2 FORECASTS

This chapter discusses the findings and methodologies used to project aviation demand at Douglas Municipal Airport (DGL). It is important to recognize that there can be short-term fluctuations in an airport's activity due to a variety of factors that cannot be anticipated. The forecasts developed in this Master Plan Update (MPU) provide a meaningful framework to guide analysis for the future Airport development needs and alternatives.

The projections of aviation demand developed for DGL are documented in the following sections:

- Socioeconomic Factors
- Historical and Current Activity
- National Aviation Trends
- Based Aircraft Projections
- Aircraft Operations Projections
- Critical Aircraft
- Forecast Summary

The forecast analysis includes methodologies that consider historical aviation trends at the Airport and throughout the nation. Local historical data was compiled from Airport records and tenants, as well as the 2008 Arizona State Airports System Plan (ASASP). Demographic data for Cochise County and the state of Arizona were obtained from Woods and Poole Economics, Inc. These data were analyzed to track local trends and conditions to project demand at DGL. Projections of aviation activity for the Airport were prepared for near-term (2021), mid-term (2026), and long-term (2036) timeframes. These projections are generally unconstrained and assume the Airport will be able to develop the various facilities necessary to accommodate based aircraft and future operations.

The two elements that are examined in the forecasts are aircraft operations and based aircraft. A based aircraft is generally defined as an aircraft that is permanently stored at an airport. An aircraft operation represents either a take-off or landing conducted by an aircraft. For example, a takeoff and a landing would count as two operations.

Operations forecasts are further categorized in this MPU as local or itinerant. According to the FAA, local operations are defined as those conducted by aircraft that operate in the local traffic pattern or within sight of the Airport; are known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the Airport; or execute simulated instrument approaches or low passes at the Airport. Itinerant operations are all aircraft operations other than local operations.

2.1 Socioeconomic Factors

Regional socioeconomic trends were identified in the preceding chapter. Where applicable, these data can be used in the MPU process to relate future aviation activity levels at the Airport to local and regional socioeconomic trends. Douglas is a small rural city and because of this, Cochise County is used as the regional market area for Douglas Municipal Airport. The forecast analysis examines historical trends and future projections of the region's population, employment, and earnings to relate to aviation activity. Socioeconomic factors are important to analyze because the level of activity at an airport typically emulates the economic condition of the region. Woods and Poole Economics, Inc. data for Cochise County and the state of Arizona were examined extensively to generate projections for DGL through 2036.

It is important to note that a large majority of tax revenues in the City of Douglas are attributed to the neighboring Mexican City of Agua Prieta. Agua Prieta is a border town adjacent to Douglas with a population of 70,000 to 100,000. Many of the Agua Prieta residents work in Maquiladoras, or factories that produce manufactured goods, several of which are shipped across the border to distribution centers in Douglas. Driven by the large population and economic industry in Agua Prieta, almost 75 percent of the City of Douglas' tax revenues can be attributed to Mexican residents.

Table 2-1 reviews the population growth trends of Cochise County and the state of Arizona over a 10-year period. Using socioeconomic data from Woods and Poole Economics, Inc., the compound annual growth rate (CAGR) was calculated. Compound annual growth rate is a metric that generates linear annual gains for a particular series of data. It should be noted that CAGR calculates a constant rate of change. CAGR dampens the effect of volatility during periods that experience significant change, and is essentially a "smoothed" annual growth rate.

Table 2-1. Comparison of Historical Population Growth Trends

Year	Cochise County	Arizona
2007	127,660	6,140,390
2008	129,020	6,280,360
2009	130,080	6,343,150
2010	131,790	6,413,740
2011	134,150	6,538,130
2012	136,520	6,662,510
2013	138,880	6,786,900
2014	141,250	6,911,280
2015	143,610	7,035,670
2016	146,030	7,162,980
CAGR 2007-2016	**1.51%**	**1.73%**

Note: Any data between those years were extrapolated.
Source: Woods and Pool Economics, Inc. for years 2000, 2008-2010, 2015, and 2020.

As shown in **Table 2-1**, historical population growth was measured for Cochise County and the State of Arizona. Between the years of 2007 and 2016, the CAGR of population growth in

Cochise County was 1.51 percent. In the same timeframe, the state of Arizona experienced population growth at a CAGR of 1.73 percent, slightly higher than that of Cochise County.

In addition to the population growth rate, there are other demographic factors that can significantly impact aviation activity. Regional economic factors can play a significant role in the level of activity experienced at an airport. **Table 2-2** summarizes historical Employment and Gross Regional Product (GRP) for Cochise County and the state of Arizona. GRP is defined as the market value of all goods and services produced within a metropolitan area in a given period of time. It should be noted that data obtained from Woods and Poole Economics, Inc. is reported in constant dollars (year 2015) to adjust for inflation over time.

Table 2-2. Historical Cochise County and State of Arizona Employment and Gross Regional Product

Year	Cochise County		State of Arizona	
	Employment (in thousands)	Total GRP (in millions)	Employment (in thousands)	Total GRP (in millions)
2007	58,510	$4,858.0	3,324,420	$281,230.5
2008	59,670	$5,058.7	3,399,940	$290,140.9
2009	59,120	$5,017.1	3,217,660	$274,524.3
2010	59,200	$5,024.3	3,227,560	$275,543.0
2011	59,880	$5,123.3	3,279,050	$282,366.6
2012	60,560	$5,222.3	3,330,550	$289,190.1
2013	61,240	$5,321.3	3,382,040	$296,013.7
2014	61,920	$5,420.3	3,433,540	$302,837.3
2015	62,600	$5,519.3	3,485,030	$309,660.9
2016	63,720	$5,687.1	3,552,770	$318,884.5
CAGR 2007-2016	**0.95%**	**1.77%**	**0.74%**	**1.41%**

Source: Woods and Poole Economics, Inc.

As shown in **Table 2-2**, employment in Cochise County grew at a rate of almost 1 percent from 2007 to 2016. One percent growth outpaces the state of Arizona whose employment growth was 0.74 percent during the same timeframe. Similarly, total GRP increased 1.77 percent annually, while the state of Arizona's GRP increased 1.41 percent annually during the same timeframe. Between 2008 and 2010, Cochise County and the state of Arizona experienced declines in GRP, which are likely attributed to the recession that occurred nationally during that time.

Statistical analysis typically indicates that regional earnings is one of the most important demographic factors impacting aviation demand, illustrating an underlying assumption that as earnings, and consequently discretionary income grows, individuals have more income to spend on goods and services, including aviation-related goods and services. Total employment and total GRP growth rates of Cochise County outperformed that of the State. The growth of the County and the proximity of DGL to the Mexican border and the adjacent City of Agua Prieta should support the growth of the Airport for the foreseeable future.

Per capita personal income (PCPI) is another way to measure the economic growth of an area. PCPI measures the average income earned per person in a given area (city, region, country, etc.) in a specified year. It is calculated by dividing the area's total income by its total population. **Table 2-3** presents a summary of historical PCPI figures for Cochise County and Arizona. It should be noted that PCPI data obtained from Woods and Poole Economics, Inc. is reported in constant dollars (year 2015) to adjust for inflation over time.

Table 2-3. Historical Cochise County and State of Arizona Per Capita Personal Income

Year	Cochise County (in 2015 $)	Arizona (in 2015 $)
2007	$35,698.2	$39,202.2
2008	$36,915.4	$39,724.9
2009	$37,902.1	$38,386.3
2010	$37,733.4	$38,373.0
2011	$37,989.5	$38,663.5
2012	$38,245.5	$38,954.0
2013	$38,501.6	$39,244.6
2014	$38,757.7	$39,535.1
2015	$39,013.8	$39,825.7
2016	$39,583.2	$40,408.2
CAGR 2007-2016	**1.15%**	**0.34%**

Source: Woods and Poole Economics, Inc.

As shown in **Table 2-3**, personal income in Cochise County has grown at a rate of 1.15 percent annually between 2007 and 2016 while the state of Arizona has grown at a rate of 0.34 percent over the same ten-year period. The state of Arizona's PCPI is higher than Cochise County in every year, however, it's growth rate was 0.81 percent less than Cochise County between 2007 and 2016. If this growth rate persists, Cochise County PCPI will closely match the State of Arizona PCPI through 2036.

2.2 Historical and Current Activity

At general aviation airports such as DGL, there are two primary indicators of activity: based aircraft and annual operations. Historical based aircraft and operations data for DGL provide the baseline from which future activity at the Airport can be projected. DGL does not have an Air Traffic Control Tower (ATCT), and it is not included in the FAA's National Plan of Integrated Airport Systems (NPIAS), which means that historical data identified in databases such as the FAA's Terminal Area Forecasts (TAF) are not available. As such, base year 2015 data for based aircraft and aircraft operations have been determined by an on-site inventory, an examination of historical fuel sales, and information provided by Airport management and tenants.

2.2.1 Historical Based Aircraft

The only resources available to identify historical DGL based aircraft are the previous Airport Master Plan, which was completed in 1994, and the ASASP. The 1994 Master Plan identified 27 based aircraft at DGL in 1993. The 2008 ASASP identified 27 based aircraft in 2007. No other

historical data for based aircraft at DGL were available to develop a base year estimate, therefore, a physical inventory count was conducted. The inventory identified 12 based aircraft at DGL in 2016 including 10 single-engine piston aircraft, one twin-engine piston aircraft, and one helicopter.

As shown in **Table 2-4**, based aircraft at DGL decreased from 27 in 2007 to 12 in 2016. This table depicts that DGL experienced a 56% decline in BAC in the 10-year period.

Table 2-4. Historical DGL Based Aircraft

Year	Total
2007	*27*
2008	*25*
2009	*24*
2010	*22*
2011	*20*
2012	*19*
2013	*17*
2014	*15*
2015	*14*
2016	12
CAGR 2007-2016	**-8.62%**

Note: Values for extrapolated years are italicized
Source: Arizona State Airport System Plan (ASASP)

Because of the significant difference in the number of based aircraft reported by the ASASP compared with the Airport survey data from 2016, forecasts of based aircraft activity in this MPU do not use time-series or historical trend methodologies. Instead, methodologies that compare existing based aircraft to other comparable factors were developed.

2.2.2 Historical Aircraft Operations

As previously defined, local operations are those conducted by aircraft that operate in the local traffic pattern or within sight of the Airport; are known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the Airport; or execute simulated instrument approaches or low passes at the Airport. Itinerant operations are all aircraft operations other than local operations.

Since DGL does not have an ATCT, historical aircraft operations represent estimates of activity from the 2008 ASASP and information provided by Airport management and tenants for base year 2015. It should be noted that historical operations between 2007 and 2015 have been extrapolated (see **Table 2-5**).

Based on information provided by Airport management and Lifeline, the Airport's sole permanent tenant, it was estimated that 2,600 operations occurred in 2016. **Table 2-5** shows that total operations from 2007 to 2016 decreased steadily. Also shown are ASASP forecasts of operations for 2007-2016, which reflects a CAGR of 1.42 percent.

Table 2-5. Historical DGL Aircraft Operational Mix

Year	Commercial Service	General Aviation	Military	Total Operations	SASP Projections
2007	0	11,000	100	11,100	11,100
2008	0	*9,990*	*170*	*10,160*	*11,266*
2009	0	*8,970*	*240*	*9,210*	*11,433*
2010	0	*7,960*	*10*	*8,270*	*11,599*
2011	0	*6,940*	*380*	*7,320*	*11,765*
2012	0	*5,930*	*450*	*6,380*	*11,932*
2013	0	*4,910*	*520*	*5,430*	*12,098*
2014	0	*3,900*	*590*	*4,490*	*12,264*
2015	0	*2,880*	*660*	*3,540*	*12,431*
2016	0	1,870	730	2,600[1]	12,597
CAGR 2007-2016	**0.00%**	**-17.87%**	**24.72%**	**-14.89%**	**1.42%**

Note: Values for extrapolated years are italicized
Sources: 2008 Arizona State Airport System Plan
[1]Lifeline – Airport tenant - August 2016

2.2.3 Historical Fuel Sales

As noted in the Inventory Chapter, DGL offers self-fueling for both Jet A and 100LL. **Table 2-6** depicts fuel sales sold in dollars and gallons from 2007 to 2015. Although this information is not used to project aircraft activity, it is important to identify the frequency of activity at the Airport. The irregularity in annual fuel sales at Douglas Municipal Airport's fuel farm is likely attributed to historical fluctuations in fuel price, the economic instability that occurred between 2008 and 2010, and changes in the number of based aircraft and itinerant operations that occur at DGL. Even though operations cannot directly be determined from the fuel sales information, it can be determined that DGL's fuel farm is a significant asset to the Airport.

Table 2-6. DGL Historical Fuel Sales

Year	100LL	100LL Gallons Sold	Jet A	Jet A Gallons Sold
2007	$0.00		$15,815.50	
2008	$34,278.99		$18,091.63	
2009	$53,035.76	11,960	$35,207.48	4,310
2010	$179,197.52	24,550	$26,048.84	6,010
2011	$69,138.58	16,100	$59,041.73	12,110
2012	$53,124.59	11,600	$26,392.09	5,830
2013	$56,328.70	11,580	$34,478.81	6,140
2014	$74,065.46	15,190	$18,312.81	3,120
2015	$64,387.62	15,210	$20,147.55	3,520

Source: Airport Management

2.3 National Aviation Trends

The preparation of forecasts of aviation-related demand requires a general understanding of recent and anticipated national trends in the aviation industry. Although trends that are occurring nationally don't always significantly impact individual airports, they are important to examine in comparison to recent levels of local activity. Although DGL experiences some military operations, the majority of the activity at the Airport is associated with general aviation (also referred to as GA). As such, this section focuses on past and anticipated trends in the general aviation industry. General aviation aircraft are defined as all aircraft not flown by commercial airlines or the military.

The general aviation industry has experienced significant changes in recent years. At the national level, fluctuating levels of general aviation usage caused by economic upturns/downturns resulting from the nation's business cycle has significantly impacted general aviation demand. This section examines general aviation trends, and the numerous factors that have influenced those trends in the U.S.

2.3.1 General Aviation Overview

There are 19,360 public and private airport facilities located throughout the United States, as reported by the FAA; 3,331 of these airports are included in the FAA's NPIAS, indicating that they are eligible for federal funding assistance. Commercial service airports, those that accommodate scheduled passenger airline service, represent a relatively small portion (514 or roughly 15 percent) of the airports in the NPIAS. General aviation airports, including relievers, comprise 85 percent of the NPIAS.

DGL is not included in the NPIAS. DGL is included in the Arizona system of airports and is eligible for state grant funding.

General aviation activity has declined in recent years. According to the *FAA Aerospace Forecast, Fiscal Years 2016-2036*, since 2000, operations on the national level have declined at an average annual rate of 3.3 percent. According to the FAA, much of this decline can be attributed to economic conditions and fuel prices.

2.3.2 Business Use of Aviation

Based on information provided by local businesses, it has been identified that DGL is occasionally used for business and corporate use. The City of Douglas and Agua Prieta, immediately south of the U.S.-Mexico border, are home to a number of businesses that currently use the Airport for business travel. For the purposes of this MPU, the terms business and corporate aircraft are used interchangeably, as they both refer to aircraft used to support a business enterprise; though as defined by the FAA, they each have their own distinct definition.

The FAA defines business use as:

"Any use of an aircraft (not for compensation or hire) by an individual for transportation required by the business in which the individual is engaged."

The FAA defines corporate transportation as:

"Any use of an aircraft by a corporation, company or other organization (not for compensation or hire) for the purposes of transporting its employees and/or property, and employing professional pilots for the operation of the aircraft."

The FAA estimated in their *2015-2019 Report to Congress* that business aircraft usage comprises 8.7 percent of all aviation activity. An additional 9.7 percent of the nation's general aviation activity is considered corporate. These figures represent a general decline nationally in the use of business/corporate aviation between 2008 and 2012 when they totaled 9.6 percent and 11.9 percent, respectively.

Increasing personnel productivity is one of the most important benefits of using business aircraft. Companies flying general aviation aircraft for business control scheduling capabilities. Itineraries can be changed as needed, and aircraft can fly to destination not served by scheduled airlines.

Business aircraft usage provides the following:

- Employee time savings
- Increased enroute productivity
- Minimized time away from home
- Enhanced industrial security
- Enhanced personal safety
- Management control over scheduling

Many of the nation's employers that use general aviation are members of the National Business Aircraft Association (NBAA). The NBAA's *Business Aviation Fact Book 2014* shows that nationwide business aviation contributes $150 billion to the U.S. economic output. The NBAA Fact Book also indicates that only three percent of business aircraft are flown by Fortune 500 companies; a large spectrum of companies and organizations of various sizes operate the remaining 97 percent. This indicates that the use of business aviation is not exclusive to large companies, and has practicable application for many different types of businesses.

Business use of general aviation aircraft ranges from small, single-engine aircraft to multiple aircraft corporate fleets supported by dedicated flight crews and mechanics. General aviation aircraft use allows employers to transport personnel and air cargo efficiently. Businesses often use general aviation aircraft to link multiple office locations and reach existing and potential customers. Business aircraft use by smaller companies has escalated as various chartering, leasing, time-sharing, interchange agreements, partnerships, and management contacts have emerged.

Though business use of general aviation has declined in recent years nationally, it is expected that the unique business climate within the DGL market area will result in continued growth in the local aviation environment. According to American Fact Finder and the 2010 Census, the City of Douglas has a population of 17,378. While this is a relatively small number, it does not account for the population of the neighboring town of Agua Prieta, Mexico. According to Douglas City officials, the majority of the City's sales tax (70%) is generated from residents of Mexico.

The city of Agua Prieta, Mexico is home to multiple Maquiladoras (factories) that produce manufactured goods, several of which are shipped across the border to distribution centers in Douglas. From there, they are routed to cities all over the U.S. The Maquiladoras and distribution centers provide employment to thousands of people in Agua Prieta and Douglas. The Port of Entry to Mexico, located on the City of Douglas/Agua Prieta border, provides access to and from each city. Douglas City officials and local Airport stakeholders have identified that demand to pass through the port of entry exceeds its capacity and that significant improvements are needed, however, it continues to be a gateway for local, regional, and international business and trade.

2.3.3 FAA Forecasts

The FAA publishes forecasts on an annual basis that summarize anticipated trends in most components of civil aviation activity. Each published forecast revisits previous activity forecasts and updates them after examining the previous year's trends in aviation and economic activity. Many factors are considered in the FAA's development of forecasts, including U.S. and international economic trends and projected fuel costs. FAA forecasts provide detailed analyses of historical and forecasted aviation trends and provide a general framework for anticipated future level of regional and national aviation activity. Even though DGL is not included in the FAA's NPIAS, the trends and guidelines used by FAA are directly relevant since they represent national activity interests.

Examples of measures of national general aviation activity that are monitored and forecast by the FAA on an annual basis in the FAA Aerospace Forecasts include active pilots, active hours flown, and active aircraft fleet. Historical and projected activity in each of these categories is examined in the following sections. The data presented is based on the most recent available information, contained in *FAA Aerospace Forecasts, Fiscal Years 2016-2036*.

Active Pilots

An active pilot is defined by the FAA as those persons with a pilot certificate and a valid medical certificate. **Table 2-6** presents historical and projected U.S. Active Pilots data by certificate type. Between 2011 and 2016, the total number of active pilots has decreased by 0.63 percent, dropping from a total of 617,128 active pilots to 588,985 active pilots. In the next 20 years, the total number of active pilots is projected to increase by a CAGR of 0.11 percent.

Active Hours Flown

Aircraft hours flown is another statistic used by the FAA to measure and project general aviation activity. Hours flown is a valuable measure because it captures a number of activity-related data including aircraft utilization, frequency of use, and duration of use. As shown in **Table 2-7**, single-engine piston hours are anticipated to continue to diminish over the next 20 years as they have since 2011. Multi-engine hours are also projected to decrease, while turboprop and jet hours are projected to increase steadily. The CAGR of U.S. active hours flown from 2011-2016 decreased by -1.06 percent while it is projected to increase from by 1.20 percent between 2016 to 2036.

Active Aircraft Fleet

The FAA tracks the number of active general aviation aircraft in the U.S. fleet annually. Active aircraft are defined by the FAA as those aircraft currently registered in the U.S. and flying at

least one hour during the year. **Table 2-8** summarizes recent active aircraft trends as well as future active aircraft by aircraft type from 2011-2036.

Similar to active hours flown, the U.S. single-engine and multi-engine piston aircraft fleets are projected to continually decrease through 2036 while turboprop and jet aircraft are anticipated to increase. The total active fleet decreased at an annual rate of -1.59 percent between 2011 and 2016 but is projected to increase at a CAGR of 0.18 percent through 2036.

FAA Forecast Summary

The cyclical nature of general aviation activity is illustrated in the historical national data presented in this analysis. While national general aviation activity experienced rebounded growth during the mid and late- 1990's, the terrorist attacks of 2001 and the economic downturn of 2008 dampened this nationwide activity. FAA projections of U.S. general aviation activity, including active pilots, active aircraft, and hours flown all showed varied levels of growth and decline through the FAA's forecast horizon of 2036.

Table 2-6. Historical and Projected U.S. Active Pilots

Certificate Type	Historical						Projected				CAGR 2011-2016	CAGR 2016-2036
	2011	2012	2013	2014	2015	2016	2017	2021	2031	2036		
Students	118,657	119,946	120,285	120,546	122,729	123,900	124,650	126,600	130,350	131,800	-3.50%	-0.27%
Recreational	227	218	238	220	190	190	190	185	180	180	7.73%	4.63%
Sport	4,066	4,493	4,824	5,157	5,482	5,900	6,350	8,000	12,450	14,600	-2.60%	-0.63%
Private	194,441	188,001	180,214	174,883	170,718	170,450	168,250	163,600	152,500	150,200	-3.97%	-0.52%
Commercial	120,865	116,400	108,206	104,322	101,164	98,700	96,750	92,200	89,300	88,950	1.69%	0.42%
Transport	142,511	145,590	149,824	152,933	154,730	155,000	155,400	156,600	163,800	168,600	0.46%	2.27%
Rotorcraft	15,220	15,126	15,114	15,511	15,566	15,575	15,645	16,685	21,555	24,420	-1.84%	-0.12%
Glider	21,141	20,802	20,381	19,927	19,460	19,270	19,240	19,025	18,835	18,825	-0.93%	0.07%
Total:	**617,128**	**610,576**	**599,086**	**593,499**	**590,039**	**588,985**	**586,475**	**582,895**	**588,970**	**597,575**	-0.63%	0.11%
Instrument Rated[1]	314,122	311,952	307,120	306,066	304,329	304,400	303,900	304,300	307,700	311,300	0.87%	0.31%

[1]Instrument rated pilots should not be added to other categories in deriving total.
Source: FAA Aerospace Forecasts

Table 2-7. Historical and Projected U.S. Active Hours Flown (in thousands)

Certificate Type	Historical						Projected				CAGR 2011-2016	CAGR 2016-2036
	2011	2012	2013	2014	2015	2016	2017	2021	2031	2036		
Single-engine Piston	11,844	11,442	10,706	10,395	10,312	10,225	10,151	9,879	9,285	9,119	-2.90%	-0.57%
Multi-engine Piston	1,782	1,766	1,646	1,573	1,555	1,541	1,530	1,497	1,496	1,505	-2.86%	-0.12%
Turboprop	2,463	2,733	2,587	2,613	2,582	2,564	2,556	2,589	3,113	3,575	0.81%	1.68%
Jet	3,407	3,418	3,488	3,881	3,913	4,016	4,164	4,771	6,425	7,422	3.34%	3.12%
Rotorcraft	3,411	3,454	2,949	3,242	3,240	3,323	3,417	3,885	4,905	5,430	-0.52%	2.49%
Experimental	1,203	1,243	1,191	1,244	1,260	1,283	1,311	1,418	1,722	1,876	1.30%	1.92%
Sport	278	169	173	165	180	194	208	268	426	505	-6.94%	4.90%
Other	181	180	135	158	154	152	152	152	151	150	-3.43%	-0.07%
Total:	**24,569**	**24,405**	**22,875**	**23,271**	**23,196**	**23,298**	**23,489**	**24,459**	**27,523**	**29,582**	**-1.06%**	**1.20%**

Sources: FAA Aerospace Forecast

Table 2-8. Historical and Projected U.S. Active Aircraft Fleet

Certificate Type	Historical					Projected				CAGR 2011-2016	CAGR 2016-2036
	2011	2012	2013	2014	2015	2016	2021	2031	2036		
Single-engine Piston	136,895	128,847	124,398	126,036	125,050	124,055	119,585	110,685	107,160	-1.95%	-0.73%
Multi-engine Piston	15,702	14,313	13,257	13,146	13,085	13,025	12,760	12,095	11,695	-3.67%	-0.54%
Turboprop	9,523	10,304	9,619	9,777	9,570	9,420	9,215	10,990	12,635	-0.22%	1.48%
Jet	11,650	11,793	11,637	12,362	12,475	12,635	13,975	18,015	20,770	1.64%	2.52%
Rotorcraft	10,082	10,055	9,765	9,966	10,240	10,540	11,985	14,730	16,255	0.89%	2.19%
Experimental	24,275	26,715	24,918	26,191	26,435	26,590	27,690	30,155	31,640	1.84%	0.87%
Sport	6,645	2,001	2,056	2,231	2,410	2,590	3,490	5,275	6,100	-17.18%	4.38%
Other	5,681	5,006	4,277	4,699	4,615	4,570	4,525	4,465	4,440	-4.26%	-0.14%
Total:	**220,453**	**209,034**	**199,927**	**204,408**	**203,880**	**203,425**	**203,225**	**206,410**	**210,695**	**-1.59%**	**0.18%**

*Experimental Light-sport category that was previously shown under Sport Aircraft is moved under Experimental Aircraft category, starting in 2012.
Note: An active aircraft is one that has a current registration and was flown at least one hour during the calendar year.
Source: FAA Aerospace Forecast

2.4 Based Aircraft Projections

The FAA maintains projections of aviation-related activity in its Terminal Area Forecasts (TAF). Terminal Area Forecasts are only available for NPIAS airports, and as DGL is a Non-NPIAS facility, the only previous forecast, other than the dated 1994 Airport Master Plan, is from the 2008 ASASP. As shown in **Table 2-9**, the ASASP projected that there would be 29 based aircraft at DGL in 2016. As previously noted, an on-site inventory identified that there were 12 based aircraft at the Airport in 2016. As such, the previous forecasts from the ASASP are no longer accurate, and additional methodologies to project based aircraft at DGL have been developed. The following sections identify 20-year forecasts of based aircraft demand using a variety of methodologies.

Table 2-9. DGL Based Aircraft Comparison

Historical	ASASP	DGL
2016	29	12
Projected		
2021	30	
2026	31	
2036	33	

Source: 2008 Arizona State Airports System Plan.

2.4.1 Based Aircraft Forecast Methodologies

The 2008 ASASP reports that there were 27 based aircraft at Douglas Municipal Airport in 2007. A physical count of based aircraft was completed in July 2016 and confirmed a total of 12 BAC at DGL. Without accurate historical records between 2007 and 2016, certain types of methodologies typically employed for forecasting are not useful for projections presented in this MPU. Methodologies such as regression or trend analysis utilize historical data to project future activity. Since these methodologies will not provide an accurate portrayal of aviation-related activity at DGL, based aircraft forecasts are derived from two types of forecasting methodologies: socioeconomic and market share.

Socioeconomic Methodology – Population Variable

Socioeconomic factors of a community do not always impact or reflect aviation-related activity at a nearby airport; however, they can often give direction to the overall health of the local economy and the potential type of aircraft activity that may be occurring at that airport. According to data obtained from Woods and Poole Economics, Inc., an independent firm that specializes in long-term county economic and demographic projections, the population of Cochise County is anticipated to increase from 146,034 in 2016 to 194,704 in 2036, which reflects a CAGR of 1.45 percent. The population of Cochise County is anticipated to increase at a slightly lesser rate than the state of Arizona (1.54 percent CAGR).

Based on conversations with Airport management and tenants, the number of based aircraft at DGL in 2016 was 12. The Socioeconomic-Population Variable Methodology for based aircraft forecasts assumes that between 2016 and 2036, the number of based aircraft at the Airport will increase at the same rate as the population of Cochise County (see **Table 2-10**). As shown, the number of based aircraft at DGL is projected to increase from 12 in 2016 to 16 in 2036.

Table 2-10. DGL Socioeconomic – Population Variable Based Aircraft Forecast

Historical	Cochise County Population	DGL Based Aircraft
2016	146,030	12
Projected		
2021	158,180	13
2026	170,410	14
2036	194,700	16
CAGR 2016-2036	**1.45%**	**1.45%**

Sources: Woods and Poole Economics, Inc. Kimley-Horn and Associates

Socioeconomic Methodology – Employment Variable

Similar to the Socioeconomic-Population Variable Methodology, the Socioeconomic-Employment Variable Methodology assumes that between 2016 and 2036 the number of based aircraft at the Airport will increase at the same rate as the number of employed individuals in Cochise County (see **Table 2-11**). According to Woods and Poole Economics, Inc., the number of employed individuals in Cochise County is anticipated to increase from 63,722 in 2016 to 90,922 in 2036, a CAGR of 1.79 percent. As shown, the number of based aircraft at DGL is projected to increase from 12 in 2016 to 17 in 2036.

Table 2-11. DGL Socioeconomic – Employment Variable Based Aircraft Forecast

Historical	Cochise County Employment	DGL Based Aircraft
2016	63,720	12
Projected		
2021	69,450	13
2026	75,780	14
2036	90,920	17
CAGR 2016-2036	**1.79%**	**1.79%**

Sources: Woods and Poole Economics, Inc., Kimley-Horn and Associates

Socioeconomic Methodology – Per Capita Personal Income Variable

Per capita personal income (PCPI) can be an indicator of a local population's propensity to travel or own an aircraft. Commercial service is not provided at Douglas Municipal Airport; however, the Airport has the capabilities to support some jet traffic due to its existing runway length and on-site jet fueling facilities. Per capita personal income is examined to project based aircraft at the Airport and the result is depicted in **Table 2-12**. As shown, per capita income in Cochise County is anticipated to increase from $39,583.20 in 2016 to $56,088.90 in 2036, a CAGR of 1.76 percent. This methodology projects the number of based aircraft at the Airport from 2016 to 2036 to increase at the same rate as per capita income in Cochise County. According to the Socioeconomic-Per Capita Personal Income Variable Methodology, the number of based aircraft at DGL is projected to increase from 12 in 2016 to 17 in 2036. It should be noted that per capita

data obtained from Woods and Poole Economics, Inc. is reported in constant dollars (year 2015) to adjust for inflation over time.

Table 2-12. DGL Socioeconomic – Per Capita Personal Income Variable ($2015) Based Aircraft Forecast

Historical	Cochise County PCPI	DGL Based Aircraft
2016	$39,583.2	12
Projected		
2021	$42,573.5	13
2026	$46,274.3	14
2036	$56,088.9	17
CAGR 2016-2036	**1.76%**	**1.76%**

Sources: Woods and Poole Economics, Inc., Kimley-Horn and Associates

Socioeconomic Methodology – Total Retail Sales Variable

The fourth socioeconomic variable examined to project based aircraft at the Airport is Total Retail Sales. Retail sales indicate the spending strength of a given location and include motor vehicle, furniture and home furnishings, electronics and appliances, building materials, food and beverage, and other miscellaneous items. According to Woods and Poole Economics, Inc. data, total retail sales in Cochise County from $1,735.90 (in millions) in 2016 to $2,849.50 in 2036, a CAGR of 2.51 percent. This methodology assumes that from 2016 to 2036, the number of based aircraft at DGL will increase at the same rate as total retail sales in Cochise County (see **Table 2-13**). As shown, the number of based aircraft at the Airport is projected to increase from 12 in 2016 to 20 in 2036. As with per capita income, total retail sales are reported in constant dollars (year 2015) to adjust for inflation over time.

Table 2-13. DGL Socioeconomic – Total Retail Sales Variable ($2015) Based Aircraft Forecast

Historical	Cochise County Total Retail Sales (Millions)	DGL Based Aircraft
2016	$1,735.9	12
Projected		
2021	$1,971.7	14
2026	$2,231.8	15
2036	$2,849.5	20
CAGR 2016-2036	**2.51%**	**2.51%**

Sources: Woods and Poole Economics, Inc., Kimley-Horn and Associates

Socioeconomic Methodology – Summary of Results

A summary of the results of the socioeconomic methodologies used to project based aircraft at the Airport is shown in **Table 2-14**, including the CAGR for each methodology from 2016-2036. The Population, Employment, and Per Capita Income Methodologies have a relatively similar CAGR. The Total Retail Sales Methodology shows a higher growth rate (2.51 percent) compared to the other three socioeconomic methodologies. This growth is most likely attributed to the sales from Mexican visitors in the City of Douglas and surrounding areas.

Table 2-14. Socioeconomic Forecasts of DGL Based Aircraft

Historical	Population Methodology	Employment Methodology	Per Capita Income Methodology	Total Retail Sales Methodology
2016	12	12	12	12
Projected				
2021	13	13	13	14
2026	14	14	14	15
2036	16	17	17	20
CAGR 2016-2036	**1.45%**	**1.79%**	**1.76%**	**2.51%**

Note: CAGR is based on 2016-2036 projections. 2015 Based Aircraft methodology is derived from the Arizona State Airport System Plan (ASASP) data records extrapolated from 2007.
Sources: Woods and Poole Economics, Inc., Kimley-Horn and Associates

Based Aircraft Forecast - Market Share Methodology

The second type of methodology used to project based aircraft at DGL is market share. Market share compares an individual component's share (based aircraft at DGL) with a larger market. Two markets were compared against based aircraft at DGL; the State of Arizona, and a regional market that includes based aircraft at nearby airports including Cochise College Airport (P03), Bisbee-Douglas International Airport (DUG), and Bisbee Municipal Airport (P04).

As mentioned in previous sections of this MPU, there were 12 based aircraft at the Airport in 2016. According to the FAA TAF, there were 5,540 based aircraft at NPIAS airports in the state of Arizona. With the known based aircraft, DGL accounted for a 0.22 percent market share of based aircraft in Arizona in 2016. FAA TAF projections of based aircraft in Arizona are depicted in **Table 2-15**. The 0.22 percent market share is held constant throughout the projection period, which results in an increase from 12 based aircraft at DGL in 2016 to 16 in 2036.

Table 2-15. DGL Market Share Methodology
Based Aircraft Forecast

Historical	Arizona Based Aircraft	DGL Based Aircraft	DGL Market Share
2016	5,540	12	0.22%
Projected			
2021	5,980	13	0.22%
2026	6,470	14	0.22%
2036	7,590	16	0.22%
CAGR 2016-2036	**1.58%**	**1.58%**	

Sources: Woods and Poole Economics, Inc., Kimley-Horn and Associates

The second market share methodology compares based aircraft at DGL to the previously mentioned nearby airports. Existing and projected based aircraft data for P03, DUG, and P04 were obtained from Airport Master Plans and extrapolated through 2036 as necessary.

It was determined that based aircraft at DGL accounted for approximately 25 percent of the regional market. This figure is held constant throughout the projection period.

As shown in **Table 2-16**, the sum of 2016 based aircraft at the four airports was 48. Keeping the percent of DGL based aircraft constant at 25 percent, the total number of based aircraft at DGL is projected to be 14 by 2036, which reflects a CAGR of 0.77 percent.

Table 2-16. Douglas and Regional Airport (Market Share) Based Aircraft Forecast

Historical	Douglas Municipal Airport Based Aircraft[1]	Cochise College Airport Based Aircraft[2]	Bisbee-Douglas International Based Aircraft[3]	Bisbee Municipal Based Aircraft[4]	Total Based Aircraft	% DGL Based Aircraft
2016	12	19	6	11	48	25%
Projected						
2021	13	21	6	11	51	25%
2026	13	22	7	11	54	25%
2036	14	24	7	11	57	26%
CAGR 2016-2036	**0.77%**	**1.17%**	**0.77%**	**0.00%**	**1.09%**	

Source: [1]Based Aircraft per Airport Manager July 2016
[2]Extrapolated Based Aircraft per P03 Master Plan Update
[3]Extrapolated Based Aircraft per DUG Master Plan Update
[4]Based Aircraft per FAA TAF projections

Based Aircraft Forecast – Summary

Table 2-17 summarizes the six methodologies used to project based aircraft at DGL from 2016 to 2036. Due the limited growth in socioeconomic indicators in Cochise County, based aircraft, depending on methodology, are projected to increase by two to eight aircraft in the 20-year timeframe.

Table 2-17. Based Aircraft Forecast - Summary

Historical	Population Variable BAC	Employment Variable BAC	PCPI Variable BAC	Total Retail Sales Variable BAC	AZ Market Share Variable BAC	Regional Market Share Variable BAC
2016	12	12	12	12	12	12
Projected						
2021	13	13	13	14	13	13
2026	14	14	14	15	14	13
2036	16	17	17	20	16	14
CAGR 2016-2036	**1.45%**	**1.79%**	**1.76%**	**2.51%**	**1.58%**	**0.77%**

Source: Woods and Poole Economics, Inc.

Based Aircraft Forecast – Preferred Methodology

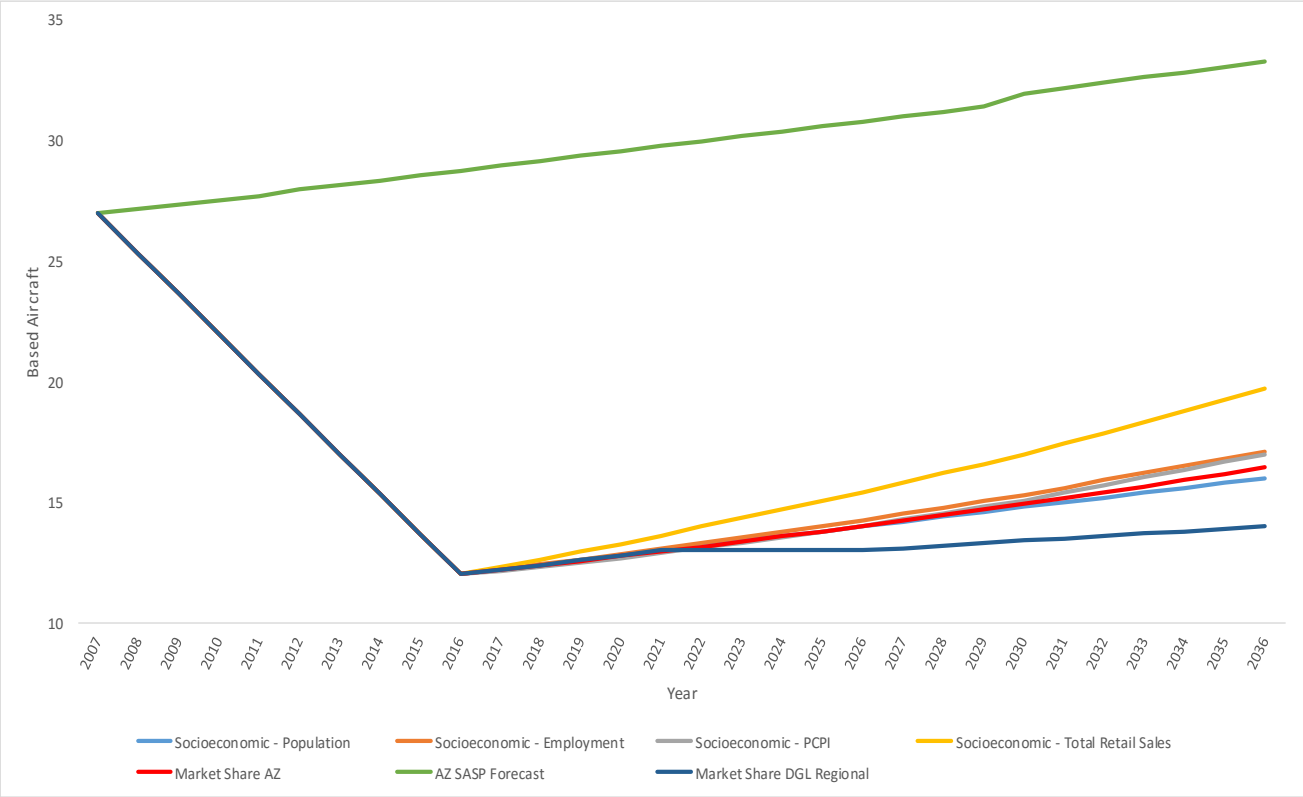
Socioeconomic population, employment, per capita income, and retail sales methodologies all suggest somewhat similar growth rates of based aircraft at DGL through 2036. Due to the regional socioeconomic status of Cochise County and the City of Douglas staying fairly consistent, this data can be referred to, but not used as a preferred methodology. The significant decline in the number of based aircraft at DGL between 2007 and 2016 also suggests that local socioeconomic factors are not the most significant indicator of Airport activity.

Because they do not account for the decline in based aircraft that has occurred in recent years, based aircraft projections based on the ASASP shown in **Table 2-9** are not accurate projections of based aircraft at DGL in 2036. The ASASP projected 27 based aircraft at DGL in 2007 with a CAGR of 0.68 percent. Using this method, DGL would have 29 based aircraft in 2016, which is incorrect based on recent inventory data. As such, the methodology that utilizes the ASASP's projections is not accurate and is not to be used as a preferred method for determining based aircraft at DGL.

Due to the consistent economic climate in Cochise County, it is not anticipated that there will be a significant change in based aircraft at DGL. Consequently, it is reasonable to assume the based aircraft market share of DGL compared to the state of Arizona and region will remain constant over time. The market share methodologies are based on available data and provide a more accurate report of based aircraft than that of the ASASP created in 2008. Because the regional market share methodology relies on actual data reported in airport master plans, and it is assumed that DGL's market share compared with overall demand in the region will remain relatively constant, the regional market share methodology is the preferred methodology for based aircraft. A summary of all methodologies for based aircraft is shown in **Table 2-17** and **Exhibit 2-1**.

It should be noted that although the market share methodology is the preferred forecast for based aircraft at DGL, projections of activity described by other methodologies represent a reasonable range of potential outcomes at the Airport. While the difference in the number of projected based aircraft is relatively small, this range of possible future aircraft at DGL provides a general indication of what the Airport should plan for with respect to facility requirements.

Exhibit 2-1 Based Aircraft Forecast - Summary



Sources: Woods and Poole Economics, Inc., 2008 Arizona State Airports System Plan, Kimley-Horn and Associates.

Based Aircraft Fleet Mix Forecast

As with most general aviation airports, the majority of the based aircraft fleet at DGL is comprised of single-engine piston aircraft. The FAA projects the national based aircraft fleet mix in 2016 to remain fairly stable with little changes throughout the projection period with one exception. National trends and FAA TAF forecasts indicate strong growth in the number of general aviation and air taxi jet aircraft in operation in the U.S. through 2036. The number of jets in operation in the U.S. in anticipated to increase from 12,475 in 2015 to 20,770 in 2036, a CAGR of 2.5 percent. In 2015, there were no based jets at DGL, and despite the recent increase in jet operations nationally, it is anticipated that DGL will not have a based jet by 2036. Although the Airport is equipped with adequate facilities to accommodate jet operations, given the Airport's location and regional socioeconomic status, it is more likely that single-engine prop, rotorcraft, and twin-engine aircraft will continue to dominate the fleet mix at DGL.

In 2016, as noted by the DGL Airport management and stakeholders, there were 10 single-engine aircraft, one multi-engine aircraft, and one helicopter based at the Airport. As shown in **Table 2-18**, single-engine prop aircraft make up 83.33 percent of the fleet mix, while multi-engine and helicopter aircraft each make up 8.33 percent of the entire fleet. Using the preferred based aircraft methodology to project BAC through 2036, and keeping the fleet mix percentage constant throughout the projection period, the fleet mix is projected through 2036. As the total based aircraft fleet is anticipated to increase by 2 aircraft through 2036, the only category that is anticipated to increase in the number of aircraft is single-engine piston aircraft.

Table 2-18. DGL Based Aircraft Fleet Mix Forecast

Historical	Single-Piston	%	Multi-Piston	%	Jet	%	Helicopter	%	Total
2016	10	83.33%	1	8.33%	0	0.00%	1	8.33%	12
Projected									
2021	10	83.33%	1	8.33%	0	0.00%	1	8.33%	13
2026	11	83.33%	1	8.33%	0	0.00%	1	8.33%	13
2036	12	83.33%	1	8.33%	0	0.00%	1	8.33%	14
CAGR	**0.92%**	**0.00%**	**0.00%**	**0.00%**		**0.00%**	**0.00%**	**0.00%**	**0.77%**

Sources: Airport management, Kimley-Horn and Associates

2.5 Aircraft Operations Projections

Aircraft operations projections are used to determine funding and design criteria at airports. At airports with ATCTs, aircraft operations are tracked and recorded by the air traffic controller. Most airport in the United States, including DGL, do not have air traffic control towers. These airports are referred to as non-towered airports, and they make up the vast majority of the airports open to the public for business. Accordingly, unlike with larger towered airports, these non-towered airports do not always have readily available records on aircraft activity.

There are several factors that impact the number of aircraft operations that occur at a particular airport. The number of based aircraft, local demographics, national economic and aviation-related trends, proximity to other airports, capability and existing condition of facilities, business

needs, and several other factors influence aircraft operations at an airport. At non-towered facilities such as DGL it is difficult to accurately measure historical aircraft operations.

The only historical data available to project operations at DGL is from the ASASP which estimated 11,000 operations in 2007. Due to the lack of historical operations data available, time series or regression analysis methodologies would not accurately portray projected aviation-related activity. The methodologies utilized for purposes of this MPU examine operations based on socioeconomic factors, market share, and operations per based aircraft (OPBA).

2.5.1 Aircraft Operations Forecast – Baseline Estimate

As discussed above, aircraft operations data are not readily accessible because of the lack of an ATCT and database estimates from sources such as the FAA TAF. Consequently, a baseline estimate for 2016 operations is based on observations from Airport management and tenants. It was determined that 2,600 operations occurred at DGL in 2016. This figure is used to project operational demand moving forward.

Socioeconomic Methodology – Population Variable - Forecasts

As with based aircraft forecasts, one methodology used to determine projections of aircraft operations was an examination of local socioeconomic data. As shown in **Table 2-19**, based on data provided from Woods and Poole Economics, Inc. the population of Cochise County is projected to increase from 146,034 in 2016 to 194,704 in 2036. This increase in population over the 20-year period represents a CAGR of 1.45 percent. The estimate of 2,600 aircraft operations in base year 2016 is applied to the projected population growth rate of Cochise County. As shown, this methodology projects 3,470 operations will occur at DGL by 2036, which represents a CAGR of 1.45 percent.

Table 2-19. DGL Socioeconomic - Population Variable Operations Forecasts

Historical	Cochise County Population	Total Operations
2016	146,030	2,600[1]
Projected		
2021	158,180	2,820
2026	170,410	3,030
2036	194,700	3,470
CAGR 2016-2036	**1.45%**	**1.45%**

Sources: [1]Airport Management and tenant estimate, Woods and Poole Economics, Inc., Kimley-Horn and Associates

Socioeconomic Methodology – Employment Variable – Forecasts

Using the same socioeconomic methodology, total operations at DGL are developed by applying the CAGR of total employment of Cochise County between 2016 and 2036 to aircraft operations in base year 2016. As shown in **Table 2-20**, employment in the County is projected to increase from 63,722 in 2016 to 90,922 in 2036, which represents a CAGR of 1.79 percent. By applying the same growth rate to the number of operations reported at DGL in 2016, 3,710 annual operations are projected by 2036.

Table 2-20. Socioeconomic – Employment Variable Operations Forecast

Historical	Cochise County Employment	Total Operations
2016	63,720	2,600[1]
Projected		
2021	69,450	2,830
2026	75,780	3,090
2036	90,920	3,710
CAGR 2016-2036	**1.79%**	**1.79%**

Sources: [1]Airport Management and tenant estimate, Woods and Poole Economics, Inc., Kimley-Horn and Associates

Socioeconomic Methodology – Per Capita Personal Income Variable - Forecasts

As stated in a previous section, per capital personal income (PCPI) can be an indicator of a local population's propensity to travel or own an aircraft. As shown in **Table 2-21**, the PCPI of Cochise County was $39,583.20 in 2016, and is projected to increase to $56,088.90 in 2036. This exhibits a CAGR of 1.76 percent during the 20-year projection period. By applying the 1.76 percent growth rate to the 2,600 operations at DGL in 2016, aircraft operations are projected to be 3,680 by 2036.

Table 2-21. Socioeconomic – Per Capita Personal Income Variable ($2015) Operations Forecast

Historical	Cochise County PCPI	Total Operations
2016	$39,583.2	2,600[1]
Projected		
2021	$42,573.5	2,800
2026	$46,274.3	3,040
2036	$56,088.9	3,680
CAGR 2016-2036	**1.76%**	**1.76%**

Sources: [1]Airport Management and tenant estimate, Woods and Poole Economics, Inc., Kimley-Horn and Associates.

Socioeconomic Methodology – Total Retail Sales Variable – Forecasts

The final socioeconomic methodology used for determining aircraft operations at DGL is the Total Retail Sales Variable. As shown in **Table 2-22**, the total retail sales in Cochise County in 2016 was $1,735.9 (millions), increasing to $2,849.5 in 2036. This increase represents a 2.51 percent CAGR for the 20-year period. After applying the 2.51 percent CAGR to the 2,600 operations currently at DGL, operations are projected to be 4,270 by 2036.

Table 2-22. Socioeconomic – Total Retail Sales Variable ($2015)
Operations Forecast

Historical	Cochise County Total Retail Sales (millions)	Total Operations
2016	$1,735.9	2,600[1]
Projected		
2021	$1,971.7	2,950
2026	$2,231.8	3,340
2036	$2,849.5	4,270
CAGR 2016-2036	**2.51%**	**2.51%**

Sources: [1]Airport Management and tenant estimate, Woods and Poole Economics, Inc., Kimley-Horn and Associates

Operations Forecast – Market Share Methodology

Similar to based aircraft, two market share methodologies were used to project DGL operations. Two tables were created to show the aircraft operations market share at DGL. **Table 2-23** identifies the market share of aircraft operations at DGL compared to the state of Arizona. **Table 2-24** compares aircraft operations of DGL to the regional market comprised of P03, P04, and DUG.

As shown in **Table 2-23**, in 2016, Arizona general and civil aviation operations were projected to be 2,583,163 compared to 2,600 operations at DGL, which represents a market share of 0.101 percent. This percentage is held constant and results in 2,750 operations by 2036.

Table 2-23. DGL Market Share Methodology
Operations Forecast

Historical	Arizona Operations	DGL Operations	DGL Market Share
2016	2,583,163	2,600[1]	0.101%
Projected			
2021	2,616,600	2,630	0.101%
2026	2,651,603	2,670	0.101%
2036	2,726,912	2,750	0.101%
CAGR 2016-2036	**0.27%**	**0.27%**	**0.00%**

Sources: [1]Airport Management and tenant estimate, Woods and Poole Economics, Inc., Kimley-Horn and Associates

The second market share methodology used to project operations at DGL is the regional airport market share methodology. This market share methodology compares the total number of annual operations at DGL in 2016 to annual operations at the surrounding airports consisting of P03, P04, and DUG.

Using forecasts of aircraft operations information from recent Master Plan Updates for DUG and P03, and using FAA TAF records for P04, operations estimates and projected activity was developed for the 2016 to 2036 timeframe.

As shown in **Table 2-24**, in 2016, the total operations of the four regional market airports were 61,920. Of the 61,920 operations, 2,600 operations came from DGL, making up 4.2 percent of the regional airport market share. Using Master Plan and FAA TAF projections and keeping the percentage of DGL operations constant, the number of operations at DGL in 2036 is projected to be 3,580, which is a CAGR of 1.61 percent.

Table 2-24. Douglas and Regional Airport (Market Share) Operations Forecast

Historical	Douglas Municipal Airport Operations	Cochise College Airport Operations[2]	Bisbee-Douglas International Airport Operations[3]	Bisbee Municipal Airport Operations[4]	Total Operations	% DGL Operations
2016	2,600[1]	54,030	2,380	2,900	61,920	4.2%
Projected						
2021	2,860	59,370	3,010	2,900	68,140	4.2%
2026	3,030	63,150	3,230	2,900	72,300	4.2%
2036	3,580	75,490	3,230	2,900	85,200	4.2%
CAGR 2016-2036	**1.61%**	**1.69%**	**1.53%**	**0.00%**	**1.61%**	

Source: [1]Airport Management and tenant estimate – August 2016
[2]Extrapolated Operations per P03 Master Plan Update
[3]Extrapolated Operations per DUG Master Plan Update
[4]Operations per FAA TAF projections

Aircraft Operations Forecast – Operations per Based Aircraft Methodology

As stated in previous sections, because of the significant decline in operations at DGL in recent years, historical data are not taken into account to project future activity. With information from Airport management and primary tenant, the operations per based aircraft (OPBA) was calculated for 2016. As shown in **Table 2-25**, DGL experienced 2,600 operations and had 12 based aircraft in 2016, which calculates to an OPBA of 217. Assuming the OPBA stays constant through 2036, and using the based aircraft projections from the preferred based aircraft methodology, operations are projected to increase from 2,600 in 2016 to 3,030 in 2036, a CAGR of 0.77 percent.

Table 2-25. Operations per Based Aircraft

Historical	DGL Based Aircraft	DGL Operations	DGL OPBA
2016 (est.)	12	2,600[2]	217
Projected			
2021	13	2,820	217
2026	13	2,820	217
2036	14	3,030	217
CAGR 2016-2036	**0.77%**	**0.77%**	

Source: [1]Airport management and tenant - August 2016

Aircraft Operations Forecast – Summary

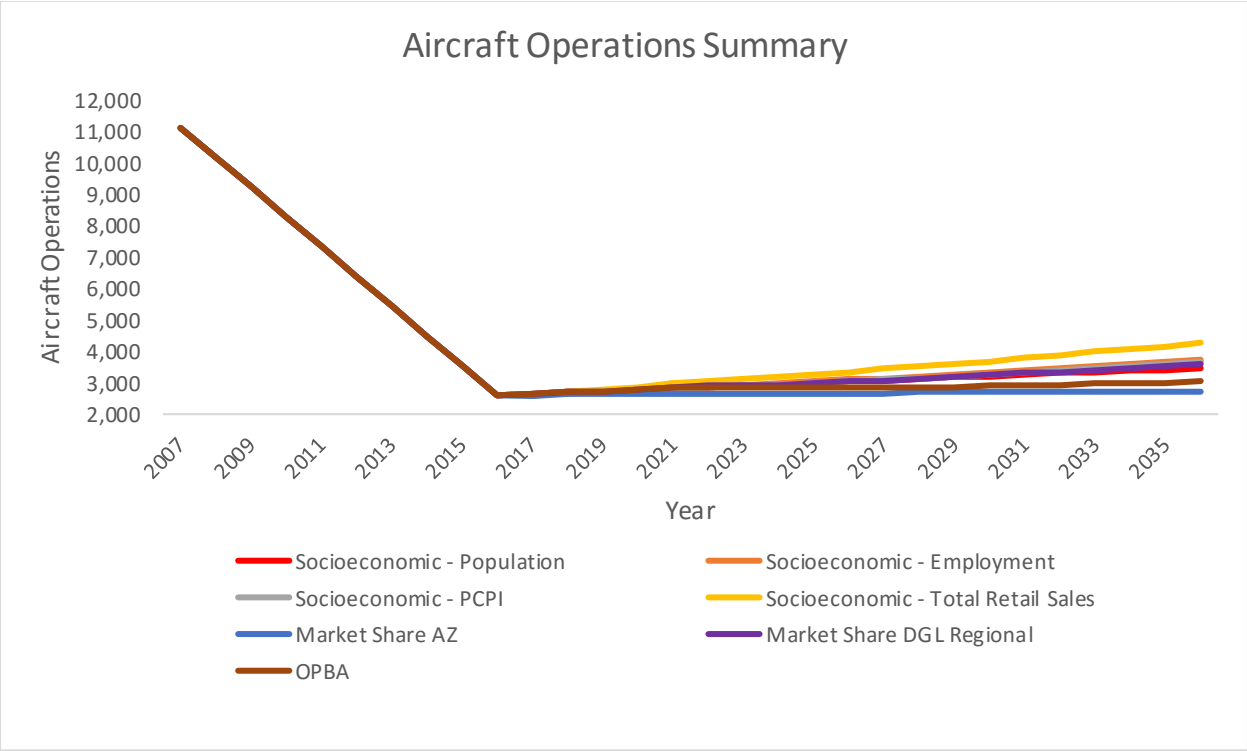
Table 2-26 and **Exhibit 2-2** summarize the seven methodologies used to project operational activity at DGL from 2016 to 2036. The Arizona Market Share Variable represents the lowest estimate of aircraft operations projected at DGL in 2036 at 2,750 operations. Alternately, the Total Retail Sales Variable represents the highest estimate of aircraft operations at the Airport in 2036 at 4,270 operations.

Table 2-26. Aircraft Operations Forecast - Summary

Historical	Population Variable Operations	Employment Variable Operations	PCPI Variable Operations	Total Retail Sales Variable Operations	AZ Market Share Variable Operations	Regional Market Share Variable Operations	OPBA Variable
2016	2,600	2,600	2,600	2,600	2,600	2,600	2,600
Projected							
2021	2,820	2,830	2,800	2,950	2,630	2,860	2,820
2026	3,030	3,090	3,040	3,340	2,670	3,030	2,820
2036	3,470	3,710	3,680	4,270	2,750	3,580	3,030
CAGR 2016-2036	**1.45%**	**1.79%**	**1.76%**	**2.51%**	**0.27%**	**1.61%**	**0.77%**

Sources: Woods and Poole, 2008 ASASP, FAA TAF, Airport Management and Tenant Estimates, Kimley-Horn and Associates

Exhibit 2-2 Aircraft Operations Forecast - Summary



Sources: Woods and Poole Economics, Inc., 2008 Arizona State Airports System Plan, Kimley-Horn and Associates

2.5.2 Aircraft Operations Forecast – Preferred Methodology

All seven of the aircraft operations methodologies presented in this MPU rely on information from the Airport management and the sole tenant on the Airport. Examining the socioeconomic methodologies and choosing the preferred methodology is challenging because similar to based aircraft, it is difficult to identify a link between local socioeconomic trends and operational activity at DGL, especially due to the lack of historical data available.

The Arizona state market share methodology shown in **Table 2-23** is not a preferred methodology because it compares the state of Arizona to DGL. Arizona's airport system is very large and complex, and the traits of the state's airports are not necessarily indicative of activity at DGL. As such, while the market share of DGL to the state of Arizona as a whole may remain relatively constant over time, there is not a strong correlation between local and state activity.

The regional airport market share methodology shown in **Table 2-24** represents the regional airport market share of operations and compares it to DGL. By predicting DGL's regional operations will stay constant at 25 percent of the regional operations between P03, P04, and DUG, it can be determined that DGL will account for 3,580 operations in 2036. Because it is assumed that DGL's share of regional demand will remain constant, and based on the fact that projected activity for the regional market is based on recent forecasts developed in airport master plan updates and the FAA TAF, the regional market share methodology is the preferred methodology for aircraft operations.

Similar to based aircraft forecasts, although the preferred methodology for aircraft operations is used for facility planning in subsequent sections of this document, the additional methodologies presented represent a reasonable range of possible activity in the future.

2.5.3 Aircraft Operations Forecast – Local/Itinerant Operations

The most accurate data to identify local vs. itinerant operations at DGL based on Airport management and tenant observations. Based on this information, it is estimated that DGL experiences approximately 75 percent itinerant and 25 percent local activity. These figures are applied to total projected itinerant operations and held constant throughout the projection period (see **Table 2-25)**.

Table 2-25. DGL Operations Forecast – Local/Itinerant Operations

Historical	Total Operations	Local Operations	% Local Ops	Itinerant Operations	% Itinerant Ops
2016	2,600	650	25%	1,950	75%
Projected					
2021	2,860	715	25%	2,145	75%
2026	3,030	758	25%	2,272	75%
2036	3,580	895	25%	2,685	75%
CAGR 2016-2036	**1.61%**	**1.61%**	**0.00%**	**1.61%**	**0.00%**

Sources: Airport Management and tenant – August 2016

2.5.4 Aircraft Operations Forecast – Operational Fleet Mix

Operational fleet mix projections identify the type of aircraft that currently operate and are anticipated to operate at DGL. These forecasts are calculated based on data obtained from Airport tenants.

As shown in **Table 2-26**, of the 2,600 operations at DGL, 27 percent are from single-engine piston aircraft, 1 percent from multi-engine piston aircraft, 1 percent from jet aircraft, and another 1 percent from turbo prop aircraft. It is assumed that these operational fleet mix percentages will remain constant throughout the 20-year planning horizon.

Table 2-26. DGL Total Operational Fleet Mix Forecast

Year	Total Ops	Single-Engine		Multi-Engine		Jet		Helicopter		Turbo-Prop	
2016	2,600	27%	700	1%	30	1%	30	70%	1,810	1%	30
Projected											
2021	2,860	27%	770	1%	40	1%	40	70%	1,970	1%	40
2026	3,030	27%	820	1%	50	1%	50	70%	2,060	1%	50
2036	3,580	27%	920	1%	70	1%	70	70%	2,450	1%	70
CAGR 2016-2036	**1.61%**	**2.93%**		**1.61%**		**5.19%**		**0.91%**		**1.61%**	

Note: Operations by aircraft type are rounded to remain consistent with total operations projections
Sources: Airport tenant, Kimley-Horn and Associates

2.5.5 Aircraft Operations Forecast – Military Operations

According to Airport management and tenant observations, it is estimated that approximately two military operations occur daily at DGL, primarily conducted by the Arizona and New Mexico Air National Guard. These military operations are primarily helicopter operations, specifically conducted by UH-60 Blackhawks and EC-145 Eurocopters. Based on two operations per day, military traffic accounts for approximately 28 percent of operations at DGL (see **Table 2-27**). It is anticipated that military operations will continue to account for 28 percent of the operations at DGL. By 2036, military operations at DGL are projected to be 1,000 annually.

Table 2-27. Military Operations at DGL

Historical	General Aviation	Military	% Military	Total Operations
2016	1,870	730[1]	28%	2,600[1]
Projected				
2021	2,060	800	28%	2,860
2026	2,180	850	28%	3,030
2036	2,580	1,000	28%	3,580

Source: [1]Airport management and tenant estimates

2.5.6 Aircraft Operations – Regional Analysis

A specific focus of this MPU is to identify the role DGL plays within the regional setting. As noted, nearby airports include P03, P04, and DUG. While each of these airports is unique and serves different users, they are also a part of a region whose demand is projected to have relatively slow growth in the future. As such, this section provides an analysis of recent historical aircraft operations by aircraft classification based on the FAA's Traffic Flow Management System Counts (TFMSC) Database. This database reports filed flight plan data from the Air Traffic Airspace Lab, typically by users that fly under IFR or are detected by radar, and are captured by the FAA's enroute computers that track aircraft on flight plans. It is important to note that the majority of jet operations and a significant proportion of turbo-prop aircraft operations have filed flight plans. Some non-turbo prop single engine piston aircraft file flight

plans for flight training purposes or when aircraft are carrying passengers, however, it is only a small proportion of overall single-engine piston operations and a limited number of VFR flights.

It should also be noted that different classifications of aircraft have significantly different impacts at airports. Jet aircraft and most turbo-prop aircraft use Jet A fuel, and significantly more fuel than piston-powered aircraft, which use lesser amounts of 100LL fuel or AvGas. Jet and turbo-prop aircraft also typically require more apron space for parking, and stronger pavements compared to piston aircraft. Aircraft operations as recorded by FAA's TFMSC by airport and classification are identified in **Table 2-28**.

Table 2-28. Regional Jet and Turbo-Prop Operations

Aircraft Classification	2013 Operations	2014 Operations	% Change	2015 Operations	% Change	% Change 2013-2015
Douglas Municipal Airport						
Turbo-Prop	10	7	-30%	54	671.4%	**440.0%**
Jet	4	28	600.0%	25	-10.7%	**525.0%**
Total	14	35	150.0%	79	125.7%	**464.3%**
Bisbee-Douglas International Airport (DUG)						
Turbo-Prop	38	62	62.3%	35	-43.5%	**-7.9%**
Jet	83	65	-21.7%	58	-10.8%	**-30.1%**
Total	121	127	5.0%	93	-26.8%	**-23.1%**
Bisbee Municipal Airport (P04)						
Turbo-Prop	10	4	-60.0%	4	0.0%	**-60.0%**
Jet		4	100.0%	3	-25.0%	**100.0%**
Total	10	8	-20.0%	7	-12.5%	**-30.0%**
Cochise College Airport (P03)						
Turbo-Prop	0	0	0.0%	7	100.0%	**100.0%**
Jet	0	0	0.0%	0	0.0%	**0.0%**
Total	**0**	**0**	**0.0%**	**0**	**100.0%**	**100.0%**

Source: Based FAA Traffic Flow Management System Counts Database, Downloaded September 2016

As shown in **Table 2-28**, both turbo-prop and jet aircraft operations increased significantly at DGL between 2013 and 2015. This corresponds with a moderate decline in turbo-prop operations and a significant decline in jet operations at DUG during the same timeframe. Neither P03 nor P04 experience significant turbo-prop or jet activity according to TFMSC.

The increase in jet traffic at DGL and corresponding loss at DUG is consistent with DGL users who have stated that they more frequently operate at DGL instead of DUG, where they used to operate. Specifically, several jet operators associated with the Maquiladoras in Agua Prieta have switched to DGL due to its close proximity to the City of Douglas and the U.S.-Mexico border, as well as the availability of self-serve jet fueling capabilities. Representatives from the Maquiladoras have indicated that is a trend that is anticipated to continue with the anticipation that facilities at DGL are conducive to jet operations, specifically, the rehabilitation of Runway 03-21.

This transfer of turbo-prop and jet aircraft from other airports in the Cochise County region to DGL is a very important element to identify in this MPU. Although projections of aviation demand at the Airport indicate slow, steady growth, the impacts and benefits of increased jet and turbo-prop activity indicate that DGL could increase its market share of demand for these types of operations if they are able to maintain and improve existing facilities.

2.6 Critical Aircraft

Facility planning for general aviation airports is impacted by existing and anticipated levels of aviation-related demand, both based aircraft and annual aircraft operations, as well as the size and type of aircraft that currently operate and are projected to operate at an airport.

As defined in FAA Advisory Circular 150/5300-13A, Change 1, the FAA classifies airports by Airport Reference Code (ARC), which identifies the overall planning and design criteria for the Airport. The ARC is assigned based on the size of the largest aircraft that generally records at least 500 operations annually at an airport; this aircraft is known as the airport's "critical aircraft." The critical aircraft can consist of multiple aircraft that are considered collectively. Although this MPU and its recommendations are not specific to FAA regulations and design standards, it is important to identify the critical aircraft in order to measure the operational capabilities of airside facilities at DGL.

The ARC is based on the highest Runway Design Code (RDC) of a particular airport. The RDC is comprised of the Aircraft Approach Category (AAC), the Aircraft Design Group (ADG), and the approach visibility minimums. The AAC is based on the approach speed of the airport's critical aircraft, and the ADG is based on the critical aircraft's wingspan and tail height. The approach visibility minimums expressed by runway visual range values in feet and relate to the lowest visibility minimums with the instrument approach procedure.

The ARC provides the guidelines for pavement surfaces, safety area dimensions, runway lengths, separation standards, and taxiway criteria in an attempt to ensure that the airfield layout and geometry provide a safe and efficient operating environment for the aircraft that typically use the airport. The ARC consists of a letter and a numeric identifier. The first is the letter, which represents the AAC; the second is the number which represents the ADG. The ARC classifications omits the runway visibility identifier used in the RDC. **Table 2-29** summarizes the classifications for determining these components of the RDC and ARC.

Aircraft approach speeds included in categories A and B are typically small, piston-engine aircraft, whereas C, D, and E are normally larger turboprop or turbine powered aircraft. Similarly, the wingspan and tail height of small, piston-engine aircraft normally correspond to design group I. Typical aircraft in design group II would be a Beechcraft King Air, Cessna Citation, or smaller Gulfstream business jets. Design groups III, IV, and V would represent air carrier aircraft, such as Boeing 737, B-757, and B-747, respectively. Group VI would include the largest of aircraft such as Airbus A-380 or C-5 military cargo aircraft.

Identified in the previous ALP Update conditionally approved in 2003, the critical aircraft at DGL was identified as a Beech King Air C-90, which has a B-II ARC. An analysis of aircraft operations from the FAA's TFMSC database at DGL from 2011 to 2016 identified that the Beech 200 Super King should be the existing and future Critical Aircraft.

Although the King Air 200 does not conduct anywhere near 500 annual operations, it is reflective of the type of aircraft that are currently and projected to occur at the Airport. The TFMSC data identified that more demanding aircraft including the Swearingen Merlin Metro 2, Bombardier Lear Jet 35/36, Cessna Excel/XLS, and others that operate at DGL, however, the number of operations are not significant enough to warrant a change in critical aircraft or ARC classification.

Table 2-29. FAA Aircraft Categories and Design Standards

Aircraft Approach Category	Approach Speed	Airplane Design Group	Wing Span (feet)	Tail Height (feet)	Runway Visual Range (feet)
A	Less than 91	I	Less than 49	Less than 20	5000
B	91 to 120	II	49 to 78	21 to 29	4000
C	121 to 140	III	79 to 117	30 to 44	2400
D	141 to 165	IV	118 to 170	45 to 59	1600
E	166 or Greater	V	171 to 213	60 to 65	1200
		VI	214 up to but less than 262	66 up to but less than 80	

Source: FAA *Advisory Circular 150/5300-13A, Change 1, Airport Design*

2.7 Forecast Summary

It is anticipated that DGL will see limited, but steady growth in based aircraft and annual operations throughout the 20-year projection period. This growth is primarily driven by the Airport's advantageous proximity to both Douglas and Agua Prieta, as well as the existing facilities at the Airport. Business and corporate activity has also steadily increased in recent years, which is largely attributed to the Maquiladoras in Agua Prieta. Furthermore, the availability of both Jet A and 100LL fuel at DGL is an attractive facility for itinerant users. Lastly, projected socioeconomic data show that Cochise County will similarly grow at a slow, steady rate over the next 20 years, similar to projected growth in aviation-related activity at the Airport. **Table 2-30**, provides a summary of expected based aircraft and aircraft operations from 2016 to 2036. These forecasts will be used to assist with the development of facility needs in the subsequent chapter of this MPU.

Table 2-30. Summary of DGL Forecasts

Category	2016	Projected 2021	Projected 2026	Projected 2036
General Aviation Operations	**2,600**	**2,860**	**3,030**	**3,580**
Itinerant	1,950	2,145	2,272	2,685
Local	650	715	758	895
Total Based Aircraft	12	13	13	14
Single-Engine Piston	10	10	11	12
Multi-Engine Piston	1	1	1	1
Jet	0	0	0	0
Helicopter	1	1	1	1

Sources: Kimley-Horn and Associates