

APPENDIX 9-B: METHODOLOGY

B.1 INTRODUCTION

This Appendix presents the methodology for estimating the economic contribution of the New Hampshire State Airport System (NHSASP) to the state and local economies in 2013. The economic contribution of the airport system includes three components that are quantified as part of this study.

- **On-airport economic activity** – The on-airport economic activity includes airport management and maintenance jobs as well jobs at airport tenant businesses.
- **Spending impacts or multiplier effect on State economy** – This off-airport effect is triggered by spending by airport management, airport tenants, airport and airport tenant employees, and visiting air passengers and pilots. As this spending is circulated throughout the state economy, additional jobs, labor income, output and tax revenues will be generated at other businesses throughout the state. These additional impacts were estimated using input-output modeling techniques and the IMPLAN modeling system.
- **Travel time savings for general aviation business travelers** – The travel time savings provided by general aviation constitute cost savings for the businesses with employees traveling on-the-clock. Business owners pass the cost savings on to customers, reinvest them into their business, or treat them as profit.

In addition to the three economic effects listed above, the airport provides benefits to residents and businesses that are not easily quantifiable. Functions range from emergency preparedness and response, to the transportation of people and freight and aerial surveying, to quality of life improvements such as access to recreational flying and space for community events.

The following narrative provides a description of data collection efforts and assumptions underlying the inputs for the analysis. Also provided is an overview of input-output modeling and of the methodologies employed to estimate tax revenues and to estimate and monetize travel time savings obtained by general aviation travelers.

B.1.1 DATA COLLECTION

At the start of this assessment, the study team conducted an extensive data collection effort that focused on the 12 airports that are part of the NPIAS. One exception was the Manchester-Boston Regional Airport where a limited data collection effort was undertaken and supplemented with information provided in an economic study completed by the airport in 2009. The data collection effort consisted of three components:

- Airport Management Survey and Interviews;
- Airport Tenant survey; and
- Visitor Survey

Airport Management Survey

The study team provided the 12 NPIAS airports with a detailed data request. The data request included questions about the airport operations and capital spending as well as information about airport tenants, airport users, and airport activities.

Data items requested include:

- Number of Employees, including full- and part-time employees; by employee county of residence;
- Employee Compensation, which includes salaries, wages and benefits; by employee county of residence;
- Airport operation and maintenance expenditures in 2010, broken down by product;
- Airport capital expenditures in 2008, 2009 and 2010;
- List of on-airport businesses;
- List of major airport users and off-airport dependent businesses; and
- Airport activities

Airport Tenant Survey

To supplement the airport tenant data provided by airport management, a separate survey of airport tenants was conducted to ascertain the characteristics of on-airport businesses. The survey questions gathered general data regarding revenues, payroll, and employment. In order to more accurately model the economic impact of the airport, in cases where data was either incomplete or unavailable, estimates were used based on similar businesses.

Visitor Survey

Spending by visitors arriving by general aviation supports jobs at businesses throughout the state. To estimate the jobs that are supported by general aviation visitors, a visitor survey was distributed. Information collected included: the primary reason for visit, general pilot and passenger information, and estimated expenditures.

Data Collection Summary

As described, the data collection effort included three separate surveys that targeted three specific groups: Airport management, airport tenants or businesses, and airport visitors. The response rate varied for each group. Outreach efforts included: scheduled airport management interviews, airport tenant visits to distribute tenant surveys, airport visitor surveys placed in high traffic locations, primarily at full service fixed base operators (FBOs), and posters which were made available in order to promote study participation. Tenant survey participation was low due in large part to the sensitivity of economic data and willingness to share it. Airport visitor data was also low, likely due to the data collection window falling within the winter season when most GA airports experience lower traffic volumes. Where data was limited or unavailable, similar economic

studies conducted for state aviation departments were analyzed, adjusted for New Hampshire as necessary, and incorporated.

B.1.2 SOURCES AND ASSUMPTIONS

This section outlines the sources of the key inputs to the analysis and underlying assumptions. Key inputs include:

- On-airport employment;
- Airport capital spending;
- Airport and tenant operations and maintenance spending;
- Visitors and visitor spending; and
- Travel time savings

On-Airport Employment

On-airport employment obtained from the airport management and airport tenant surveys. The following assumptions were made for airports and airport tenants for which the number of employees was not provided:

- For Manchester-Boston Regional Airport, the employment estimates from the 2009 economic impact study were adjusted based changes in the level of passengers, general aviation operations and cargo since 2009.
- For Dillant-Hopkins Airport (Keene) the employment projections presented in the airport's 2012 economic impact study were used for the 2013 employment levels.
- For the other 10 NPIAS airports, the employment number was obtained from the airport management and airport tenant surveys. Where direct airport employment levels were unavailable, employment was estimated based on responses from system airports with similar levels of annual operations. Missing employment data at tenant business was estimated based on responses from similar businesses at airports of similar size and function.

Airport Capital Expenditures

The airport system contributes to the state and local economy through airport capital projects such as runway, taxiway, and apron rehabilitation and construction, hangar construction, and equipment purchase, as well as various airport related studies and assessments. Capital budgets for each of the 12 NPIAS airports for FY2010-2012 were obtained from NHDOT and from the airport management survey. Since airport capital expenditures vary from year to year, annual cost was estimated by averaging capital project cost in FY2010-2012.

Airport Operation and Maintenance Expenditures

Airport non-labor operation and maintenance (O&M) expenditures support jobs at airport vendors and supplying industries. Similarly, an airport's payroll is used by employees for household spending such as food, transportation, education, personal services, health services, and entertainment. Furthermore, this spending supports jobs at the

businesses providing these goods and services, as well as their suppliers. Estimates of labor and non-labor O&M expenditures were obtained from the airport management survey. Where information was not provided by airport management, expenditures were estimated based on responses from airports in the system that were similar with regard to the level of operations.

Tenant Operation and Maintenance Expenditures

Like the airport itself, airport tenants support jobs at other businesses in the state through their labor and non-labor O&M expenditures. Labor and non-labor O&M expenditures were obtained from the airport tenant survey or estimated based on the number of on-airport employees by industry. The latter assumed that labor and non-labor expenditures per employee at on-airport tenant business are equal to the industry's statewide average.

Visitors Spending

Many tourists and other visitors arrive in New Hampshire by air. Their spending on lodging, food, entertainment and other goods and services supports jobs throughout the state. The majority of the visitors arrive by commercial air although general aviation also brings visitors to the state.

Visitors arriving by commercial air

Spending by visitors arriving by commercial air was based on the 2009 economic impact study of Manchester-Boston Regional Airport. In the study, visitors are assumed to account for 44 percent of the total arriving passengers. The study defined visitors as persons residing outside of New Hampshire, Vermont, Maine and Massachusetts. The 2009 Manchester economic impact study also reported visiting air passenger spent an average of about \$500 (adjusted for inflation) per person per trip in New Hampshire on lodging, food and beverages, retail and other

Table B-1 - Average Visitor Spending, Commercial Service

Average Expenditures per visitor per trip	
Lodging	\$283
Food and Beverages	\$142
Retail	\$50
Other	\$23
TOTAL	\$498

Source: 2009 Manchester Airport Economic Impact Study, BLS

expenditures (**Table B-1**).

The assumptions of the 2009 Manchester study were applied to air passenger arrival counts from the FAA for Manchester-Boston Regional Airport as well as for Lebanon Municipal Airport to estimate total visitor spending for these airports. While commercial service became once again available at Portsmouth International Airport at Pease in the fall of 2013, service was limited to Florida and is therefore likely to be mostly used by New England residents traveling to Florida.

Visitors arriving at general aviation airports

Spending by visitors arriving by general aviation airports was estimated making assumptions about the number of aircraft, number of visitors per aircraft, and the average spending per visitor per trip. The assumptions are presented in **Table B-2**.

Number of visiting aircraft

Based on a review of similar airports in neighboring states, it was assumed that 65 percent of itinerant general aviation operation at primary and national airports was by visitors coming from out-of-state or out-of-market area. For regional, local and basic airports, it was assumed that 33 percent of itinerant operations were made by visitors. The latter is based on the 2012 Massachusetts Economic Impact study, which estimates the impact of a comparable New England state system

Table B-2 - Data Inputs Visitor Spending Estimate

	Percent of Itinerant Operations that are Visitors	Visitors per aircraft	Spending per Visitor
Primary	65%	2.8	\$220
National	65%	2.8	\$220
Regional	33%	2.3	\$155
Local	33%	2.0	\$113
Basic	33%	1.7	\$77

Source: Consultant Assumptions

with airports of similar size and function.

Average visitors per aircraft

The average number of passenger per aircraft is dependent on the type of aircraft and differs therefore by airport role; Local and basic airport are typically used by smaller aircraft. Based on the survey, the average number of visitors per aircraft was 2.8 at primary airports (Portsmouth) and 2.3 at regional airports (Concord). The 2009 economic impact study for Massachusetts presented averages that were similar, albeit slightly higher, for comparable airports. Since survey data was not available for local and basic airports, the average number of visitors per aircraft for these studies was estimated by reducing the averages reported in the Massachusetts study by roughly 5 percent, to account for the lower average number of passenger at New Hampshire airports.

Spending per visitor

The visitor survey ascertained off-airport expenditures: lodging, food and beverage, ground transportation, auto fuel, retail, entertainment, and other purchases. Based on survey responses, visitors to Portsmouth International Airport spent on an average of \$220 per visitor per trip while Concord Airport visitors spent an average of \$155 per trip. Where visitor information was unavailable at other similar system airports, the averages presented above were used. National and primary airports were assumed to be \$220/visitor while regional airports were assumed to be \$155/visitor. Visitor spending information at the basic and local airports was unavailable. In order to make reasonable assumptions for these facilities, an analysis of visitor spending presented in a 2012 Massachusetts report was performed and showed that New Hampshire

visitors spent on average 10 percent less than Massachusetts visitors. Therefore, the spending used by visitors at local and basic in New Hampshire was based on similar Massachusetts airports and reduced by 10 percent. These assumptions are presented in the following table.

Table B-3 - Average Spending per General Aviation Visitor

	New Hampshire	Massachusetts
Primary	\$220	\$240
National	\$220	\$240
Regional	\$155	\$175
Local	\$113	\$125

Source: The Louis Berger Group (New Hampshire); Massachusetts Economic Impact Study (Massachusetts)

Travel Time Savings

In most cases, general aviation airports enhance overall productivity for business travelers because they are more convenient and less restrictive. A survey conducted for the National Business Aviation Association (NBAA) and the General Aviation Manufacturers Association (GAMA) found that travelers on general aviation aircraft are more likely to spend their time productively compared to travelers using other modes.

The travel time savings are calculated based on the formula below and each of the variables are explained in more detail below.

$$\text{Number of Business Flights} * \text{Average Number of Passengers per Flight} * \text{Number of hours saved per Flight} * \text{Value of one hour saved}$$

Number of Business Flights

GA airports experience a certain level of operations conducted for business purposes by general aviation aircraft, big and small. The number of business travelers was estimated based on the number of itinerant operations at each of the airports. Assumptions about the proportion of itinerant operations that were for business purpose are presented in **Table B-4**.

Table B-4 - Business Travel

	Percent of Itinerant Operations that are Business Flights
Primary	30%
National	30%
Regional	30%
Local	10%
Basic	1%

Source: Consultant Assumptions

Inventory data collected from national and regional airports such as Nashua and Keene reported that an estimated 30 percent of itinerant operations were for business purposes. Local airports (Berlin, Skyhaven and Claremont) reported a percentage of business flights between

1 and 40 percent. This assessment conservatively assumes that 30 percent of itinerant operations at the primary, national and regional airports and 10 percent of the itinerant operations at local airports were for business purposes. Since non-NPIAS airports were not part of our survey program, data from basic airports was unavailable. However, based on the characteristics of basic airports, it was assumed that business activity is minimal. In these cases, the percentage of itinerant operations used for business was assigned a value of 1 percent.

Average Number of Passengers per Business Flight

Since data collected at system airports did not present a reliable estimate of passengers per business flight this assessment assigned a value based on a 2009 report from the NBAA and GAMA. It was assumed that the average number of passengers per business aircraft was 3.4.

Travel Time Savings

Without security check-in procedures and wait times for baggage and curbside transportation, general aviation airports provide a more convenient experience for business travelers. Most importantly, GA airports allow a customizable route between specific locations and saves valuable time. This assessment assumes that general aviation business travelers save an average of two hours to and from their destination.

Value of Travel Time

The value of the travel time savings are typically quantified using the value of time (VOT) metric, which is an estimate of the amount the average individual is willing to pay for one hour of travel time savings. For business trips during which the traveler is paid for his time spent traveling, travel time savings constitute a benefit to the individual traveler as well as the employer. To estimate the cost savings for employers, VOT for business travelers is often set to equal hourly wage. Recent DOT guidelines recommend adjusting VOT of business air travelers by a factor of 2.5 to take into account the higher average income of business air travelers. Using the average annual pay in the state of \$48,963 as reported by the Bureau of Labor Statistics multiplied by a factor of 2.5 to take into account the higher average income of business air travelers, the average VOT was estimated as \$59.

$$\text{Value of Travel Time Savings} = \frac{\text{Average Annual Pay/Hours Worked}}{\text{per Year}}$$

- Average Annual Pay in New Hampshire of \$48,963 as reported by the Bureau of Labor Statics
- 2,080 hours worked in one year

Input-output Modeling

IMPLAN was used to quantify the multiplier effect triggered by regional spending by the airport management, tenants, employees and visitors. IMPLAN is an input-output modeling system that was originally created by the US Forest Service to help it gauge the effects of its policies. This model has since grown in popularity for use in economic impact

studies for a wide range of economic sectors. IMPLAN has undergone several rounds of refinements since its inception. The latest version was released in 2009 and includes the ability to conduct multi-regional analyses.

Multiplier Effect - The multiplier effect consists of three distinct effects presented below.

- The direct impact is the initial change in demand resulting from the project, investment, or business operation under study. The direct effect is the economic activity that triggers the rest of the multiplier effect. The direct effect of the NHSAS is the on-airport economic activity including the airport employment, employment at airport tenants.
- The indirect impact is the change in economic activity in those sectors that supply services, materials, and machinery necessary to support the directly affected industries. For example, an increase in orders for aircraft will result in an increased demand for aircraft parts. This increase in demand for aircraft parts will generate additional activity involved in providing raw materials, energy, and transportation for manufacturing parts, which in turn provides stimulus to the industries supplying those industries. This ripple effect stemming from a change in final demand for products and services in the directly affected industry is multiplied throughout the economy and can account for a significant amount of the total effect.
- The induced impact is the effect of increased consumer spending by wage earners in the directly and indirectly affected industries. The ripple effect from this spending can also be followed through the economy. For this report, the induced impact is composed of jobs supported by airport employees, other on-airport employees and employees of all the other directly and indirectly affected businesses.

Together, the direct, indirect and induced impacts constitute the multiplier effect, to the extent to which the direct impact results in other economic activity. Expressed numerically, a multiplier of 2.5 indicates that for every dollar directly generated by the industry under study, an additional \$1.50 of ripple effects are felt within the state, for a total impact of \$2.50.

Tax Methodology

New Hampshire is one of two states in the U.S. without personal income tax and sales tax. The three primary sources of state tax revenue are business profit tax, enterprise tax, and meal and rooms tax.

- **Business profit tax** – 8 percent tax on income from conducting business activity within the state as well as a portion of the income for interstate businesses.
- **Business enterprise tax** – 0.75 percent on the enterprise value tax base, which is defined as the sum of all compensation paid or accrued, interest paid or accrued, and dividends paid, after special adjustments and apportionment.
- **Meals and rooms tax** – 9 percent tax on hotels, campsites, motor vehicle rentals, and restaurant meals.

Business Profit and Enterprise Tax

To estimate Business Profit and Enterprise tax revenues directly and indirectly generated, an effective tax rate was developed for business profit tax and enterprise tax. The effective rate was estimated based on the historical relationship between tax revenue and total output. More specifically, it was calculated by dividing (1) the sum of 2012 business profit tax revenue and business enterprise tax revenue as reported by the New Hampshire Department of Revenue Administration by (2) the 2012 output included in the IMPLAN system.

Table B-5 - Business Profit and Enterprise Tax Effective Rate

	Tax Revenues and Effective Rate
Business Profit Tax Revenue (in \$M)	\$309.1
Business Enterprise Tax Revenue (in \$M)	\$195.9
Labor Income (in \$M)	\$119,140.7
Effective Combined Business Profit and Business Enterprise Tax Rate	0.42%

Source: Consultant Calculations

The resulting combined business profit and business enterprise tax is 0.42 percent. This rate is applied to the total economic output generated by the New Hampshire Airport System including the multiplier effect.

Meals and Room Tax

Meals and Room tax generated by air passenger and general aviation visitor spending was estimated by applying the 9 percent tax rate to spending on lodging and on food and beverages.