly Sized Airports

Airport Name	Accomack County			New Market Regional Airport			Virginia Tech Regional			WH Morse State Airport		
Home County	Accomack County, VA (Eastern Shore)			Shenandoah County, VA			Montgomery County			Bennington County		
County Population(2003)*	39,025			37,199			85,614			37,178		
Median HH Income (1999)*	$30,250			$39,173			$32,330			$39,926		
Nearby Major Urban Areas	179 miles to Baltimore			72 miles to Richmond			151 miles to Greensboro, NC			114 miles to Boston, MA		
	180 miles to Washington DC			200 miles to Washington DC			190 miles to Raleigh Durham, NC			155 miles to New York City		
Closest Commecial Airport	Norfolk International (63 miles)			Richmond International (72 miles)			Roanoke (36 miles)			Albany International (39 miles)		
Secondary Commercial Airport	Richmond International (165 miles)			Washington Dulles (190 miles)			Greensboro, NC (151 miles)			Bradley (Hartford) (81 miles)		
Airport Statistics												
Runway Length	**4,999'**			**3,050'**			**4,539'**			**3,704'**		
	1990	**1995**	**2000**	**1990**	**1995**	**2000**	**1990**	**1995**	**2000**	**1990**	**1995**	**2000**
Based Aircraft	14	16	25	14	38	33	29	30	33			
Fleet Mix	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**	**2000 (Actual)**	**2005 (Actual)**	**2015 (Forecast)**
Total Based Aircraft	**25**	**30**	**41**	**33**	**36**	**39**	**33**	**35**	**39**		**41**	
Single engine piston	22	27	36	28	30	33	24	24	27		28	
Multi engine piston	2	2	3	2	2	2	3	3	3		2	
Turbo prop (multi-engine)	0	0	0	0	0	0	2	2	2		7	
Multi engine jet	0	0	0	0	0	0	0	1	2		0	
Other (helicopter, ultralight, etc.)	1	1	2	3	4	4	4	5	5		4	
Average Annual Operations	**9,429**	**11,908**	**17,277**	**12,834**	**14,247**	**17,162**	**13,805**	**15,935**	**19,713**			
Single engine piston	7,681	9,647	13,999	10,339	11,321	13,573	9,129	9,870	11,871			
Multi engine piston	792	978	1,357	778	839	961	1,177	1,256	1,449			
Turbo prop (multi-engine)	198	250	363	0	0	0	1,329	1,479	1,838			
Multi engine jet	85	107	155	0	0	0	124	886	1,473			
Other (helicopter, ultralight, etc.)	673	926	1,403	1,717	2,087	2,628	2,046	2,444	3,082			
Growth Rates												
	'00-'05	**'05-'15**	**2000-2015**	**'00-'05**	**'05-'15**	**2000-2015**	**'00-'05**	**'05-'15**	**2000-2015**	**'00-'05**	**'05-'15**	**2000-2015**
Based Aircraft p.a.	3.71%	3.17%	3.35%	1.76%	0.80%	1.12%	1.18%	1.09%	1.12%			
Total Growth	20.0%	36.7%	64.0%	9.1%	8.3%	18.2%	6.1%	11.4%	18.2%			
Operations	4.78%	3.79%	4.12%	2.11%	1.88%	1.96%	2.91%	2.15%	2.40%			
Total Growth	26.3%	45.1%	83.2%	11.0%	20.5%	33.7%	15.4%	23.7%	42.8%			
Source:												
2003 VATSP Update - Technical Report; Chapter 5												
Consultant: HTNB												

	Rutland			Lebanon NH				Saratoga County, New York		
County Population	Rutland County 63,504			Grafton County 84,038				Saratoga County 209,818		
Median HH Income	$36,743			$41,962				$49,460		
Nearest Commercial Airport	Albany (92 miles); Burlington (69			Manchester (70 miles); Burlington (95				Albany 24 miles		
Runway Length	**5,000**			two runways: 5,200' and 5,496'				two runways: 4,700' and 4,000'		
	2004 (Actual)	**2010**	**2015**	**2000 (Actual)**	**2005**	**2010**	**2020**	**1999 (Actual)**	**2005**	**2010**
Based Fleet Mix										
Single	32	32	33					58	66	76
Multi	3	6	7					2	3	5
Turbo	4	5	6					1	2	3
Jet	3	3	4					0	1	2
Rotor/Gliders/Ultralight	2	2	3					0	0	0
Total	**44**	**48**	**53**	**69**	**75**	**81**	**93**	**61**	**72**	**86**
Annual Operations/Type										
Local	10,010	11,210	12,330	23,000	25,000	26,000	29,000	21,200	22,800	24,400
Itinerant	20,857	23,360	25,700	19,000	21,000	23,000	27,000	17,300	24,250	27,590
Total	**30,867**	**34,570**	**38,030**	**42,000**	**46,000**	**49,000**	**56,000**	**38,500**	**47,050**	**51,990**
Growth Rates										
	'04-'10	**'10-'15**	**'04-'15**	**'00-'05**	**'05-'10**	**'10-'15**	**'00-'20**	**'00-'05**	**'05-'15**	**'00-'15**
Based Aircraft p.a.	1.46%	1.00%	1.71%	1.68%	1.55%	1.55%	1.50%	2.80%	3.62%	3.17%
Total Growth	9.1%	10.4%	20.5%	8.7%	8.0%	8.0%	34.8%	18.0%	19.4%	41.0%
Operations	1.91%	0.96%	1.92%	1.84%	1.27%	2.71%	1.45%	3.40%	2.02%	2.77%
Total Growth	12.0%	10.0%	23.2%	9.5%	6.5%	14.3%	33.3%	22.2%	10.5%	35.0%

Sources:
Demographic - 2003 US Census; HH Income - 1999 estimates from 2000 Census
Rutland: Rutland State Airport - Runway Safety Area Study (Draft April, 2005)
Lebanon: Airport Business Plan - Lebanon Municipal Airport (revised January 2004)
Saratoga: Saratoga County Airport Monthly Plan Update

Airports with plans to/or recent runway extensions									
Airport Name	**Middle Peninsula Airport**			**Culpeper County**			**Hampton Roads Executive**		
Home County	King and Queen County			Culpeper County			City of Hampton		
County Population(2003)*	6,585			38,555			85,614		
Median HH Income (1999)*	$35,941			$45,290			$32,330		
Nearby Major Urban Areas	35 miles to Richmond			75 miles to Washington DC			Norfolk		
	20 miles to Williamsburg			85 miles to Richmond, VA			Newport, Virginia Beach		
Closest Commecial Airport	Richmond International			Dulles International (50 miles0			Norfolk News		
Secondary Commercial Airport	Norfolk News			Richmond International (85)			Newport, Virginia Beach		
Airport Statistics									
Current Runway Length	**3700'**			**3,200' (1968); 4,002' (1983)**			**4,000'**		
Planned Runway Length	5300' (construction scheduled for 2005)			5,000' (2004)			**5,500'**		
Primary Reasons for expansion:	take regional focus, tap into tourism market			economic development; looking down the road towards charters					
	1990	**1995**	**2000**	**1990**	**1995**	**2000**	**1990**	**1995**	**2000**
Based Aircraft	16	23	30	20	90	111	140	140	147
Fleet Mix	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**	**2000 (Actual)**	**2005 (Forecast)**	**2015 (Forecast)**
Total Based Aircraft	**30**	**36**	**51**	**111**	**131**	**172**	**147**	**151**	**163**
Single engine piston	23	28	40	102	119	155	129	133	143
Multi engine piston	6	7	9	4	5	6	14	14	14
Turbo prop (multi-engine)	1	1	2	0	0	0	1	1	1
Multi engine jet	0	0	0	1	2	3	1	1	2
Other (helicopter, ultralight, etc.)	0	0	0	4	5	8	2	2	3
Average Annual Operations	**11,395**	**14,525**	**21,353**	**42,160**	**51,648**	**72,247**	**55,287**	**59,304**	**67,825**
Single engine piston	8,358	10,665	15,785	35,282	42,774	59,251	45,040	48,087	54,799
Multi engine piston	1,868	2,334	3,263	2,282	2,747	3,706	5,220	5,477	5,952
Turbo prop (multi-engine)	759	1,003	1,537	885	1,085	1,517	1,680	1,828	2,121
Multi engine jet	103	131	192	899	1,322	2,393	1,017	1,290	1,878
Other (helicopter, ultralight, etc.)	307	392	576	2,812	3,720	5,380	2,330	2,622	3,075
Growth Rates									
	'00-'05	**'05-'15**	**2000-2015**	**'00-'05**	**'05-'15**	**2000-2015**	**'00-'05**	**'05-'15**	**2000-2015**
Based Aircraft p.a.	3.71%	3.54%	3.60%	3.37%	2.76%	2.96%	0.54%	0.77%	0.69%
Total Growth	20.0%	41.7%	70.0%	18.0%	31.3%	55.0%	2.7%	7.9%	10.9%
Operations	4.97%	3.93%	4.28%	4.14%	3.41%	3.66%	1.41%	1.35%	1.37%
Total Growth	27.5%	47.0%	87.4%	22.5%	39.9%	71.4%	7.3%	14.4%	22.7%
Source:									
2003 VATSP Update - Technical Report; Chapter 5									
Consultant: HTNB									
Note: Middle Pensisula base estimates considered low; airport estimates closer to 24,000 - 26,00									

Appendix E:

Estimated relationship between Aircraft Operations and Economic Impacts

Airport	Number of Operations	Estimated (modeled) Economic Impact (1)	Ratio between Economic Impact and Operations
WH Morse	12,120	$7,630,250	$630
New Market	17,163	$532,000	$31
Danville	21,135	$2,340,000	$111
Virginia Tech	19,713	$1,653,000	$84
Accomack	17,277	$892,000	$52
			$181

Source: The Economic Impact of Vermont's Public Use Airports; Virginia Airport System Economic Impact Study; WSA
Notes: Includes direct on-airport and off-airport economic impacts only; does not include spin-off impacts.

Appendix F: Order of Magnitude Cost Estimates

Alternative 1: Runway extension to approximately 4,000'

Extend runway 370'
Construct Taxiway 'C' - 2,441'

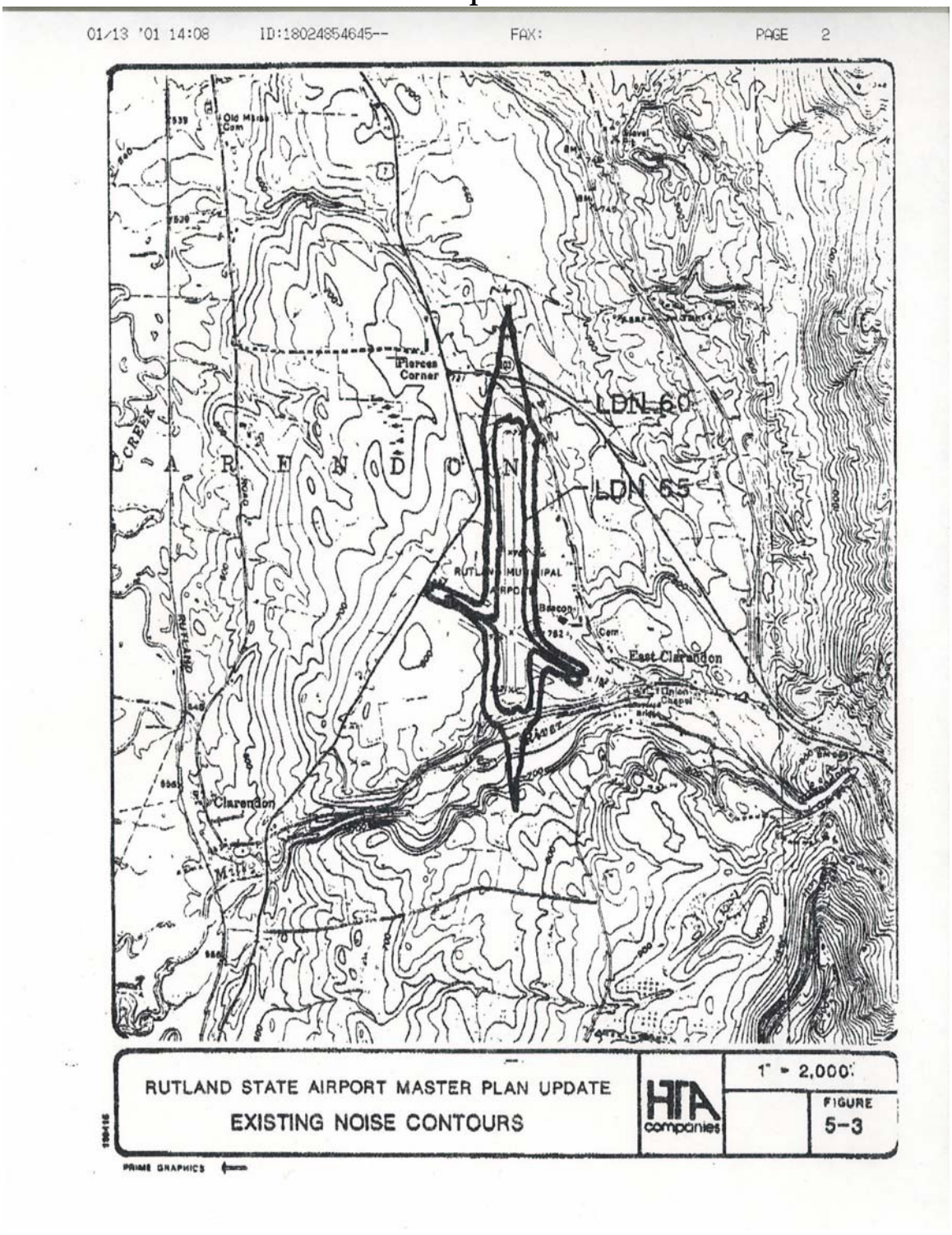
Item	Description	Units	Quantity	Unit Cost	Extended Total	
	Excavation	CY	100,000	$ 10.00	$ 1,000,000	
	Embankment	CY	25,000	$ 15.00	$ 375,000	
	Runway Pavement	SY	3,200	$ 60.00	$ 192,000	*$80/TON (P-401, 4" Thick), $15/SY (P-209, 8" ThicK), subgrade work, markings*
	Taxiway Pavement	SY	9,600	$ 60.00	$ 576,000	*$80/TON (P-401, 4" Thick), $15/SY (P-209, 8" ThicK), subgrade work, markings*
	Airfield Drainage	LS	1	$ 175,000.00	$ 175,000	
	Airfield Lighting	LS	1	$ 350,000.00	$ 350,000	*assuming runway and taxiway lighting*
				Subtotal	**$ 2,668,000**	
				10% Contingency	**$ 266,800**	
				Total	**$ 2,934,800**	

Alternative 2: Runway extension to approximately 5,000'

Extend runway 1,409'
Acquire land
Construct Taxiway 'C' - 3,480'
Relocate Walloomsac Road

Item	Description	Units	Quantity	Unit Cost	Extended Total	
	Excavation	CY	50,000	$ 10.00	$ 500,000	
	Embankment	CY	100,000	$ 15.00	$ 1,500,000	
	Runway Pavement	SY	12,000	$ 60.00	$ 720,000	*$80/TON (P-401, 4" Thick), $15/SY (P-209, 8" ThicK), subgrade work, markings*
	Taxiway Pavement	SY	13,600	$ 60.00	$ 816,000	*$80/TON (P-401, 4" Thick), $15/SY (P-209, 8" ThicK), subgrade work, markings*
	Airfield Drainage	LS	1	$ 250,000.00	$ 250,000	
	Airfield Lighting	LS	1	$ 500,000.00	$ 500,000	*assuming runway and taxiway lighting*
	Land Acquisition	AC	3		$ -	
	Walloomsac Demolition	SY	11,000	$ 25.00	$ 275,000	
	Walloomsac Construction	Mile	0.8	$ 3,000,000.00	$ 2,400,000	assume 2-lane rural road (unit cost based on FDOT, "2004 Transportation Costs")
				Subtotal	**$ 6,961,000**	
				10% Contingency	**$ 696,100**	
				Total	**$ 7,657,100**	

Appendix G: Existing (1985) Noise Contours for Rutland State Airport



Appendix H: Aircraft Types and Noise Levels Assumed for Noise Index

Single Piston Engine

Aircraft	Take-off/Departure (dBA)	Landing/Approach (dBA)
Cessna 150	56.0	59.0
Cessna 210	71.4	67.1
Cessna 182P	70.0	56.0
Piper PA-28-181	60.0	62.0
Cessna 182Q	69.0	56.0
Piper PA-46-31P Malibu	70.0	63.9
Cirrus SR 20 (2 Bladed Prop)	72.3	61.9

Source: FAA AC 36-3H, April 25, 2002

Twin Piston Engine

Aircraft	Take-off/Departure (dBA)	Landing/Approach (dBA)
Piper Comanche	56.0	70.6

Source: FAA AC 36-3H, April 25, 2002

Turbo prop Aircraft

Aircraft	Take-off/Departure (dBA)	Landing/Approach (dBA)
Beech B100 King air	61.5	77.1
Embraer EMB 110-P2	71.0	76.0
Embraer EMB 120 Brasilia	63.2	81.8

Source: FAA AC 36-3H, April 25, 2002

Light Jet

Aircraft	Take-off/Departure (dBA)	Landing/Approach (dBA)
Cessna Citation I	67.3	77.7
Cessna Citation V (560)	69.4	80.5
Cessna Citation Jet (525)	60.3	81.7
Cessna Citation Ultra	67.1	78.0
BeechJet 400	71.8	83.0
Dassault Falcom 20-F	71.4	88.9
Learjet 31	68.9	82.9
Learjet 25D	79.7	88.2
Learjet 35A	71.6	81.7
Sabre 40A	83.4	92.0
Learjet 24E	73.1	88.3

Source: FAA AC 36-3H, April 25, 2002

Appendix I: Selected Property Values in vicinity of WH Morse State Airport (*used to estimate average property value only – not intended as list of all properties potentially affected by airport development*).

Address	Value	Parcel #
386 Quarry Road	188,300	
491Dermoody Road	184,700	
981 Walloomsac	237,400	
29 Monument Avenue	603,400	
1003 Monument Avenue	195,100	
11 West Road	392,200	
546 Dermoody Road	104,200	
110 Monument Avenue	325,700	
Houran Road	20,900	
257 Austin Hill	212,000	
229 Walloomsac	232,700	
590 Airport Road	194,700	
549 Houran Road	91,100	
159 Austin Hill	106,300	
1382 Walloomsac	117,800	
2530 Monument Avenue	141,300	
224 Quarry	136,000	
304 Austin Hill	157,600	
40 Monument Avenue	359,200	
535 Dermoody Road	136,700	
588 Dermoody Road	132,700	
74 Monument Avenue	437,300	
694 Walloomsac	143,800	
55 Dermoody Road	112,900	
85-87 Monument Avenue	268,300	
1938 West Road	94,900	
100 Monument Avenue	372,600	
Walloomsac	35,900	40-50-01-16
19 Pippin Knoll	251,400	
1702 West Road	94,300	
695 Dermoody Road	132,200	
120 Monument Avenue	183,800	
515 Quarry	171,900	
302 Airport	49,500	
2968 West Road	285,800	
400 Pippin Knoll	182,700	
34 West Road	281,800	
989 Monument Avenue	173,600	
945 Monument Avenue	140,600	
Airport Road	25,200	40-50-01-04
2100 Monument Avenue	156,500	
482 Dermoody	110,800	

163 Dermoody	102,900	
Walloomsac	33,700	40-50-01-12
Airport Road	34,500	40-50-01-02
1914 Walloomsac	244,100	
133 Houran Road	149,600	
638 Dermoody Road	165,100	
40 West Road	282,500	
394 Dermoody Road	109,000	
1084 Monument Avenue	144,200	
1128 Monument Avenue	223,600	
881 Monument Avenue	150,300	
740 Airport Road	111,400	
Pleasant Valley	53,100	07-01-47-00
1107 Pleasant Valley	282,900	
Pleasant Valley	10,100	07-01-39-00
274 Walloomsac	182,900	
88 Monument Avenue	373,500	
306 Walloomsac	169,500	
11 Monument Avenue	339,000	
331 Austin Hill	125,600	
324 Pippin Knoll	207,000	
229 Pleasant Valley	96,000	
54 Airport Road	93,000	
2523 Monument Avenue	183,000	
1704 Monument Avenue	224,600	
195 Walloomsac	292,100	
Walloomsac	33,700	40-50-01-10
33 Monument Avenue	267,400	
1750 West Road	94,200	
57 Monument Avenue	281,900	
775 Pleasant Valley	157,900	
2082 West Road	200,900	
Pleasant Valley	65,700	07-01-45-00
Walloomsac	77,600	40-50-01-17
9 Monument Avenue	305,000	
422 Dermoody Road	113,000	
548 Houran	210,300	
309 Dermoody Road	144,300	
550 Dermoody Road	144,900	
34 Monument Avenue	216,500	
West Road	49,900	46-50-37-00
Dermoody	61,000	46-50-15-00
West Road	159,600	42-50-38-00
97 Monument Avenue	121,600	
101 Monument Avenue	142,200	
417 Austin Hill	127,900	
703 West Road	112,800	
77 Monument Avenue	316,600	

566 Walloomsac	184,800	
Airport Road	35,900	40-50-01-14
230 Walloomsac	221,100	
57 Houran	155,200	
12 Dermoody Road	139,300	
203 Pippin Knoll	227,200	
515 Walloomsac	118,400	
Walloomsac	29,900	42-50-39-01
1730 Monument Avenue	231,500	
20 Monument Avenue	216,600	
1101 Monument Avenue	226,400	
664 Walloomsac	142,700	
630 Walloomsac	144,900	
1510 Pleasant Valley	437,700	
1940 West Road	131,600	
568 Houran	130,400	
507 Walloomsac	118,300	
2320 West Road	115,300	
287 Houran	308,200	
106 Airport Road	102,000	
834 Dermoody	147,100	
Total Value	**$19,328,400**	
Average Value Per Unit	**$191,370**	

Source: Town of Bennington Assessor's Office