CHAPTER 3 - FORECASTS OF AVIATION ACTIVITY

3.1. INTRODUCTION

This chapter estimates the Airport's current activity forward 20-years, in three planning periods. Projecting future aviation activity at an airport is one of the most critical and vital steps in the master planning process. All master plan recommendations for facility needs, both airside and landside, are directly affected by the projected aviation activity levels presented in this chapter. To develop the most realistic forecasts possible, a solid understanding of current and historical airport operations, industry trends, and socioeconomic conditions within the Airport's primary service area (i.e., market area) is vital. The variables, when factored into a range of forecast scenarios that, together, make up the master plan estimates.

The FAA has the oversight responsibility to review and approve aviation forecasts developed in this chapter. The FAA considers the forecasts to compare them to its Terminal Area Forecasts (TAF) and the National Plan of Integrated Airports System (NPIAS). There is almost always a disparity between the TAF and the Master Plan forecasts because the TAF forecasts do not consider local conditions or recent trends. Also, aviation activity forecasts may be an essential input to future benefit-cost analyses associated with airport development, and the FAA reviews these analyses when Federal funding requests are submitted.

3.2. FAA APPROVAL

The forecasts were initially prepared in January 2019 and approved by the FAA on February 8, 2019.[1] These projections provided the basis for assessing facility requirements, implementation planning, and other analyses as part of the master plan update.

3.3. AIRPORT MASTER PLANNING PROCESS

The forecast analysis for BAF follows the guidelines outlined in FAA Advisory Circular (AC) 150/5070-5B, *Airport Master Plans*. Forecasts are the basis for effective decision-making in airport planning. Therefore, in developing the forecasts for the Westfield-Barnes Regional Airport, the process followed must:

- Be realistic
- Be based on the latest available data
- Reflect current conditions at the Airport
- Be supported by information in the study
- Provide adequate justification for airport planning and development

Other forecasts, such as those in the last update, the FAA's Terminal Area Forecasts[2], and the MA State Airport Systems Plan,[3] were examined and compared against the current and historical activity. The

[1] Letter, FAA (L. Lesperance) to BAF (E. Billowitz) 2/8/2019.
[2] Terminal Area Forecasts are the official FAA forecasts of aviation activity for U.S. airports.
[3] Massachusetts State Airport Systems Plan. Prepared by Massachusetts Department of Transportation, Aeronautics Division (2010).

historical aviation activity is considered alongside other factors and trends that could affect demand. The intent is to integrate the updated aviation demand projections for the Airport into the facility needs analysis of this report.

The forecast process consists of a series of necessary steps that can vary depending upon the issues addressed and the level of effort required to develop the estimates. These necessary steps include a review of previous forecasts, determination of data needs, identification of data sources, a collection of that data, selection of projection methods, preparation of the estimates, and evaluation of documentation of the results. FAA guidelines (AC 5070-6B, *Airport Master Plans*) outline seven standard steps in the forecast process.

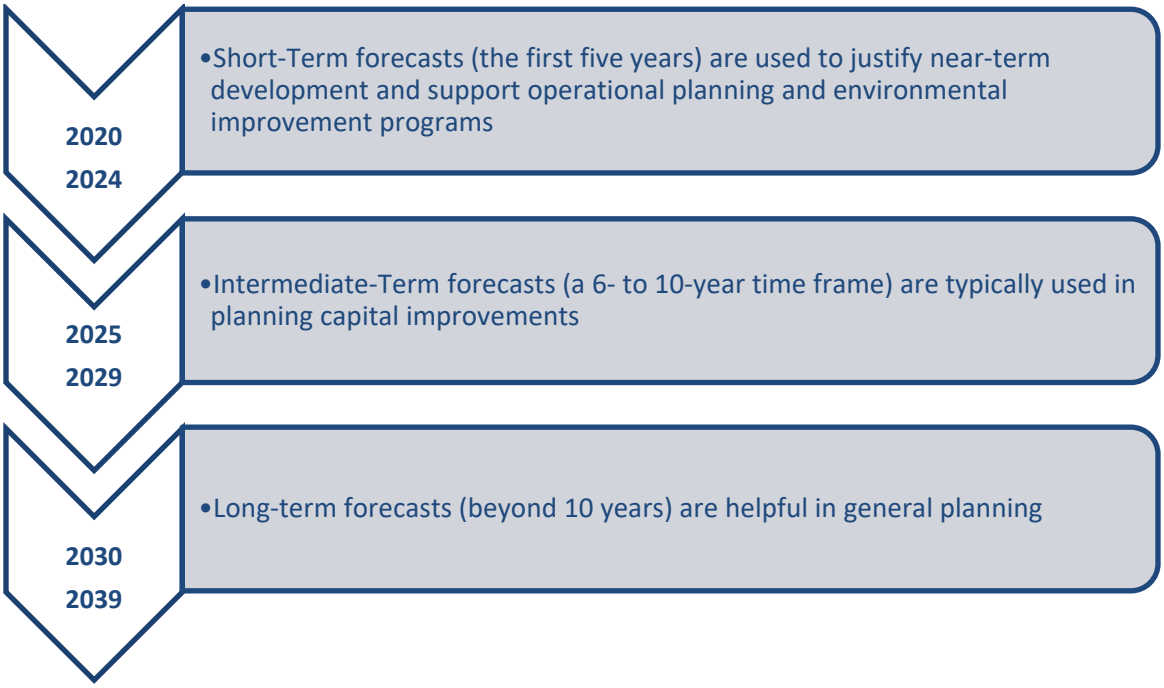
- Identify Aviation Activity Measures. These are the aviation activities that would affect the capacity of airport facilities. For general aviation, this typically includes based aircraft and operations.
- Review Previous Airport Forecasts. The previous forecasts include the FAA Terminal Area Forecast (TAF), any state or regional system plans, and previous master plans
- Gather Data. Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecasted data.
- Select Forecast Methods. There are several appropriate methodologies and techniques available; in this study, a trend analysis of historical local, regional, and national data, compared to state and national projected activity and professional judgment, is used to determine future actions.
- Apply Forecast Methods and Evaluate Results. Finally, prepare the actual forecasts and assess for reasonableness.
- Summarize and Document Results. Provide supporting text and tables to explain the rationale behind the projections.
- Compare Forecast Results with the TAF. Follow the guidance in FAA Order 5090.3C. In part, the Order indicates that forecasts should not vary significantly (more than 10%) from the TAF. When there is a variance higher than 10%, supporting documentation should be supplied to the FAA.

3.4. FORECASTING METHODOLOGY

Choosing the appropriate methodology is critical to developing forecasts that allow for adequate planning for future system needs. The approach used to create forecasts for this update involves identifying historical relationships between national, regional, state, and local estimates, as available, and operational and based aircraft data. Demand projections for general aviation aircraft operations and based aircraft for this effort were primarily developed by analyzing historical trends nationally and statewide. This historical trending analysis combined with growth rates from the FAA Aerospace Forecast for Fiscal Years 2019-2038 was the chosen methodology for this forecast effort.

Utilizing this information for a master plan forecast is an industry-accepted practice and an appropriate level of effort for this system plan. Other methodologies commonly used to predict aviation activity (e.g., regression analysis) were not employed.

It is important to emphasize that aviation forecasting is not an "exact science." Hence, expert judgment and practical considerations ultimately influence the level of detail and effort required to establish a reasonable aviation forecast and develop decisions that result from them. This forecasting effort looks forward in five, ten, and 20-year increments. Historically, the general aviation industry has been highly cyclical, exhibiting vigorous growth during economic expansions and negative growth during economic uncertainty.



3.5. FACTORS INFLUENCING AVIATION ACTIVITY

Aviation activity is impacted by a range of local, regional, or national events, making it difficult to predict year-to-year fluctuations of the activity or to forecast growth, particularly 20 years from now. Therefore, it is essential to remember that estimates serve only as guidelines, and planning must remain flexible enough to respond to a range of unexpected developments.

The following forecast analysis for Westfield followed these basic guidelines:

- Current estimates at the national and state level are examined and compared against current and historical activity at the Airport.
- Consider the historical aviation activity along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections that permit

Westfield officials to make planning adjustments necessary to maintain a viable, efficient, and cost-effective facility.

3.6. BASELINE FORECAST DATA

For this 20-year forecast, Westfield-Barnes Regional Airport data as of January 2019 serves as the baseline or starting point from where the forecasting begins.

3.6.1. Operations

The number of existing aircraft operations begins with the baseline data development in Chapter 2, Inventory of Existing Conditions. Table 3.1 - Forecast Baseline Operations breaks out operations by aircraft category, including the assumed 2.5% increase in operations during the period when the control tower is closed.

Table 3.1 - Forecast Baseline Operations

AIRCRAFT CATEGORY	OPERATIONS	RATIO
Air Carrier	25	0.1%
Air Taxi	828	2.0%
General Aviation Local	15,978	38.6%
General Aviation Itinerant	19,201	46.4%
Military	5,382	13.0%

Source: Federal Aviation Administration
Includes 2.5% additional assumed operations during a period when the control tower is closed.

3.6.2. Based Aircraft

Projections for the number of general aviation aircraft at the Airport determine general aviation facility needs and anticipated operations, and projected revenue derived from fuel sales. Table 3.2 - Forecast Baseline Civil Aircraft Fleet Mix provides the breakdown of the 2015 airport-based aircraft by category. Typical of many GA airports in the United States, most based aircraft at BAF are single-engine piston types. Therefore, the total based aircraft count represents .10% of all based aircraft in the United States and 7.6% of based aircraft in the state.

Table 3.2 - Forecast Baseline Civil Aircraft Fleet Mix

AIRCRAFT CATEGORY	COUNT	RATIO
Single Engine Piston	100	87.0%
Multi Engine Piston	6	5.0%
Helicopter	1	2.6%
Jet	4	5.2%
Total Based Civil Aircraft	**111**	**100%**
State Total	**1,460**	**7.6%**
National Total	**115,243**	**0.10%**

Source: FAA 5010-1, dated December 2018

3.7. NATIONAL FORECASTS

As with baseline operations data, the forecast factors are collected from multiple sources and adjusted as necessary based on the Airport, market, and industry conditions. Two primary sources of national data were used in preparing the forecasts.

- FAA Terminal Area Forecast (TAF) (as of December 2018)
- FAA Aerospace Forecast, Fiscal Years (2018 – 2038)

3.7.1. Terminal Area Forecasts (TAF)

The TAF is the FAA's forecast of aviation activity for US airports. The FAA prepares estimates for the National Airspace System; these categories include air carrier, air taxi/commuter, general aviation, and military. The TAF is prepared to meet the budget and planning needs of the FAA and provide information for use by state and local authorities, the aviation industry, and the public. Moreover, while the FAA does not encourage the sole use of the TAF as the Airport's forecast, it is standard practice to use the TAF for comparison purposes.

The TAF was compared to the forecast of aviation activity for BAF developed in this chapter. Then recommendations are made for the FAA to accept any suggestions or to keep the TAF intact. Any variation of TAF to the forecasts developed in this chapter that exceeds +10% must be justified. The TAF for Westfield-Barnes Regional Airport from 2019 through 2039 is listed in Table 3.3 - Terminal Area Forecasts for Westfield-Barnes Regional Airport. Table 3.4 - TAF Comparison between BAF, Commonwealth, and United States (2019-2019) compares the TAF between the Airport, the Commonwealth, and the United States.

Table 3.3 - Terminal Area Forecasts for Westfield-Barnes Regional Airport

YEAR	ITINERANT					LOCAL			TOTAL	BA
	AC	AT	GA	MIL	TOTAL	GA	MIL	TOTAL		
2019	29	629	18,509	4,143	23,310	15,124	3,040	18,164	41,474	141
2021	29	629	18,491	4,143	23,292	15,138	3,040	18,178	41,470	146
2023	29	629	18,473	4,143	23,274	15,152	3,040	18,192	41,466	150
2025	29	629	18,455	4,143	23,256	15,166	3,040	18,206	41,462	156
2027	29	629	18,437	4,143	23,238	15,180	3,040	18,220	41,458	162
2029	29	629	18,419	4,143	23,220	15,194	3,040	18,234	41,454	168
2031	29	629	18,401	4,143	23,202	15,208	3,040	18,248	41,450	174
2033	29	629	18,383	4,143	23,184	15,222	3,040	18,262	41,446	180
2035	29	629	18,365	4,143	23,166	15,236	3,040	18,276	41,442	186
2037	29	629	18,347	4,143	23,148	15,250	3,040	18,290	41,438	192
2039	29	629	18,329	4,143	23,130	15,264	3,040	18,304	41,434	200

Source: FAA (https://taf.faa.gov)

Table 3.4 - TAF Comparison between BAF, Commonwealth, and United States (2019-2019)

YEAR	BAF	MASSACHUSETTS		UNITED STATES	
		OPERATIONS	RATIO	OPERATIONS	RATIO
2019	41,500	1,629,000	2.5%	99,359,330	0.042%
2021	41,500	1,653,000	2.5%	100,338,638	0.041%
2023	41,500	1,676,000	2.5%	101,324,356	0.041%
2025	41,500	1,701,000	2.4%	102,605,471	0.040%
2027	41,500	1,726,000	2.4%	103,950,994	0.040%
2029	41,500	1,753,000	2.4%	105,359,913	0.039%
2031	41,450	1,780,000	2.3%	106,801,574	0.039%
2033	41,400	1,807,000	2.3%	108,258,635	0.038%
2035	41,400	1,835,000	2.3%	109,769,143	0.038%
2037	41,400	1,864,000	2.2%	111,322,266	0.037%
2039	41,400	1,893,622	2.2%	112,913,147	0.037%

Source: Federal Aviation Administration
Note: Operations rounded

3.7.2. FAA Aerospace Forecasts

The second set of FAA forecasts consulted were the FAA Aerospace Forecasts, FY 2018 - 2038[4]. These provide an overview of aviation industry trends and expected growth for the commercial passenger carrier, cargo carriers, and general aviation activity segments. In addition, provided are national growth rates in enplanements, operations, fleet growth, and fleet mix for the general aviation fleet over a 20-year forecast horizon. For Westfield's forecast, the FAA Aerospace Forecasts formed part of the basis for determining the growth of the general aviation fleet at BAF and its composition by type of aircraft (i.e., general aviation fleet mix).

Forecasts for Westfield begin with examining the national historical and projected changes with the US general aviation market, especially the number of fleet aircraft, the fleet mix, and estimated hours flown.

The 2018 Aerospace Forecasts predict that as the economy recovers from the worst economic downturn since World War II and the slowest expansion in recent history, aviation will see positive growth over the long run. However, this is more applicable to the commercial sector than to the struggling general aviation market. While commercial air travel and air cargo have seen a significant increase in passenger enplanements and goods moved, the general aviation end of the market has not been productive. Still, while the recreational fleet has been in a slow decline for the past ten years due to fuel prices and the general economy, the high-end general aviation market (i.e., business jet fleets) has grown faster than the commercial market.

[4] FAA Aerospace Forecasts, 2018 – 2038 (https://www.faa.gov/data_research/aviation/aerospace_forecasts/)

As noted in the Aerospace Forecasts, the general aviation market continues its recovery, focusing on the high-end business-related sector. Continued concerns about safety, security, and flight delays involving commercial air travel keep business aviation attractive. In 2014, the turbojet sector recorded its first increase in deliveries by US manufacturers since 2008. In addition, for the third year in a row, single-engine piston deliveries have increased but remain well below historical trends dating back to circa 1970 –2000.

While it is slightly lower than predicted last year, the growth in business aviation demand over the long term also expands regarding aircraft, flight hours, and passenger movement. The FAA predicts business usage of general aviation aircraft expanding faster than that for personal and recreational use. Increased demand for turboprop aircraft, which are accessible and often used for business purposes, also contributes to increased turbine fleet and hours flown. However, sales of turboprop aircraft decreased by 2.1 percent in 2016 compared to the previous year. As the fleet grows, the number of general aviation hours flown is projected to increase an average of .9% per year through 2038.

General aviation highlights from the 2018 – 2038 forecasts include four essential elements: Fuel sales, fleet aircraft, hours flow, and active pilots. The following sections address each of the four elements.

- **National Fuel Sales Projections.** This data indicates how much fuel the FAA forecasts in future sales to both turbine aircraft that use Jet A fuel and piston aircraft that use 100LL (also referred to as Avgas). As noted in Table **3.5** - National Fuel Sales Projections (2018-2037), jet fuel sales are expected to increase by 1.9% over the planning period. On the contrary, Avgas sales are projected to decrease by approximately 0.4% throughout the same period. The latter is a function of declining operating hours by recreational aircraft – the primary users of this type of fuel – and a transition from gasoline-based fuels to kerosene and plant-based fuels.

Table 3.5 - National Fuel Sales Projections (2018-2037)

YEAR	AVGAS	JET A
2018	203	1,541
2022	195	1,744
2027	192	1,896
2032	190	2,038
2037	190	2,204
Avg. Annual Growth	(0.4%)	1.9%

Source: FAA Aerospace Forecasts (2018 – 2038)
Quantities in millions of gallons

- **National Fleet Aircraft Forecasts.** The industry will see a change in aircraft in the active fleet[5] in the next 20 years. As indicated in Table 3.6, the Average Annual Growth (AAG) of piston aircraft (both single and multi-engine) will decline. Five of the other six categories increase on average by 2.5% annually. Overall, the general aviation fleet is only expected to increase by

[5] Aircraft flown at least one hour per year

0.4%. However, the fastest-growing segment of general aviation, the sport aircraft category,[6] is projected to grow by over 4% during this same period.

Table 3.6. National Aircraft Production Forecasts (2021-2037)

YEAR	SE PISTON	ME PISTON	TP	JET	ROTOR	EXP	SPORT	TOTAL FLEET
2021	121,645	13,005	9,075	15,480	11,615	30,640	3,315	209,725
2026	116.335	12,765	9,570	17,345	12,560	32,065	4,125	201,735
2031	110,990	12,430	10,675	19,385	13,595	33,595	4,930	210,590
2037	105,550	11,970	12,585	22,040	15,065	35,310	5,885	213,420
AAG	(0.9%)	(0.5%)	1.4%	2.3%	1.6%	1.0%	4.1%	0.1%

Source: FAA Aerospace Forecasts (2018– 2038)
Legend: SE – Single-engine; ME – Multi-engine; TP – Turboprop; Rotor – Helicopter; Exp – Experimental

- **National Hours Flown Estimates**. Hours flew nearly mirrors changes in fleet aircraft, with positive changes in the jet, helicopter, and sport aircraft categories as identified in Table 3.8. Of interest to BAF are jet, helicopter (rotor), and sport aircraft categories, with a projected Average Annual Growth (AAG) of 2.8, 2.5, and 4.3%, respectively. Jet traffic is significant because of its direct correlation to business traffic and the airports they utilize. Helicopters are growing in popularity in both the business and recreational ends of aviation. Light sport aircraft growth is a product of the low entry cost of new aircraft into an aging GA fleet.

- **National Active Pilots Predictions.** Unfortunately, the number of active pilots in the United States is expected to continue its 20-year decline. As noted in Table 3.7, the only areas where pilots with a significant increase are in the sport pilot and rotor (helicopter) ratings[7]. However, both are confident regarding growth in the general aviation market, including Westfield.

[6] Light Sport Aircraft (LSA) is a class of simple-to-fly aircraft that meets the following definition: Maximum gross takeoff weight: 1,320 lbs; Maximum stall speed: 51 mph; Maximum speed in level flight with maximum continuous power: 138 mph.

[7] Pilot certification (commonly referred to as a pilot's license) in the United States is typically required for an individual to act as a pilot of an aircraft. Pilots must also be "rated" to fly different classes of aircraft in certain conditions (single engine, multiengine, seaplane, instrument, helicopters, gliders, light sport, etc.).

Table 3.8. National Projected Hours Flown for US Pilots (2021 - 2037)

YEAR	SE PISTON	ME PISTON	TP	JET	ROTOR	EXP	SPORT	TOTAL FLEET
2021	10,295	1,577	2,554	5,250	3,754	1,515	275	25,375
2026	9,807	1,547	2,706	6,039	4,169	1,669	351	26,451
2031	9,436	1,545	3,017	6,820	4,571	1,825	430	27,810
2037	9,187	1,566	3,561	7,736	5,124	2,007	529	29,876
AAG	(0.9%)	(0.1%)	1.6%	3.0%	2.0%	2.0%	4.6%	.9%

Source: FAA Aerospace Forecasts (2017 – 2037)

Legend: AAG – Average Annual Growth SE – Single-engine; ME – Multi-engine; TP – Turboprop; Rotor – Helicopter; Exp – Experimental

Table 3.7. National Estimated Active US Pilots (2021 - 2037)

YEAR	STUDENTS	REC	SPORT	PVT	COMM	ATP	ROTOR	GLIDER	TOTAL
2021	133,950	170	7,750	153,250	85,950	161,800	15,900	17200	575,970
2026	136,400	165	9,650	148,600	84,150	165,600	17,150	16750	578,165
2031	138,800	165	11,250	144,250	83,850	169,800	18,850	16600	583,515
2037	141,200	165	13,600	139,000	83,800	175,100	21,300	16550	590,715
AAG	0.4%	(0.3%)	4.1%	(0.7%)	(0.6%)	0.5%	1.5%	(0.4%)	0.1%

Source: FAA Aerospace Forecasts (2017 – 2037)
Legend: AAG – Average Annual Growth; REC – Recreational; PVT – Private; COMM – Commercial; ATP – Airline Transport Pilot

3.7.3. FAA Aerospace Forecast Summary

The FAA Aerospace Forecast for the period 2018-2038 indicates that while economic uncertainties still affect the business jet market, recovery is expected to continue, with a stable outlook in the long term. This outlook is because of the overall higher corporate profits and the growth of worldwide GDP[8] , and the continued concerns about safety, security, and commercial flight delays that keep business aviation attractive. In addition, industry predictions and general aviation survey results suggest an expansion in business use of general aviation aircraft at a faster pace than that for personal and recreational use.

3.8. MASSACHUSETTS STUDIES

The Massachusetts Department of Transportation, Aeronautics Division (MassDOT) prepared two studies of importance to Westfield-Barnes Regional Airport. These are the Massachusetts Statewide Airport

[8] Gross Domestic Product (GDP) is the broadest quantitative measure of a nation's total economic activity. More specifically, GDP represents the monetary value of all goods and services produced within a nation's geographic borders over a specified period.

System Plan (MSASP) and the Statewide Airport Economic Impact Study Update. The 2010 MSASP provided demand projections for airports in the Commonwealth, while the Economic Impact Study, completed in 2019, summarizes Massachusetts's significant economic benefit each year from its 39 public-use airports. Discussed in the following sections are the impact and findings of each study on the Westfield-Barnes Regional Airport.

3.8.1. State Airport System Plan

While dated, the MSASP was prepared to serve as a guide to maintain and develop airports in Massachusetts. A significant factor in developing a state airport system plan was the projection of aviation demand at the local and state levels. The market projections provide insight into how aviation activity is anticipated to change over time and the changes expected at BAF. Although nearly nine years old, the forecasts in MSASP serve as an indicator of the potential growth of aviation in the Commonwealth and, more importantly, provide an opportunity to examine the methodology used in the study to compare the methods used in this update.

3.8.1.1. MSASP Findings

Some conclusions in the MSASP may affect Westfield, including a decline in based aircraft and the stability of the number of pilots to aircraft ratio to the state's population.

- The MSASP overestimated based aircraft growth at BAF. The 2010 study estimated the number of aircraft at BAF at 141 by the end of 2018[9]. However, that number is now 110, or 22% lower than forecast. This projection is understandable because the industry trend in past years consistently overestimated aircraft numbers.

- The MSASP estimated operations in 2018 at approximately 66,500[10]; however, the actual total at the end of 2018 was 41,400, or 33% lower. Again, the conventional approach in forecasting general aviation operations over the past 20+ years has shown a steady increase, where actual numbers have declined.

- Since 2004 the total number of based aircraft in MA has declined while New England saw growth in based aircraft from 2003 until 2009.

- From 2000 to 2007, the ratio of actual aircraft to the population was stable, with some fluctuation from year to year, notably the decline in the two years following the 2001 recession.

- MA was shown to have the highest ratio of actual aircraft to the population of the New England states; the study showed a declining trend for Massachusetts over 11 years (2000-2010).

[9] Interpolated from MSASP, Figure 4-3. Unknown if this data includes military aircraft.
[10] Interpolated from MSASP, Figure 4-5.

- Excluding the data for CT, the combined average aircraft utilization for the other five New England states except 2002 showed a declining long-term trend with values significantly below those for the US.[11]

- The historical data collected for the study shows a decline in based aircraft and operations data at many of the airports inventoried in Massachusetts.

3.8.1.2. Westfield-Barnes Regional MSASP Activity Forecasts

Table 3.9 lists the past and MSASP forecasts for based aircraft, operations, and operations per based aircraft (OPBA). The forecast indicates a 1.24% increase in operations and a 1.52% of based aircraft average annual growth rate throughout 22 years. However, as noted earlier, the number of based aircraft and operations at the end of 2017 fell well short of the MSASP forecasts.

Table 3.9. MSASP Operations & Based Aircraft Forecasts for BAF

YEAR	OPERATIONS	BASED AIRCRAFT	OPBA
2008	59,179	122	485
2015	63,948	134	477
2018	66,500	141	472
2020	68,216	145	470
2030	77,619	170	457

Source: Massachusetts State Aviation Systems Plan (2010)
2018 data interpolated

3.8.2. Statewide Airport Economic Impact Study

Sponsored by the Massachusetts Department of Transportation Aeronautics Division, this study continues an overall planning effort initiated by the Aeronautics Division in 2009 with the MSASP. While the MSASP examined the structure and long-term development of the statewide airport system, the goal of the Massachusetts Statewide Airport Economic Impact Study Update was to show how aviation serves as an economic engine for the Commonwealth, as well as documenting some of the many other benefits that air transportation brings to its host communities.

The study provided a socioeconomic overview of the Commonwealth, including population, employment, income, and the state's gross product and industry mix. Moreover, it examined airport employment, payroll, and output impacts. Also, the impact state and local taxes have on the aviation industry, education, and the impact of the military has also been examined. The study provided an overview of the

[11] The long-term trend in average aircraft utilization for the New England region is less clear because of the effects of data anomalies and particularly high average utilization in Connecticut for a period of years.

Commonwealth, and more importantly, the impact aviation has on the local economy within the confines of each of the airports recognized in the analysis, including the Westfield-Barnes Regional Airport and the community it serves.

3.8.2.1. Impact Study Findings

Westfield-Barnes Regional Airport provides an excellent example of a successful public-private partnership stimulating economic development. Gulfstream Aerospace invested over $20 million in a new 100,000 square-foot hangar and added 100 new aircraft maintenance technician jobs to an existing workforce of over 130 employees. In addition, MassDOT invested $3 million in airside infrastructure improvements for the project. This successful partnership fostered the Westfield Technical Academy Aircraft Maintenance Program, which includes nearly 70 high school students training to become FAA-certified aircraft maintenance technicians.

Used by both civil and military aircraft, the Westfield-Barnes Regional Airport is an economic driver in the community. With Air and National Guard units and support from Gulfstream and other aviation-related businesses, the Airport had a total payroll of $138.5 million with a total output[12] of $236.8 million in 2018.[13]

Barnes Air National Guard Base (ANGB) is the home of the 104th Fighter Wing of the Massachusetts Air National Guard, whose mission is to provide operational military forces, including combat-ready F-15 aircraft and support elements, for peacetime operations. The operational combat arm of the 104th Fighter Wing is the 131st Fighter Squadron, which provides combat-ready pilots to perform air sovereignty and alert missions for air defense of the northeastern United States. In addition, Westfield-Barnes Regional Airport is also home to the Army National Guard 226th Division - Army Aviation Support Battalion.

Gulfstream Aerospace has been a long-time tenant at the Westfield-Barnes Regional Airport, and in 2012 the firm expanded their Northeast Aircraft Maintenance Repair Facility at the Airport. Massachusetts was competing with other states and communities for this project. This classic example of a private-public partnership provided economic development far beyond state and local officials anticipated. The Commonwealth invested $5 million for airside and landside transportation infrastructure improvements that leveraged $23 million of private funding (Gulfstream) for a 100,000-square-foot hangar facility. Additionally, Massachusetts' sales-tax exemption on aircraft parts and maintenance gives the Westfield location a distinct competitive advantage. Over 100 new jobs have been added to the location in Westfield, bringing the total to over 230 employees. These jobs pay between $60,000 and 70,000 per year, on average.

3.9. SOCIOECONOMIC TRENDS

This section examines local trends compared to national trends to assess any possible impacts on the Westfield-Barnes Regional Airport. General aviation airports are typically influenced to a lesser extent by

[12] Economic output is the total value of all goods and services produced in an economy.
[13] Massachusetts Statewide Airport Economic Impact Study Update, January 2019, CDM Smith Inc.

national and regional trends and more by the local population, per capita income, employment, airport prominence, and market-based factors such as the availability of flight training, aircraft maintenance, and hangars for rent. In addition, airports that offer superior facilities, more services, and competitive costs can attract higher passenger levels and activity. Finally, an airport's prominence (i.e., location and size of the market) can drive the aviation business.

On a regional scale, the factors that have the most significant impact on the growth prospects of an airport are its service area's socioeconomic characteristics. Market area population growth or decline has the potential to influence an airport's aviation demand directly. In addition, per capita income is a reliable indicator of a community's discretionary income and ability to afford travel. Consequently, a clear understanding of local demographic trends and economic forces is essential for developing an actual aviation activity forecast.

3.9.1. Airport Catchment Area

An airport's catchment area is the area surrounding the Airport from which it attracts its passengers and users. The size of the catchment area and the Airport's market share within the catchment area depend on the driving factors behind one's airport choice. This includes accessibility and service level offered by the Airport, which for a general aviation airport means of hangar and apron availability, fuel prices, runway length, and instrument procedures vis-à-vis surrounding airports.

An airport catchment area is the general geographic area that provides most airport users for an airport. This area evaluates the surface travel time (usually within 30 minutes of a general aviation airport and 90 minutes for a commercial service airport) between populated areas and the Airport. The location of competing airports, their capabilities and services, and their relative attractiveness and convenience are also considered to assess how an airport would likely accommodate much aviation demand. The BAF service area lies mainly in Hampden County and portions of Hampshire County of the north and Hartford County to the south in Connecticut. For planning purposes, the population and other demographics of Hampden County serve as a sample.

As shown in Figure 3.1, there are numerous public airports in the region, but three have catchment areas that overlap Westfield-Barnes'. The three airports include The Westover Metropolitan Airport, 8 miles east in Chicopee; Bradley International Airport[14], 13 miles south in Windsor Locks, Connecticut; and Northampton Airport, 11 miles northeast in Northampton. While there are several other airports near Westfield-Barnes (Turners Falls 27 miles north, Hartford-Brainard, 25 miles south, Pittsfield, 30 miles northwest, and Southbridge, 30 miles east), they are far enough from Westfield-Barnes that they do not pose a marketing risk.

[14] While Bradley is a commercial service airport, the general aviation market is the primary focus of this study.

The airports are listed in Table 3.10, and data about each airport pertains to its marketing risk to BAF.[15] Marketing risk refers to the Airport's potential capture of both the number of aircraft based at an airport and itinerant aircraft operations. The based aircraft risk refers to airport facilities and their attraction to aircraft owners regarding amenities such as hangar and apron parking runway length, approach procedures and minimums[16], food, lodging, rental cars, courtesy cars, reasonable prices, and a superior FBO that provides service beyond essential services, such as hangar parking and deicing service. The more attractive the Airport, the more likely it is that people use it, and therefore, less risky.

Of the three airports listed in Table 3.10, only Westover poses a small marketing risk to Westfield-Barnes because of its ability to handle general aviation business jet traffic. However, Westover has limited general aviation facilities, and unlike BAF, a civil airport with a military presence, CEF is a military airfield with a civil aviation presence. The other airports in the area offer a slight risk because they can park (and hangar) general aviation aircraft, thus creating a marketing challenge to BAF regarding hangar and apron availability and prices.

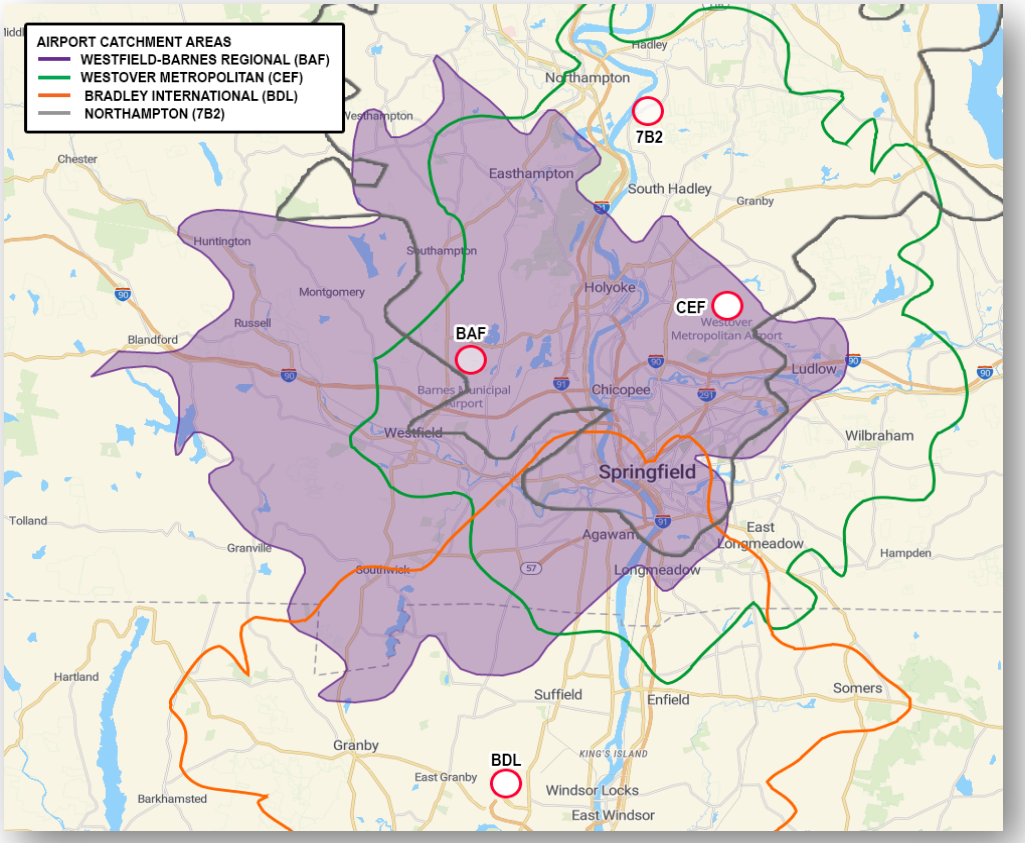


Figure 3.1. Westfield-Barnes Regional Airport Catchment Area
Source: Stantec Analysis, January 2019

[15] The marketing risk is a subjected ranking based on an assessment by Stantec Consulting Services.
[16] Minimums refer to how close and how low an aircraft can fly before the pilot must see the runway environment and then complete the landing in visual conditions. In terms of minimums, lower and closer is better.

Table 3.10. Airports in or near BAF Service Area

ID	AIRPORT	DISTANCE (MILES – TIME)	NPIAS ROLE	RWY	BA	FBO	FUEL	IAP	RISK
BAF	Westfield-Barnes	0 (0:0)	GA	9,000	116	5	AG – J	300–1/2	
CEF	Westover	13 (0:20)	CS	11,598	22	4	AG – J	300–3/4	3
7B2	Northampton	18.5 (0:27)	GA	3,335	91	3	AG	940–1	1
BDL	Bradley	34 (0:40)	CS	9,510	64	5	AG – J	200 – 1	0

Source: Airnav.com, Google Maps, FAA Master Record (5010-1)

Legend	
ROLE	NPIAS Role either GA – General Aviation or CS – Commercial Service
NPIAS	The Airport is part of NPIAS and potential federal funding through AIP and adherence to FAA design standards
RWY	The length of the longest runway. Longer runways support a larger array of aircraft
BA	The number of Civil Based Aircraft. More aircraft suggests increased airport support and a higher revenue stream
FBO	FBO Services (subjective ranking based on available services from 0 (none) to 5 (full service, including maintenance, full-service fuel, flight training, hangars, etc.).
FUEL	Type of fuel available (AG – Aviation Gas; J – Jet)
IAP	Instrument approach procedure minimums (altitude AGL - visibility). Lower minimums increase the Airport's viability
RISK	Consultant's assessment of potential market risk to BAF (0 – 5, with 0 being no risk and 5 being a significant risk)

3.9.2. Population

Listed in Table 3.11 is the historical and projected population and similar average annual growth rates (AAGR) for the city of Westfield, Hampden County, the state of Massachusetts, and the United States for the years 1960 through 2015 (historical) and 2020 through 2035 (projected). For the years 1960 through 2015, the city of Westfield and Hampden County rose 58% and 9%.

Table 3.11. Historical and Projected Population (1960-2035)

YEAR	WESTFIELD	HAMPDEN COUNTY	MASSACHUSETTS	UNITED STATES
1960	26,302	429,353	5,148,578	179,323,175
1970	31,433	459,050	5,689,170	203,211,926
1980	36,465	443,018	5,737,037	226,545,805
1990	38,372	456,310	6,016,425	248,709,873
2000	40,072	456,228	6,349,097	281,421,906
2010	41,094	463,490	6,547,629	308,745,538
2015	41,641	470,690	6,794,422	321,729,000
2020	42,599	479,431	6,950,668	334,503,000
2025	43,536	490,458	7,105,878	347,335,000
2030	44,320	499,286	7,231,126	359,402,000
2035	44,852	505,277	7,319,469	370,338,000

Sources: United States Census Bureau; University of Massachusetts Donahue Institute

Massachusetts and the United States grew 32% and 79% throughout the same period. As shown in Figure 3.3, projections for the period 2020 through 2035 indicate that the city, county, and state are forecast to increase by 5.3%, 5.3%, and 10.71%. The US population is projected to increase by approximately 11%.

Moreover, Figure 3.2 shows how the rate of change in population in all four areas has and continues to slow over the next 20 years. The important takeaway is the similarities in projected population variations in the state and county compared to the United States. While the city's expected growth rate is somewhat flat, the Airport's service area, which is contained within Hampden County, has a projected change in the population of the United States. This fact is discussed later in the chapter when this data is compared from national aviation forecasts to regional and local projections.

Figure 3.3. Change in Population Between the U.S., Commonwealth, County, and City of Westfield

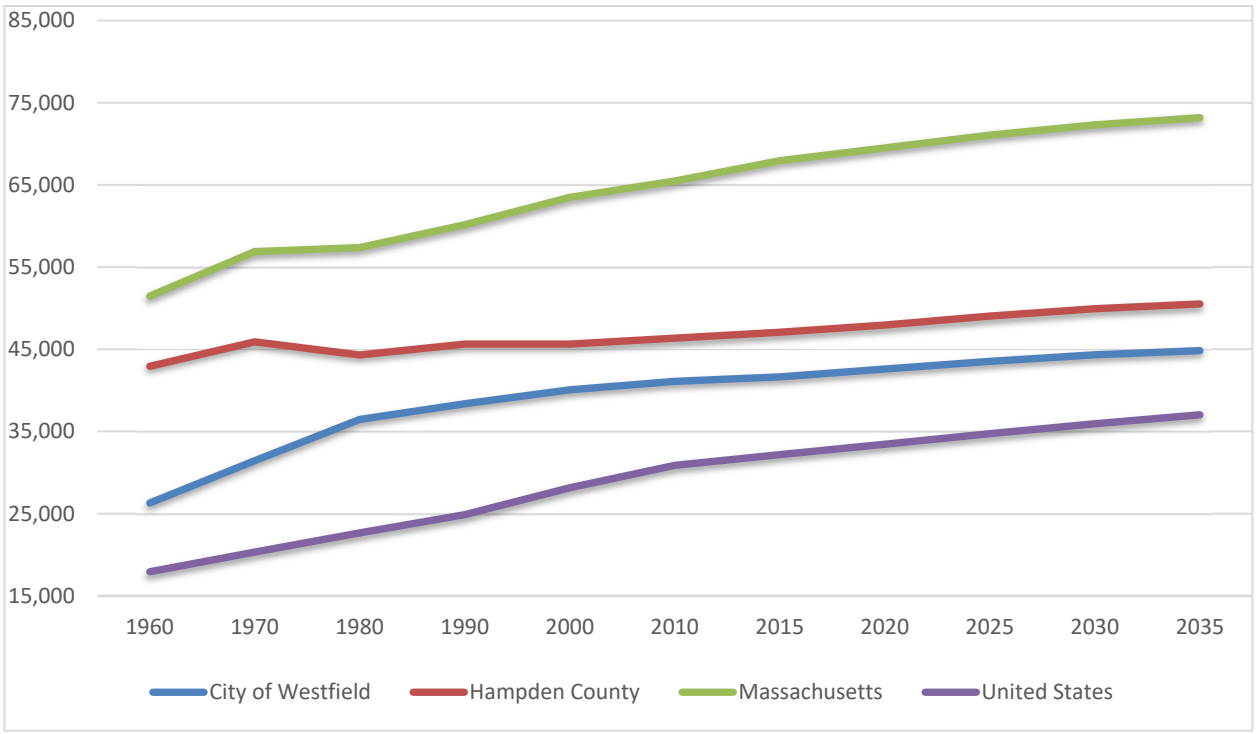
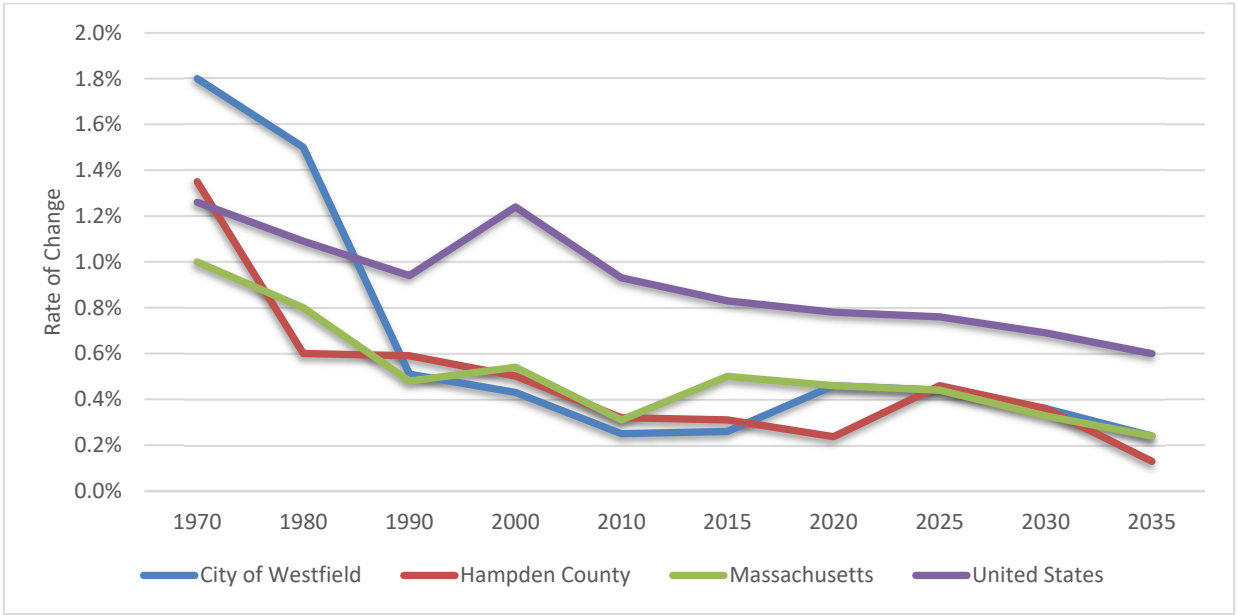


Figure 3.2. Population Rate of Change in the U.S., Commonwealth, County and City of Westfield

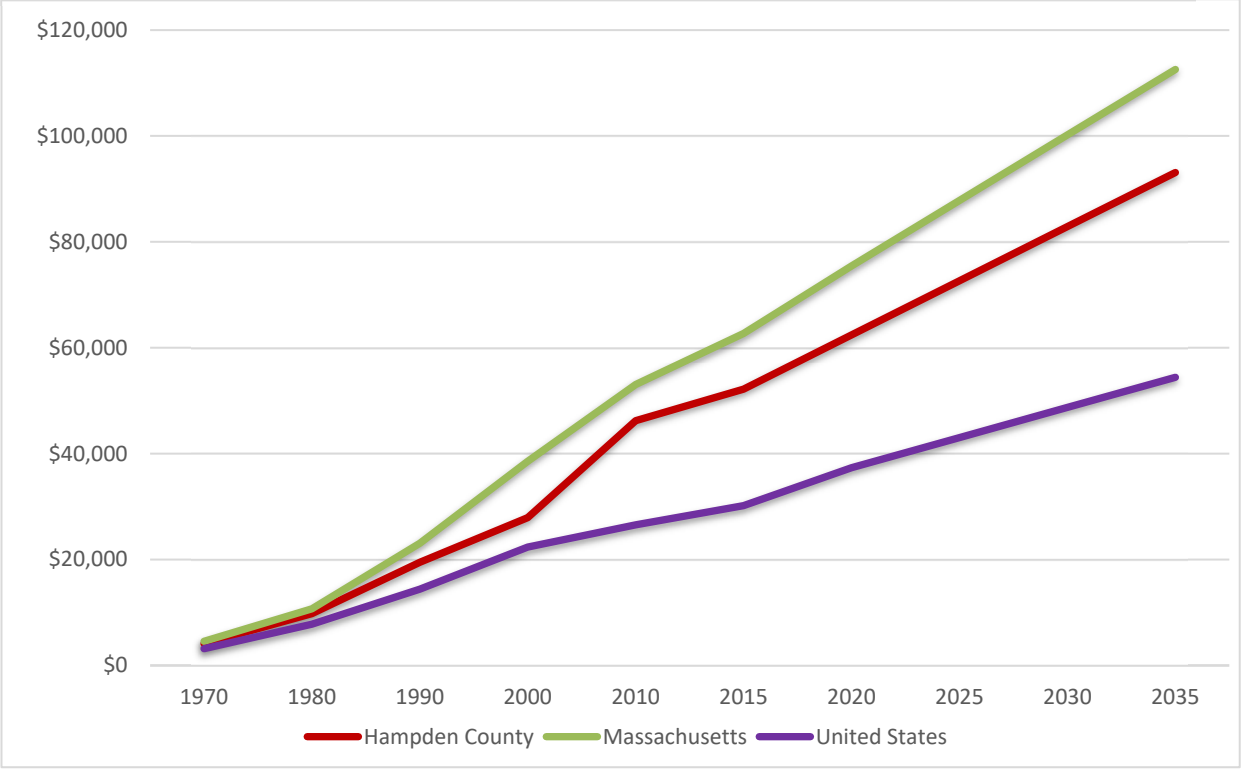


3.9.3. Per Capita Personal Income

Per capita, personal income (PCPI), also known as income per person, is the mean income of the individuals in an economic unit such as a country or city. PCPI measures all sources of income taken together (such as GDP or gross national income) and dividing it by the total population. Like demographic trends, we examined PCPI as a measure of the Airport's service area against the same pattern nationwide. Figure 3.4 illustrates the PCPI for Hampden County, the Commonwealth, and the United States. This figure also shows the historic Per Capita Income in Hampden County, the Commonwealth of Massachusetts, and the United States from 1970 through 2014. This data is extrapolated through a linear trend line out to 2025.

As illustrated, in 2016, Massachusetts had a per capita annual personal income (PCPI) of $65,137. This PCPI ranked 3rd in the United States and was 131% of the national average, $49,571. The 2016 PCPI reflected an increase of 3.9% from 2015. The 2015-2016 national change was 3.6%. In 2005, the PCPI of Massachusetts was $44,289 and ranked 2nd highest in the United States. The 2006-2016 compound annual growth rate of PCPI was 3.7%. The compound annual growth rate for the nation was 3.5%.[17]

Figure 3.4. Per Capita Income (U.S., Commonwealth of Massachusetts, and Hampden County)



[17] Bureau of Economic Analysis, US Department of Commerce.

3.9.4. Intangibles

The local flavor of aviation and the surrounding community can and often does impact the growth of any industry, including aviation. Unfortunately, some airports apply little to no effort to maintain it to high standards or promoting its future. In these rare cases, stagnation will occur no matter how bright the region's future might be, the Airport's development regarding increased activity and revenue production. Regardless of how well maintained or promoted, some airports do not have room to grow. Moreover, for those airports with an actively engaged community who recognize the airport's value, concepts around airport improvements, sustainability, and usability are more likely to come to fruition. Thus, the hidden and sometimes overlooked asset are the intangible qualities of the community.

In reviewing the Westfield-Barnes community, several signs suggest how the Airport may fare compared to the rest of the Commonwealth, the region, and the United States.

- Full-time airport management position and a dedicated airport maintenance staff
- Attitude toward making the Airport a vital component of the community's and region's transportation network
- Excellent instrument approach procedures and low minimums
- Well maintained facility
- Availability of land for the continued development of hangars and other facilities
- Favorable hangar and land lease rates
- Restaurant facility (building and equipment are city-owned)
- A well-run and productive fixed-base operator (FBO)
- The availability of flight training, aircraft maintenance, and similar services
- Local businesses that use and depend on the Airport for transportation services
- A positive public image, with some concerns related to safety improvements (tree removal) adjacent to private residences
- Well documented environmental resources with established protocols for compliance (re Rare Species Master Plan and the Barnes Aquifer Protection Advisory Committee)
- Ample buffer between the Airport and a significant part of the surrounding community that limit noise complaints

Development on the Airport is restricted because the entire Airport is within Priority and Estimated Habitat for state-listed rare species. In addition, the Airport is within Department of Environmental Protection (MassDEP) Zone I and I1 protection areas for public drinking water supply wells and within a high-yielding portion of the Barnes Aquifer which provides water to over 60,000 people in Westfield, Easthampton, Southampton, and Holyoke. The Airport is in Zone 1 for the city of Westfield Water Wells No. 1,2,7 and 8

and within Zone 1 for Wells No. 7 and 8. Wells No. 7 and 8 are located immediately to the southeast of Runway 15-33, just outside the Airport's fence.[18]

Westfield-Barnes Regional Airport also has an active and ongoing Part 150 [19] Noise Compatibility Program. While unlikely, it could limit the growth that would increase the Airport's noise signature (contours) beyond their current levels. Also, the historical fact that like most other airports in the region and US, the number of general aviation aircraft owners and the number of general aviation operations has declined steadily in the past 20 years.

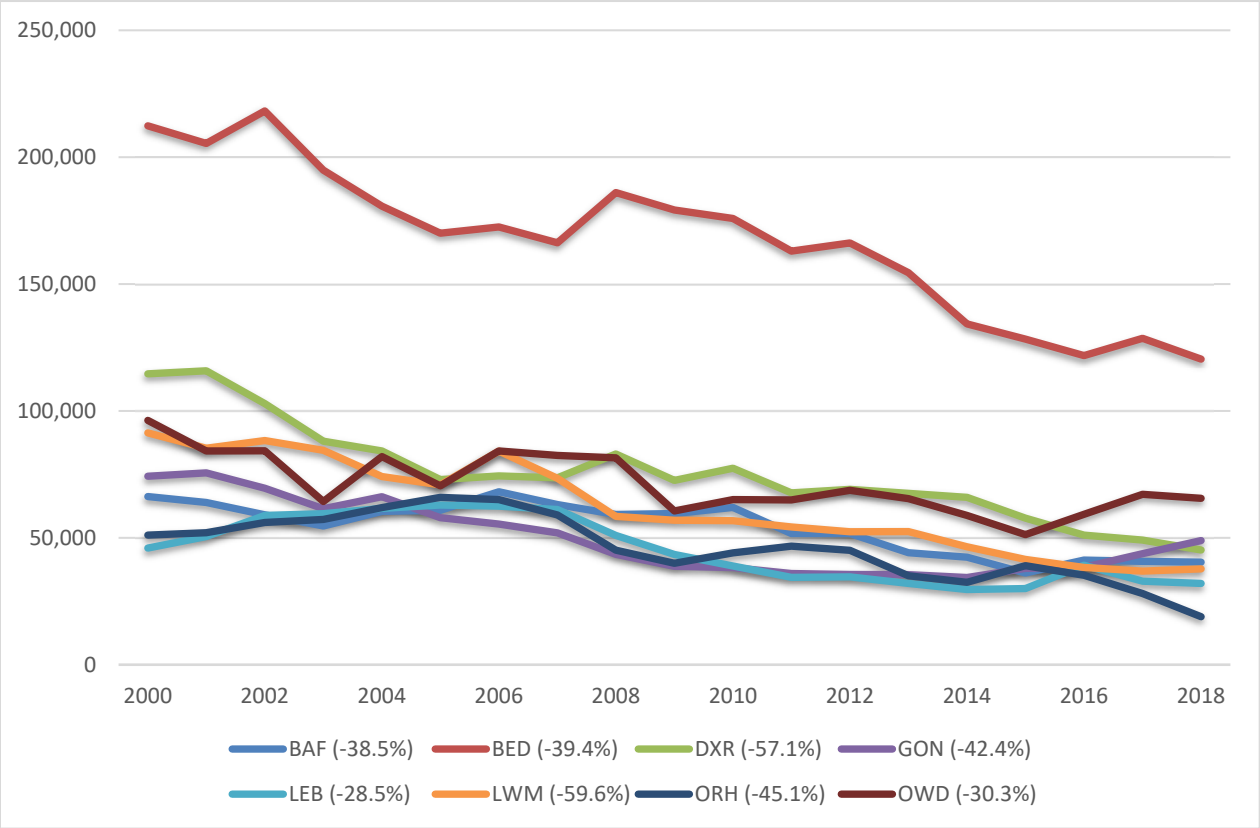
Data on eight New England airports, all with operating control towers and similar in size and the type of activity like BAF, indicates a steady decline in air traffic. As Figure 3.5 illustrates, the eight airports showed all experienced a significant decrease in aircraft operations over the 18 years from 2000 to the end of 2018. The reduction in activity ranged from 28.5% at Lebanon Municipal Airport (LEB) to nearly 60% at Lawrence Municipal Airport (LWM). The Westfield-Barnes Regional Airport saw a reduction of 38.5%). The aggregate decline of all eight airports in the analysis was 43.2%.

Unlike non-towered airports where the operations data is estimated, towered airports provide air traffic control recorded operations data. The eight airports examined are:

1. BAF - Westfield-Barnes Regional Airport
2. LWM – Lawrence Municipal Airport (North Andover, MA)
3. LEB – Lebanon Municipal Airport (Lebanon, NH)
4. OWD – Norwood Memorial Airport (Norwood, MA)
5. DXR – Danbury Municipal Airport (Danbury, CT)
6. GON – Groton-New London Airport (Groton, CT)
7. ORH – Worcester Regional Airport (Worcester, MA)
8. BED – Laurence G. Hanscom Field (Bedford, MA)

[18] Commonwealth of Massachusetts, Certificate of The Secretary Of Energy & Environmental Affairs on the Environmental Notification Form, May 23, 2008.
[19] 14 CFR, Part 150, Airport Noise Compatibility Planning.

Figure 3.5. Aircraft Operations at 8 New England Towered Airports



3.9.5. Socioeconomic Conditions Summary

Three elements were examined in the previous sections: population, income, and employment. Regarding population, the projected changes in the state outpaced the nation, but the county and city lag both the state and the US. Economically, the region has similar growth in per capita income, the state and county realizing similar positive changes in income. While there are no projections regarding unemployment, the data suggest that unemployment mirrors the historical trends when considering the optimistic estimates in per capita income. At the same time, when examining the Airport's intangible assets, the Westfield-Barnes Regional Airport is a facility that should meet or exceed national growth patterns.

While some segments of general aviation have been in a steady decline, such as the number of new pilots in training and the number of hours flown (which closely parallels operations), others have seen a positive change in the past 10-20 years, and indications are that this trend continues. Also, as the US commercial air service market continues its expansion, no new airports are planned for the system, which means people and aircraft compete with the same number of airports. As the US air transportation market grows, demand for air services spreads into smaller markets. For those who can afford it, charter activity and the use of private aircraft fill the void for those who elect not to travel to commercial services airports in the region (Manchester, Boston-Logan, et cetera).

With other aviation segments, notably sales and activity in light sport and experimental aircraft, succeed because of their relatively low entry costs, the traditional reciprocating general aviation fleet, with higher ownership costs, continue a slow decline in aircraft numbers and similar flight activity. While we see no indication that commercial air service returns to BAF, demand for the light sport, experimental, helicopter, and most notably jet activity matches national trends, a growth rate that closely matches the FAA's Aerospace Forecasts is a reasonable expectation.

3.10. WESTFIELD-BARNES FORECASTS

This chapter examined several forecast indicators helpful in evaluating the future growth of aircraft and aircraft operations at the Westfield-Barnes Regional Airport. These markers included three demographic indicators at the national, state, and local levels, including population changes, historical and rates, and economic factors. For comparison, this study examined aviation forecasts at the state and national levels. These included the FAA's Aerospace Forecasts and the MSASP. Also, and what may prove to be the most reliable are the historical trends at the Airport.

Regional demographics (within Hampden County, which makes up a good part of the Airport's service area) indicate population and economic indicators. These pointers identify an area that has historically kept pace with the US. There's little doubt when looking at the data that the Commonwealth, as well as the service area around BAF, paralleled national trends regarding population and per capita income. One additional factor that was examined but not discussed until now is the unemployment rate. Like the nation, the Commonwealth of Massachusetts and Hampden County reflect the national trend of a robust employed workforce.

More specific to aviation, FAA national projections for aircraft activity, including ownership of aircraft, the number of pilots, and their willingness to fly these aircraft, are, for the most part, increasing, but with mixed results. Nationally, people continue to buy aircraft. Whether for recreational purposes or business use, aircraft ownership in specific niche areas has been forecast to remain positive. While the traditional small two or four-seat aircraft (like the Cessna 172 Skyhawk, for example, and similar aircraft) have declined, more affordable recreational aircraft in the experimental and light sport categories are likely to remain strong the change in the national economy over the past year. Closer to home, the MSASP has mixed results for BAF. The MSASP based aircraft forecasts differ by about 16% at the end of 2017. The Plan's projections indicate 138 aircraft, while the actual count was 117 aircraft (see Figure 3.7). In addition, the aircraft operations forecast was off the mark by a wide margin—the Systems Plan forecast 65,654 operations in 2017. The actual count was 40,737[20], a difference of 38% (see Figure 3.7).

Forecasts of based aircraft and operations during the period this Plan was developed (2008-2010), overestimating these measurements was common. However, historical records indicate the opposite trend.

[20] This number includes the "tower closed" differential discussed in Chapter 2 (see section 2.10.).

Figure 3.7. Based Aircraft Comparison (Actual v. MSASP)

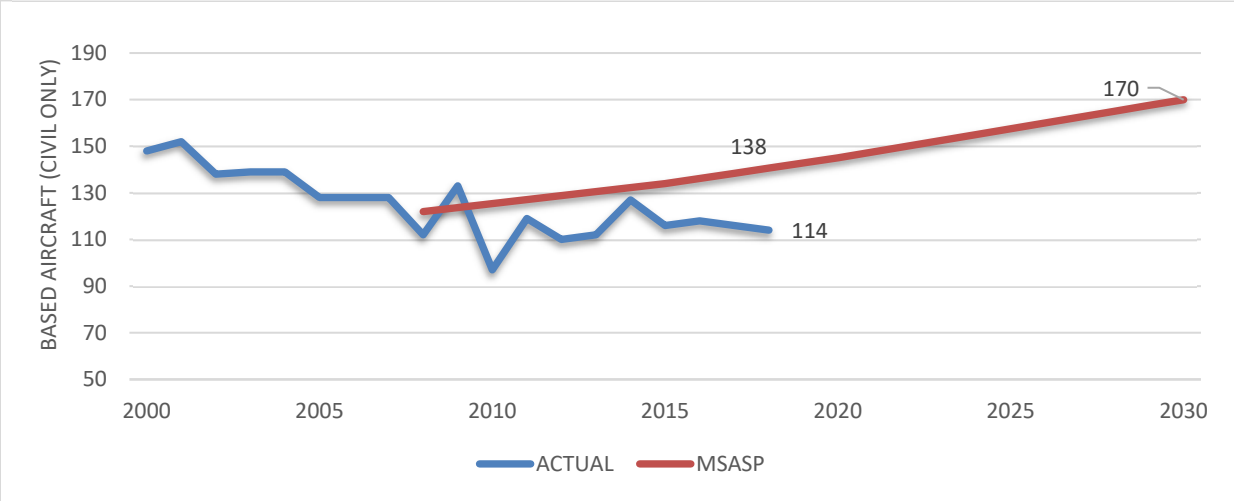
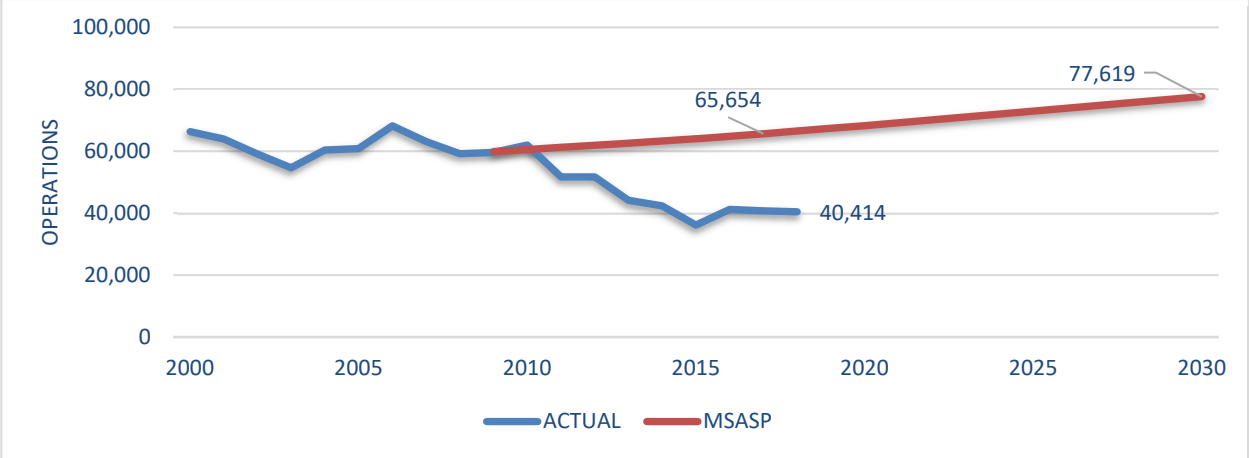


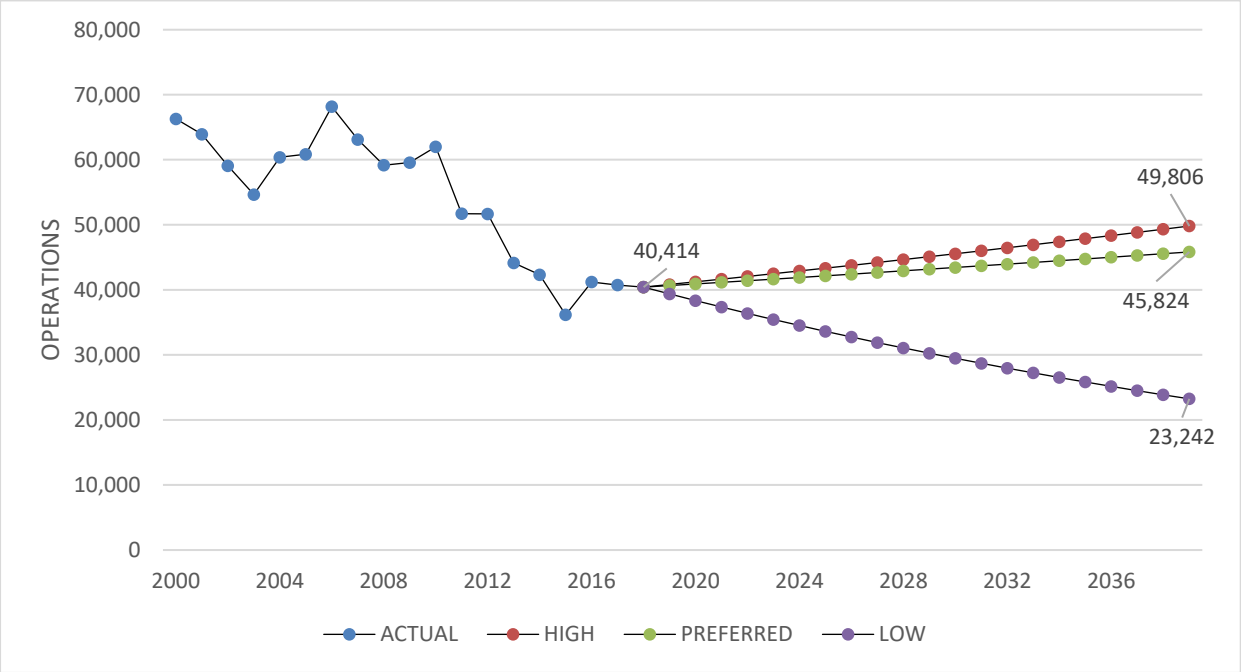
Figure 3.6. Aircraft Operations Comparison (Actual v. MSASP)



3.10.1. Aircraft Operations Forecast

The historical trends at the Westfield-Barnes Regional Airport show a clear picture. This representation indicates that BAF trends for aircraft operations range from the high growth of perhaps 1% (to account for the favorable demographics and national trends) to a continued slight decline of 2.1% per year, one that reflects the 18-year downward trend. The delta between the 1% growth and 2.1% decline results in a median of -0.6%. Figure 3.8 shows the historical operations since 2000 and the projected changes (high, low, and medium) for the next 20 years. The graph also shows a linear trendline based on historical activity.

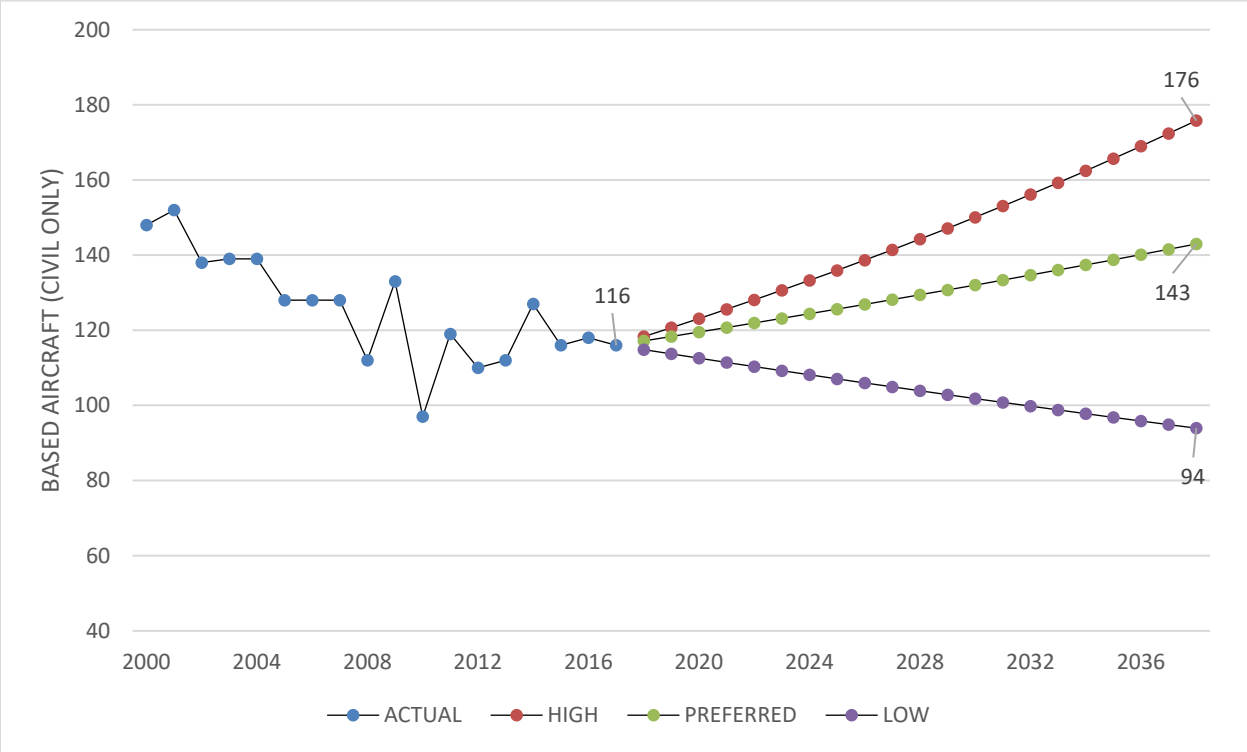
Figure 3.8. BAF Operations Forecast (2019-2038)



3.10.2. Based Aircraft Forecasts

Based aircraft forecasts are not as downbeat in the sense that the historical trends did not mirror the change in operations at the Westfield-Barnes Regional Airport. Moreover, because single-engine reciprocating, including sport and experimental aircraft, make up most based airplanes at BAF, the projected trend range from a growth rate of 2% per year to a likely decline of 1% per year, with a 0.5% growth as the median. Figure 3.9 illustrates the historical activity and the high, medium, and low forecasts. The graph also shows a linear trendline based on historical data.

Figure 3.9. Forecast Based Aircraft (2019-2038)



3.11. SUMMARY

Through the 20-year planning period, the Westfield-Barnes Regional Airport will remain a general aviation airport supporting recreational and business aviation and the Air and Army National Guard. The population, per capita income and employment levels in the service area reflect national and state demographics changes. Moreover, the Airport's level of activity emulates that of the US regarding the number of based aircraft, fleet mix, and operations. These projections are the mainstay of this Plan in developing the Airport's facility needs and alternatives to meet those needs. **Error! Reference source not found.** summarizes the findings of this chapter.

As discussed earlier in paragraphs 3.1 and 3.7.1, the forecasts prepared for the Westfield-Barnes Regional Airport are compared to the FAA Terminal Area Forecasts in **Error! Reference source not found.**. While the based aircraft numbers differ by an average of 25%, with the TAF data considerably higher, the operations forecasts are well within the FAA criteria, averaging less than a 4% difference in the first 15 years, and then 10% by the 20th year.

Table 3.12. Forecast Summary for Westfield-Barnes Regional Airport

ELEMENT	EXISTING (2019)	SHORT-TERM (2020-2024)	INTERMEDIATE TERM (2025-2029)	LONG-TERM (2030-2039)
Design Aircraft				
Airport	Gulfstream 650	Gulfstream 650	Gulfstream 650	Gulfstream 650
Runway 2-20	Gulfstream 650	Gulfstream 650	Gulfstream 650	Gulfstream 650
Runway 15-33	Beech King Air	Beech King Air	Beech King Air	Beech King Air
Small Aircraft Aprons/Taxilanes	Cessna 172	Cessna 172	Cessna 172	Cessna 172
Reference Code				
Airport	C-III	C-III	C-III	C-III
Runway 2-20	C-III	C-III	C-III	C-III
Runway 15-33	B-II	B-II	B-II	B-II
Small Aircraft Aprons/Taxilanes	A-I	A-I	A-I	A-I
Taxiway Design Codes				
Taxiways A, B, D, E, G, S [21]	TDG-2	TDG-2	TDG-2	TDG-2
Taxiways B1, B2, B4	TDG-1A	TDG-1A	TDG-1A	TDG-1A
Based Aircraft				
Single Engine	100	107	111	124
Multiengine	6	5	5	4
Helicopters	1	6	6	7
Jets	4	6	6	7
BAF Total	111	124	129	143
FAA TAF	141	150	165	200
Difference	24%	19%	24%	33%
Operations (per year)				
Westfield-Barnes	40,414	41,900	43,200	45,800
FAA TAF	41,474	41,466	41,454	41,434
Difference	3.5%	1.0%	4.1%	10.0%
Ratio Local v. Itinerant Operations	46% / 54%	46% / 54%	46% / 54%	46% / 54%

[21] Exclusive of requirements for military aircraft under U.S. Department of Defense, Airfield and Heliport Planning and Design criteria (UFC 3-260-01).