Chapter Two

FORECASTS

The definition of demand that may reasonably be expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport forecasting, this involves projecting potential aviation activity for at least a 20-year timeframe. Aviation demand forecasting for the Treasure Valley Executive Airport at Caldwell (EUL) will primarily consider based aircraft, aircraft operations, and peak activity periods.

The Federal Aviation Administration (FAA) has oversight responsibility to review and approve aviation forecasts developed in conjunction with airport planning studies. FAA will review individual airport forecasts with the objective of comparing them to its *Terminal Area Forecasts* (TAF) and the *National Plan of Integrated Airport Systems* (NPIAS). Though the TAF is updated annually, there has been disparity between the TAF and airport planning forecasts in the past. Consequently, the TAF forecasts are the result of a top-down model that does not consider local conditions or recent trends. While the TAF forecasts are to be a point of comparison for airport forecasts, they serve other purposes, such as asset allocation by the FAA.

When reviewing a sponsor's airport forecast, the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. As stated in FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and Airports Capital Improvement Plan* (ACIP), forecasts should be:

- Realistic;
- Based on the latest available data;
- Reflective of current conditions at the airport (as a baseline);
- Supported by information in the study; and
- Able to provide adequate justification for airport planning and development.

The forecast process for an airport planning study consists of basic steps that vary in complexity depending upon the issues addressed and the level of effort required. The steps include a review of previous forecasts, determination of data needs, identification of data sources, collection of data, selection of forecast methods, preparation of the forecasts, and evaluation and documentation of the results. FAA Advisory Circular (AC) 150/5070-6B, *Airport Master Plans*, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Review Previous Airport Forecasts**: May include the FAA *Terminal Area Forecast*, state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and data tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: For general aviation airports such as EUL, forecasts for based aircraft and total operations are considered consistent with the TAF if they meet the following criteria:
   - Forecasts differ by less than 10 percent in the 5-year forecast period and 15 percent in the 10-year forecast period, or
   - Forecasts do not affect the timing or scale of an airport project, or
   - Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.5, *Formulation of the NPIAS and ACIP*.

Aviation activity can be affected by many influences on the local, regional, and national levels, making it virtually impossible to predict year-to-year fluctuations of activity over 20 years with any certainty. Therefore, it is important to remember that forecasts are to serve only as guidelines, and planning must remain flexible enough to respond to a range of unforeseen developments.

The following forecast analysis for EUL was produced following these basic guidelines. Existing forecasts are examined and compared against current and historic activity. The historical aviation activity is then examined, along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for EUL that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

The forecasts for this study will utilize a base year of 2019, with a long-range forecast year of 2039.

AIRPORT SERVICE AREA

The initial step in determining the aviation demand for an airport is to define its generalized service area for various segments of aviation the airport can accommodate. The airport service area is determined primarily by evaluating the location of competing airports, their capabilities, their services, and their relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of that airport as well as the specific areas of aviation demand the airport is intended to serve. The primary role of the Airport is to relieve congestion at Boise Air Terminal/Gowen Field and to serve general aviation demand in the area.

The airport service area is a geographical area where there is a potential market for airport services. Access to general aviation airports and transportation networks enter the equation to determine the size of a service area. Also, to be factored are subjective criteria, such as the quality of aviation facilities and services.

As in any business enterprise, the more attractive the facility is in terms of services and capabilities, the more competitive it will be in the market. If an airport's attractiveness increases in relation to nearby airports, so will the size of the service area. If facilities are adequate and rates and fees are competitive at the Airport, some level of aviation activity might be attracted to the Airport from more distant locales.

Defining a service area for an airport is also important in the forecasting process. Once a general service area is identified, various statistical comparisons can be made for projecting aviation demand. For example, in rural areas, where there may be one general aviation airport in each county, the service area could reasonably be defined as the entire county. This would facilitate comparisons to county population and other factors pertaining to that county for forecasting purposes.

In urban areas, where there are many general aviation airports, the definition of a service area is not as simple. Aircraft owners in urban areas have many more choices when it comes to basing their aircraft. The number one reason aircraft owners select an airport at which to base their aircraft is convenience to home or work. Other reasons may include the capability of the runway system, services available, availability of hangar space, airport congestion, etc.

A defined service area is developed for the purposes of identifying a geographic area from which to further develop aviation demand projections. The service area will generally represent where most, but not all, based aircraft will come from. It is not unusual for some based aircraft to be registered outside the region or even outside the state. Particularly in urban areas, airport service areas will likely overlap to some extent as well.

As previously discussed, the generalized service area of an airport can be estimated by its proximity to other airports providing similar levels of service. As discussed in Chapter One, EUL is one of several airports serving the general aviation needs of southwestern Idaho. **Table 2A** summarizes the capabilities of six of the most competitive airports within 40 miles of the Airport. The service area for the Airport is primarily limited to the southeast by Nampa Municipal Airport and by Boise Air Terminal/Gowen Field to the east. Nampa Municipal and Boise Air Terminal are both located within 20 nautical miles (nm) from EUL and offer an array of general aviation services, including 100LL and Jet A fuel, aircraft maintenance, hangar storage, etc. It should be noted that Emmett Municipal is also located within the 20 nm radius; however, this airport is not included in the NPIAS and services offered are more limited, including 100LL fuel and aircraft tiedown storage. Although the primary function of Boise Air Terminal is to serve scheduled commercial passenger and cargo airline services, the airport also caters to general aviation operators including a wide array of corporate aviation activity. It is estimated that approximately 590 aircraft are based at these three airports.

Table 2A | Area Airports and Capabilities

Identifier	Airport Name	Distance/ Direction from EUL	Tower[1]	AWOS/ ASOS[2]	Longest Runway	IAP[3]	Based Aircraft	Annual Operations
EUL	Caldwell Industrial	NA	No	Yes	5,500	Yes	400[4]	147,366[4]
MAN	Nampa Municipal	6.0 nm SE	No	Yes	5,000	Yes	300	72,000
S78	Emmett Municipal	13.0 nm NE	No	No	3,307	No	21	12,000
BOI	Boise Air Terminal	19.0 nm E	Yes	Yes	9,763	Yes	269	137,459
ONO	Ontario Municipal	28.0 nm NW	No	Yes	5,006	Yes	32	12,930
S75	Payette Municipal	29.0 nm NW	No	No	3,534	No	15	5,500
S87	Weiser Municipal	37.0 nm N	No	No	4,000	Yes	47	5,150

Key:
[1] Tower - Does the airport have a control tower?
[2] AWOS/ASOS - Does the airport have on-field weather reporting station?
[3] IAP - Does the airport have instrument approach procedures?
[4] Airport records

Source: Airnav.com.

Available runway length and the capability of instrument approaches is a significant factor when aircraft owners choose an airport at which to base. Aside from Boise Air Terminal, EUL provides the longest runway (5,500 feet) and has similar instrument approach (GPS approach with 1-mile visibility minimums) capabilities among general aviation airports within a 40-nautical-mile radius. The next closest airport with similar capability to EUL is Nampa Municipal, located approximately six nm to the southeast in the neighboring City of Nampa, Idaho. The runway length at Nampa Municipal is 5,000 feet long; however, Nampa Municipal has slightly lower instrument approach visibility minimums (not lower than ⅞-mile) when compared to EUL. Given its proximity and characteristics, Nampa Municipal could be considered the greatest competition to EUL, with Boise Air Terminal a close second.

The remaining airports situated between 20 nm and 40 nm from EUL are Ontario Municipal, Payette Municipal, and Weiser Municipal Airports. These airports also provide an array of general aviation services and have runway lengths of 5,006, 3,534, and 4,000 feet, respectively. These airports also somewhat limit the EUL service area, however, are not as competitive as Nampa Municipal and Boise Air Terminal Airports.

The levels of service and facilities will play a role in determining the Airport's service area. However, EUL has remained a very important facility that meets the needs of general aviation operators in the region. This includes recreational flying in single engine aircraft up to corporate business jets and charter operators. The Airport is also home to significantly more aircraft than any other airport in the region. In addition, EUL is a designated reliever airport. In this capacity, the Airport should be maintained to accommodate a full range of general aviation aircraft.

An indication of the Airport's general service area can also be obtained through an examination of its based aircraft owners. **Exhibit 2A** presents the total registered aircraft within 30 nm of EUL for 2010 and 2019. For 2019, a comparison has been made between regional registered aircraft and current based aircraft. The regional registered aircraft are depicted as the green dots, while registered aircraft that are currently based at the Airport are represented as blue dots.

The 2010 historic aircraft registration counts are slightly higher when compared to the 2019 counts, by a total of 112 aircraft. However, between 2008 and 2014, two factors contributed to the decline in registered aircraft nationally: 1) the 2008-2009 national recession and subsequent slow recovery; and 2) FAA required all aircraft to be re-registered from 2010-2013, which removed approximately 10.5 percent of previously registered active general aviation aircraft. The registered aircraft count within 30 nm of EUL totaled 1,529 in the year 2010, while the 2019 total shows a decline of slightly more than 100 aircraft to 1,417.

In 2019, many of these aircraft registrations surround EUL within the 0-10 nm radius and to the east within the 10-20 nm radius. It is likely that many of these aircraft base at a combination of EUL, Nampa Municipal, and Boise Air Terminal. At present, there are a total of 401 registered aircraft within 10 miles of EUL. Of these aircraft, EUL has 125 based at the Airport, leaving a difference of 276 aircraft that have registered owners within 10 miles of the Airport. Within the 10-20 nm radius, there are a total of 765 aircraft registrations, 130 of which are based at EUL.

This data shows that a high percentage of based aircraft that are regionally registered reside or do business near the Airport. It should be noted that 126 of the current based aircraft at EUL are registered beyond 30 nm of the Airport. The remainder of the based aircraft owners are more rurally located surrounding the greater Boise metropolitan area.

Table 2B shows the percentage breakdown of where in proximity to the Airport, based aircraft owners have their aircraft registered. Approximately 31 percent of based aircraft are registered within 10 miles of the Airport. Another 33 percent are registered within 10-20 miles from the Airport, while approximately 5 percent are registered between 20-30 miles. Registrations beyond 30 miles account for approximately 31 percent of based aircraft owners.

TABLE 2B | Based Aircraft Location Analysis
Treasure Valley Executive Airport

Range	Aircraft Count	Percentage
Within 10 miles	125	31%
Within 10-20 miles	130	33%
Within 20-30 miles	19	5%
Beyond 30 miles	126	31%
Total	**400**	**100%**

Source: Coffman Associates analysis

While EUL draws significantly from neighboring communities such as Nampa, Meridian, and Boise, it also serves a significant general aviation need throughout much of Canyon County as well as the western portion of Ada County.

Considering all previous factors associated with competing airports, available aviation services, and based aircraft ownership, the airport's primary service area can be considered to include the entirety of Canyon and Ada Counties, which are the primary driver of based aircraft at EUL.

SOCIOECONOMIC TRENDS

Socioeconomic conditions also provide an important baseline for preparing aviation demand forecasts. Local socioeconomic variables, such as population and employment, are indicators for understanding the dynamics of the community and can relate to local trends in aviation activity. Analysis of the demographics of the airport service area will give a more comprehensive understanding of the socioeconomic situations influencing the region which supports EUL. The following is a summary of the demographic and socioeconomic data presented in Chapter One, as well as forecasts of those socioeconomic characteristics.

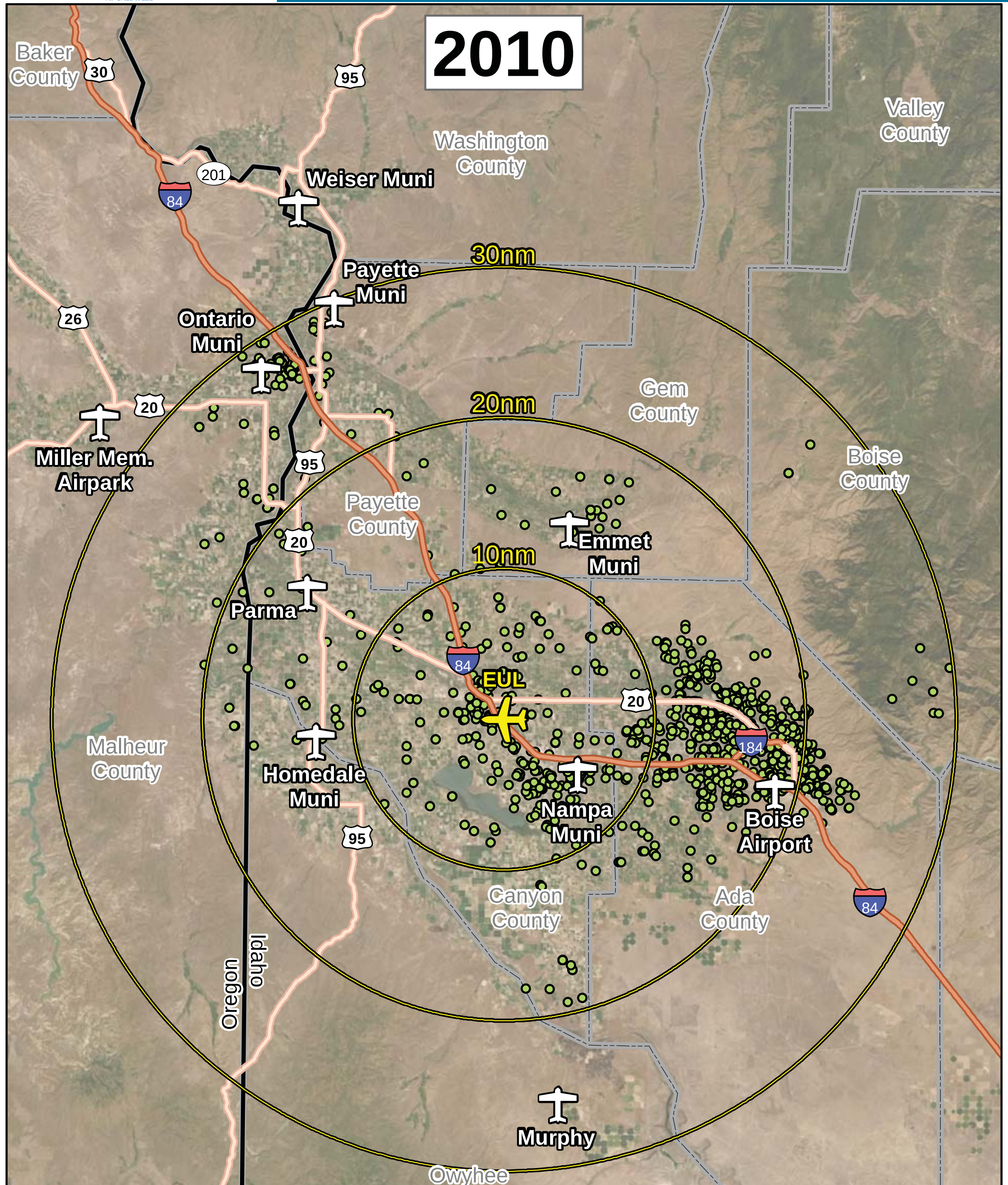
Table 2C summarizes historical and forecast population, employment, and income estimates for Canyon and Ada Counties, which comprise the airport service area. For purposes of this analysis, socioeconomic metrics of the airport service area (as a whole) have also been examined. As a point of comparison, historical and forecast figures for the State of Idaho are also depicted in the table. By 2039, the population of Canyon County is projected to reach over 314,000 people, while Ada County is projected to total over 604,000 people. The airport service area is projected to reach over 918,000 residents by 2039, which will make up approximately 43 percent of the state's population. With the exception of Canyon County, employment growth is projected to outpace population growth in each jurisdiction, forecast at 1.55 percent compound average annual growth rate (CAGR) for Canyon County, 1.55 percent CAGR for Ada County, 1.55 percent for the airport service area, and 1.25 percent CAGR for the state. Per capita personal income is projected to grow most quickly in Ada County at 1.20 percent CAGR, compared to 0.97, 1.11, and 1.12 percent CAGR for Canyon County, the airport service area, and state, respectively. Gross regional product (GRP) for Canyon County and State are projected to grow at CAGRs of 2.05 and 1.76 percent, respectively, while the GRP for Ada County and the airport service area are projected to grow at 2.07 percent.

TABLE 2C | Socioeconomic History and Projections

	HISTORICAL				PROJECTIONS			
	2000	2010	2019	CAGR (2000-2019)	2024	2029	2039	CAGR (2019-2039)
Canyon County								
Population	133,082	189,366	224,780	2.66%	245,769	267,891	314,347	1.69%
Employment	64,926	75,633	95,453	1.95%	103,825	112,524	129,873	1.55%
Income (PCPI)	$26,013	$25,896	$30,395	0.78%	$32,291	$34,140	$36,859	0.97%
GRP (millions)	3,809	4,588	5,759	2.09%	6,411	7,118	8,640	2.05%
Ada County								
Population	303,328	393,446	469,940	2.21%	503,189	537,131	604,465	1.27%
Employment	227,409	261,664	330,901	1.89%	360,010	390,277	449,714	1.55%
Income (PCPI)	$44,101	$39,993	$49,192	0.55%	$52,640	$56,195	$62,475	1.20%
GRP (millions)	18,156	20,565	26,830	1.97%	29,911	33,271	40,436	2.07%
Airport Service Area (Canyon and Ada Counties Combined)								
Population	436,410	582,812	694,720	2.35%	748,958	805,022	918,812	1.41%
Employment	292,335	337,297	426,354	1.90%	463,835	502,801	579,587	1.55%
Income (PCPI)	$38,586	$35,412	$43,110	0.56%	$45,963	$48,856	$53,711	1.11%
GRP (millions)	21,965	25,152	32,590	1.99%	36,322	40,389	49,076	2.07%
State of Idaho								
Population	1,299,430	1,570,912	1,754,389	1.51%	1,849,426	1,946,406	2,138,877	1.00%
Employment	776,896	868,708	1,036,700	1.45%	1,110,541	1,185,373	1,328,304	1.25%
Income (PCPI)	$32,069	$33,353	$40,849	1.22%	$43,713	$46,525	$51,079	1.12%
GRP (millions)	48,562	57,647	71,399	1.95%	78,327	85,744	101,197	1.76%

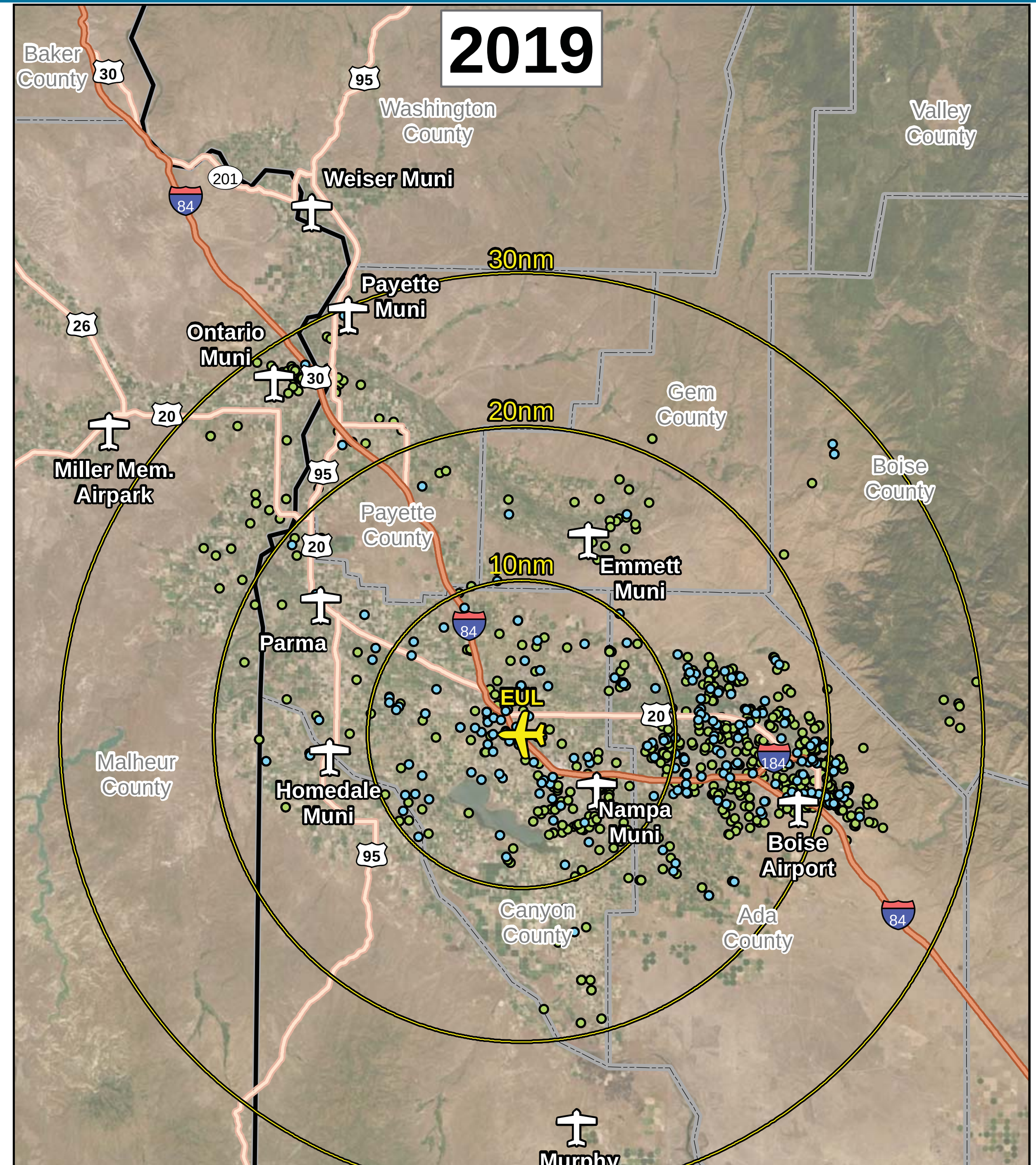
CAGR – Compound Annual Growth Rate
GRP – Gross Regional Product (adjusted to 2009 dollars)
PCPI – Per Capita Personal Income (adjusted to 2009 dollars)

Source: U.S. Census Bureau; Woods & Poole Complete Economic and Demographic Data Source (CEDDS) 2019



Registered Aircraft Address Locations

Radius	2010 Count
0 - 10nm	415
10 - 20nm	848
20 - 30nm	266
Total	*1,529*



Registered & Based Aircraft Address Locations

Radius	2019 Registered	2019 Based
0 - 10nm	401	125
10 - 20nm	765	130
20 - 30nm	251	19
Total	*1,417*	*274**

*400 Aircraft are based at EUL. 126 Aircraft are registered to addresses beyond 30nm from EUL.

Legend

- County Boundary
- State Boundary
- Limited Access
- Major Highways
- Caldwell Industrial
- NPIAS Airport
- Registered Aircraft
- 2019 Based Aircraft

0 10 20
1" = 10 nautical miles
N

Source: ESRI Basemap Imagery (2018), FAA Registered Aircraft Database, basedaircraft.com

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NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the general public. The current edition used in preparation of this study was FAA *Aerospace Forecasts – Fiscal Years 2020-2040*, published in March 2020. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the FAA Aerospace Forecasts.

FAA GENERAL AVIATION FORECASTS

The FAA forecasts the fleet mix and hours flown for single engine piston aircraft, multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and others (gliders and balloons). The FAA forecasts "active aircraft," not total aircraft. An active aircraft is one that is flown at least one hour during the year. As previously mentioned, from 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

The long-term outlook for general aviation is relatively stable, as growth at the high-end offsets continuing retirements at the traditional low end of the segment. The active general aviation fleet is forecast to decline slightly between 2020 and 2040. While steady growth in both gross domestic product (GDP) and corporate profits results in continued growth of the turbine and rotorcraft fleets, the largest segment of the fleet – fixed-wing piston aircraft – continues to shrink over the forecast. Against the marginally declining fleet, the number of general aviation hours flown is projected to increase by an average of 0.7 percent per year during the same period, as growth in turbine, rotorcraft, and experimental hours more than offset a decline in fixed wing piston hours. **Table 2D** shows the primary general aviation demand indicators as forecast by the FAA.

TABLE 2D | FAA General Aviation Forecast

Demand Indicator	2020	2040	CAGR
GENERAL AVIATION FLEET			
Total Fixed Wing Piston	141,245	115,970	-0.98%
Total Fixed Wing Turbine	25,490	36,595	1.82%
Total Helicopters	10,340	14,295	1.63%
Total Other (experimental, light sport, etc.)	35,305	43,520	1.05%
Total GA Fleet	**212,380**	**210,380**	**-0.05%**
GENERAL AVIATION OPERATIONS			
Local	13,600,473	14,538,858	0.33%
Itinerant	14,412,203	15,166,018	0.26%
Total GA Operations	**28,012,676**	**29,704,876**	**0.29%**
CAGR: compound annual growth rate (2020-2040)			

Source: FAA Aerospace Forecast - Fiscal Years 2020-2040

General Aviation Aircraft Fleet Mix

For 2020, the FAA estimated there were 141,245 piston-powered aircraft in the national fleet. The total number of piston-powered aircraft in the fleet is forecast to decline by 0.98 percent from 2020-2040, resulting in 115,970 by 2020. This includes a decline of 1.00 percent annually for single engine pistons and a decline of 0.50 percent for multi-engine pistons.

Total turbine aircraft are forecast to grow at an annual growth rate of 1.82 percent through 2040. The FAA estimates there were 25,490 fixed-wing turbine-powered aircraft in the national fleet in 2020, and there will be 36,595 by 2040. This includes annual growth rates of 1.20 percent for turboprops and 2.20 percent for business jets.

Total helicopters are forecast to grow at an annual growth rate of 1.63 percent annually through 2040. The FAA estimates there were 10,340 helicopters in 2020, which are forecast to grow to 14,295 by 2020. This includes annual growth rates of 1.40 percent for piston helicopters and 1.70 percent for turbine helicopters.

The FAA also forecasts experimental aircraft, light sport aircraft, and others. Combined, there were 35,305 other aircraft in 2020. This is forecast to grow to 43,520 by 2040 for an annual growth rate of 1.05 percent.

General Aviation Operations

The FAA also forecasts total operations based upon activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military.

General aviation operations, both local and itinerant, declined significantly as a result of the 2008-2009 recession and subsequent slow recovery. Through 2040, total general aviation operations are forecast to grow 0.29 percent annually. This includes annual growth rates of 0.33 percent for local general aviation operations and 0.26 percent for itinerant general aviation operations.

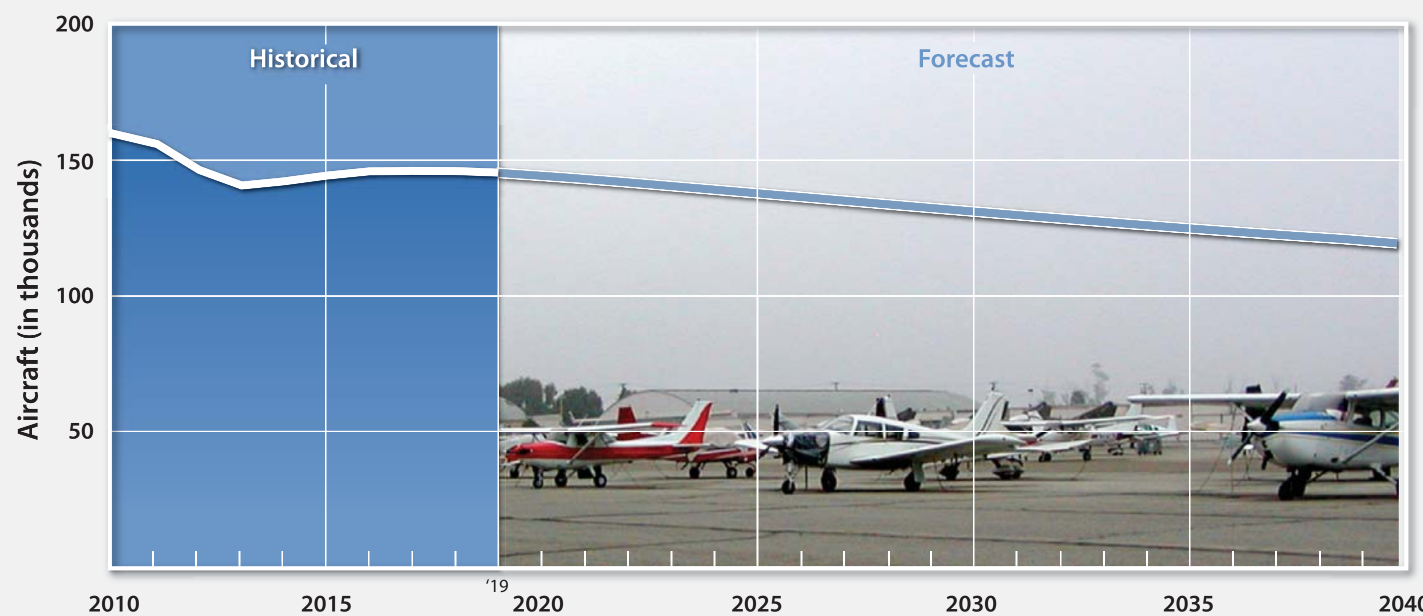
Exhibit 2B presents the historical and FAA forecast of the U.S. active general aviation aircraft fleet and operations.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth. However, the judgment of the forecast analyst, based upon professional experience, knowledge of the aviation industry, and assessment of the local situation, is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the utilization of more than one analytical technique. Methodologies frequently considered include trend line/time-series projections, correlation/regression analysis, and market share analysis. The forecast analyst may decide to employ one or all these methods to arrive at a reasonable single forecast. The following is a description of those methodologies utilized to develop the forecasts of aviation demand.

U.S. ACTIVE GENERAL AVIATION AIRCRAFT

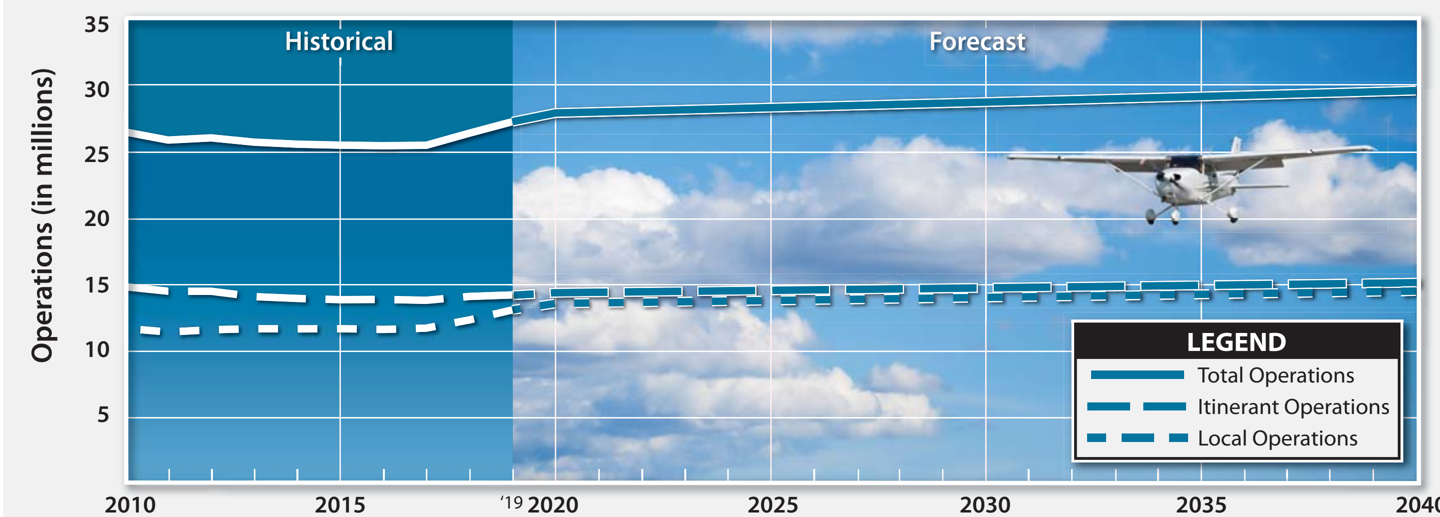
	2019E	2025	2030	2040	CAGR 2020-2040
Fixed Wing					
Piston					
Single Engine	129,535	122,245	115,710	104,335	-1.0%
Multi-Engine	12,800	12,485	12,195	11,635	-0.5%
Turbine					
Turboprop	9,965	10,230	10,795	12,595	1.2%
Turbojet	15,035	17,760	19,970	24,000	2.2%
Rotorcraft					
Piston	3,130	3,405	3,665	4,215	1.4%
Turbine	7,035	7,820	8,540	10,080	1.7%
Experimental					
	27,725	29,365	30,805	33,475	0.9%
Sport Aircraft					
	2,700	3,545	4,185	5,430	3.3%
Other					
	4,410	4,545	4,575	4,615	0.1%
Total Pistons	**145,465**	**138,135**	**131,570**	**120,185**	**-0.9%**
Total Turbines	**32,035**	**35,810**	**39,305**	**46,675**	**1.8%**
Total Fleet	**212,335**	**211,400**	**210,440**	**210,380**	**0.0%**



Notes: 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 - Fiscal Years 2019-2040*

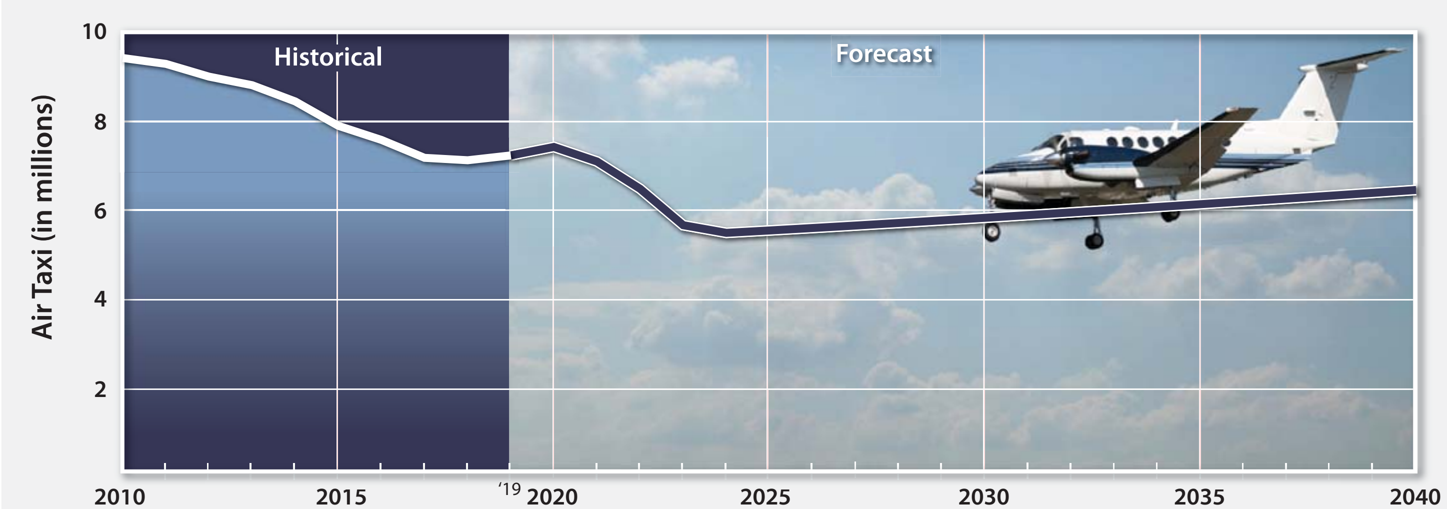
U.S. GENERAL AVIATION OPERATIONS

	2019E	2025	2030	2040	CAGR 2020-2040
Itinerant					
	14,245	14,594	14,780	15,166	0.3%
Local					
	13,109	13,824	14,055	14,539	0.3%
Total GA Operations	**27,354**	**18,418**	**28,835**	**29,705**	**0.3%**



U.S. AIR TAXI

	2019E	2025	2030	2040	CAGR 2020-2040
Air Taxi/Commuter Operations					
Itinerant	7,234	5,557	5,840	6,462	-0.7%



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TREND LINE/TIME SERIES EXTENSION: Trend line/time-series projections are probably the simplest and most familiar of the forecasting techniques. By fitting growth curves to historical data, and then extending them into the future, a basic trend line projection is produced. An assumption of this technique is that outside factors will continue to affect aviation demand in much the same manner as in the past. As broad as this assumption may be, the trend line projection does serve as a reliable benchmark for comparing other projections.

RATIO PROJECTION: The ratio projection methodology examines the historical relationship between two variables as a ratio. A common example in aviation demand forecasting is to consider the number of based aircraft as a ratio of the service area population where there may be 1.8 aircraft per 1,000 people. This ratio can then be carried to future years in comparison to projections of population.

MARKET SHARE ANALYSIS: Market share analysis involves historical review of airport activity as a percentage, or share, of a larger regional, state, or national aviation market. A historical market share trend is determined, providing an expected market share for the future. These shares are then multiplied by the forecasts of the larger geographical area to produce a market share projection. This method has the same limitations as trend line projections but can provide a useful check on the validity of other forecasting techniques.

SOCIOECONOMIC METHODOLOGIES: Though trend line extrapolation and market share analysis may provide mathematical and formulaic justification for demand projections, many factors beyond historical levels of activity may identify trends in aviation and impact aviation demand locally. Socioeconomic or correlation analysis examines the direct relationship between two or more sets of historical data from which future aviation activity projections are developed.

PROFESSIONAL JUDGEMENT: Judgmental methods are educated estimations of future events based on the industry knowledge, experience, and intuition of the forecaster. This method permits the inclusion of a broad range of relevant information into the forecasting process and is usually used to refine the results of the other methods.

Forecasts will age the farther they are from the base year, thus the less reliable a forecast may become, due to changing local and national conditions. Nonetheless, the FAA indicates that a 20-year forecast be developed for long-range airport planning. Facility and financial planning usually require at least a 10 -year view because it often takes more than five years to complete a major facility development program. However, it is important to use forecasts that do not overestimate revenue-generating capabilities or understate demand for facilities required to meet public (user) needs.

A wide range of factors is known to influence the aviation industry and can have significant impacts on the extent and nature of aviation activity in both the local and national markets. Historically, the nature and trend of the national economy have had direct impacts on the level of aviation activity. Recessionary periods have been closely followed by declines in aviation activity. Nonetheless, over time trends emerge and provide the basis for airport planning.

Future facility requirements, such as hangar and apron needs, are derived from projections of various aviation demand indicators. Using a broad spectrum of local, regional, and national socioeconomic and aviation information, and analyzing the most current aviation trends, forecasts are presented for the following aviation demand indicators:

- Based Aircraft
- Based Aircraft Fleet Mix
- General Aviation Operations
- Air Taxi and Military Operations
- Operational Peaks

This forecasting effort was completed in April 2020, with a base year of 2019. While it is too early to understand the long-term impact of the COVID-19 pandemic on general aviation, there are early signs that are considered in this forecasting effort. For example, recreational and student training appears to be slowing while charter and private aviation appears to be increasing. Therefore, certain forecasting elements are tempered in the short term and an assumption made that activity will return to more normal levels within the short term (five year) timeframe.

EXISTING FORECASTS

Consideration is given to any forecasts of aviation demand for the Airport that have been completed in the recent past. These are typically sourced from the FAA *Terminal Area Forecast* (TAF), previous Airport master plans, and state or regional aviation plans. The most recent completed master plan is from 2010.

PREVIOUS MASTER PLAN (2010)

A master plan update for Caldwell Industrial Airport was last completed in 2010. The previous master plan is now nearly 10 years old which is typically when a master plan would be updated in a normal cycle. The forecasts from the 2010 master plan provide insight to the assumptions and projections at the time. **Table 2E** presents the approved aviation demand forecasts from the 2010 master plan.

TABLE 2E | 2010 Master Plan Forecasts
Caldwell Industrial Airport

	Actual	FORECAST			CAGR:
	2009	2015	2020	2030	2009-2030
ITINERANT					
General Aviation	43,900	45,200	46,200	47,600	0.39%
Air Taxi	2,000	2,200	2,400	2,800	1.62%
Military	300	300	300	300	0.00%
Total Itinerant	*46,200*	*47,700*	*48,900*	*50,700*	*0.44%*
LOCAL					
General Aviation	107,800	111,300	114,100	118,300	0.44%
Military	0	0	0	0	0.00%
Total Local	*107,800*	*111,300*	*114,100*	*118,300*	*0.44%*
Total Operations	**154,000**	**159,000**	**163,000**	**169,000**	**0.44%**
BASED AIRCRAFT					
Based Aircraft	480	530	570	650	1.45%
CAGR - Compound annual growth rate					

FAA *TERMINAL AREA FORECAST* (TAF January 2020)

On an annual basis, the FAA publishes the *Terminal Area Forecast* (TAF) for each airport included in the *National Plan of Integrated Airport Systems* (NPIAS). The TAF is a generalized forecast of airport activity used by FAA primarily for internal planning purposes. It is available to airports and consultants to use as a baseline projection and important point of comparison while developing local forecasts. The TAF was published in January 2020 and is based on the federal fiscal year (October-September).

Table 2F presents the 2020 TAF for EUL. For based aircraft, the TAF shows 389 in 2019 and is not projected to grow over the planning horizon. For total operations, the TAF shows 148,088 in 2019 and a projected annual growth rate of 0.37 percent. It should be noted that the TAF is rarely in concert with an actual date for an airport. For example, Airport staff have physically counted 400 based aircraft, which is different than the TAF. From March 2019 through February 2020, JUB Engineers conducted a physical operations count utilizing a series of motion activated cameras and counted a total 147,366 operations, which is also slightly different than the TAF. Once this forecast is approved by the FAA, it is recommended that the TAF be updated to reflect these forecasts.

The FAA also provides a TAF for all airports in each state. Statewide TAF data is helpful as a projection tool and as a point of comparison to assess the reasonableness of the forecasts developed here. In the State of Idaho, total based aircraft is projected to grow 1.05 percent and total general aviation operations are projected to grow 1.59 percent.

TABLE 2F | 2020 FAA Terminal Area Forecast
Treasure Valley Executive Airport

	2019	2024	2029	2039	CAGR 2019-2039
ANNUAL OPERATIONS					
Itinerant					
Air Taxi	2,032	2,189	2,355	2,735	1.50%
General Aviation	35,162	35,748	36,279	37,358	0.30%
Military	325	325	325	325	0.00%
Total Itinerant	*37,519*	*38,262*	*38,959*	*40,418*	*0.37%*
Local					
General Aviation	110,569	112,764	114,825	119,064	0.37%
Total Local	*110,569*	*112,764*	*114,825*	*119,064*	*0.37%*
Total Operations	**148,088**	**151,026**	**153,784**	**159,482**	**0.37%**
BASED AIRCRAFT					
Based Aircraft	389	389	389	389	0.00%
CAGR - Compound annual growth rate					

Source: FAA Terminal Area Forecast (TAF), *January 2020*

GENERAL AVIATION FORECAST

General aviation encompasses all portions of civil aviation except commercial service and military operations. To determine the types and sizes of facilities that should be planned to accommodate general aviation activity at the Airport, certain elements of this activity must be forecast. These indicators of general aviation demand include based aircraft, aircraft fleet mix, operations, and peak periods.

The number of based aircraft is the most basic indicator of general aviation demand. By first developing a forecast of based aircraft for EUL, other demand indicators can be projected. The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations. An initial forecast of service area registered aircraft is developed and will be used as one data point to arrive at a based aircraft forecast for EUL.

BASED AIRCRAFT FORECAST

Forecasts of based aircraft may directly influence needed facilities and the applicable design standards. The needed facilities may include hangars, aprons, taxilanes, etc. The applicable design standards may include separation distances and object clearing surfaces. The size and type of based aircraft are also an important consideration. The addition of numerous small aircraft may have no effect on design standards, while the addition of a few larger business jets can have a substantial impact on applicable design standards.

Because of the numerous variables known to influence aviation demand, several separate forecasts of based aircraft are developed. Each of the forecasts is then examined for reasonableness and any outliers are discarded or given less weight. The remaining forecasts collectively will create a planning envelope. A single planning forecast is then selected for use in developing facility needs for the Airport. The selected forecast of based aircraft can be one of the several forecasts developed or based on the experience and judgment of the forecaster, or it can be a blend of the forecasts.

Based Aircraft Inventory

Documentation of the historical number of based aircraft at EUL has been somewhat intermittent. For many years, FAA did not require airports to report the number of based aircraft. It is only in recent years that the FAA has established a based aircraft inventory in which it is possible to cross-reference based aircraft claimed by one airport with other airports. The FAA is now utilizing this based aircraft inventory as a baseline for determining how many, and what type of, aircraft are based at any individual airport. This database evolves daily as aircraft are added or removed, and it does not provide an annual history of based aircraft. It is the responsibility of the sponsor (owner) of each airport to input based aircraft information into the FAA database (www.basedaircraft.com). The FAA based aircraft database currently shows 400 verified aircraft. The mix of aircraft is comprised of 352 single engine pistons, 20 multi-engine pistons, three turboprops, three jets, and 22 helicopters.

Registered Aircraft

The process of developing forecasts of based aircraft begins with an analysis of aircraft ownership in the primary general aviation service area through a review of historical aircraft registrations.

Table 2G presents historical data regarding aircraft registered in the airport service area (Canyon and Ada Counties) since 2000. These figures are derived from the FAA aircraft registration database that categorized registered aircraft by county based on the zip code of the registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in the service area but based at an airport outside the service area or vice versa.

As presented in the table, the airport service area experienced a slight decline in registered aircraft during this timeframe that was likely attributed to the 2008-2009 recession and the FAA's re-registration process. With these two major factors now in the past, it is reasonable to anticipate a return to more normal growth trends.

Registered aircraft within the airport service area ranged between a low of 1,066 in 2000 to a high of 1,320 in 2011. After 2011, registered aircraft have fluctuated, but trended downward slightly to a total of 1,189 in 2019. The table also includes the type of aircraft registered in the service area. As is typical for nearly all areas in the United States, single engine piston aircraft dominate the total aircraft registrations. In 2019, for example, of the 1,189 registered aircraft in the service area, 930 were single engine piston aircraft. Aircraft registrations in 2019 also included 31 multi-engine piston aircraft, 83 turboprop aircraft, 51 jets, and 48 helicopters. There were also 46 aircraft included in the "other" category, which can include gliders, ultralights, and electric-powered aircraft.

Now that the actual number of registered aircraft within the airport service area has been identified, several projections of future registered aircraft are considered over the 20-year planning horizon.

TABLE 2G | Historical Aircraft Registration by Type
Airport Service Area (Canyon and Ada Counties)

Year	SEP	MEP	Turboprop	Jet	Helicopter	Other[1]	Total
2000	821	70	41	28	41	65	1,066
2001	841	67	56	35	45	68	1,112
2002	845	68	57	35	46	68	1,119
2003	845	43	127	35	50	70	1,170
2004	865	40	116	36	53	69	1,179
2005	892	38	113	37	51	71	1,202
2006	981	57	33	19	54	73	1,217
2007	945	55	42	22	56	83	1,203
2008	1,021	53	63	31	55	83	1,306
2009	1,017	53	63	30	52	80	1,295
2010	1,017	55	73	32	52	80	1,309
2011	1,027	49	73	35	54	82	1,320
2012	982	42	77	37	59	80	1,277
2013	915	43	68	33	64	67	1,190
2014	901	45	79	35	70	62	1,192
2015	913	37	77	38	64	62	1,191
2016	947	38	77	36	62	72	1,232
2017	938	34	73	42	57	70	1,214
2018	898	32	80	45	50	53	1,158
2019	930	31	83	51	48	46	1,189

[1] "Other" category consists of gliders, ultralights, electric-powered aircraft, etc.
SEP - Single Engine Piston
MEP - Multi-Engine Piston
Source: FAA Aircraft Registration Database

Ratio Projection

In 2019, the service area had 1.71 registered aircraft per 1,000 residents. By holding this ratio constant through the plan years, a forecast emerges. The constant ratio forecast results in 1,571 registered aircraft by 2039 and a CAGR of 1.40 percent.

Market Share Analysis

The first market share forecast considers the relationship between registered aircraft located in the airport service area and active aircraft in the U.S. as projected by FAA. In 2019, the service area had 0.560 percent of the U.S. active aircraft. By keeping this market share constant, a forecast emerges that shows negative growth, with 1,177 registered aircraft and a CAGR of -0.05 percent by year 2039. This negative growth rate is the direct result of the FAA projection of a decrease in the number of active aircraft over the next 20 years.

The second forecast considers an increasing market share percentage of service area registered aircraft to the number of U.S. active aircraft. Since 2000, the service area's market share has fluctuated from a low of 0.490 percent to a high of 0.611 percent. Over the past 20 years, the service area has generally gained market share of the U.S. active aircraft. An increasing forecast model having the service area market share of U.S. active aircraft returning to the historic high of 0.611 percent in 2039 yields 1,284 registered aircraft at a CAGR of 0.39 percent

20-Year Historic Growth Rate Projection

From the year 2000 to 2019 the number of registered aircraft within the airport service area grew from 1,066 to 1,189 for a CAGR of 0.55 percent. The peak during this time was 1,320 registered aircraft in 2011. Applying this growth rate to the 2019 registered aircraft count of 1,189 results in a total of 1,327 registered aircraft by year 2039.

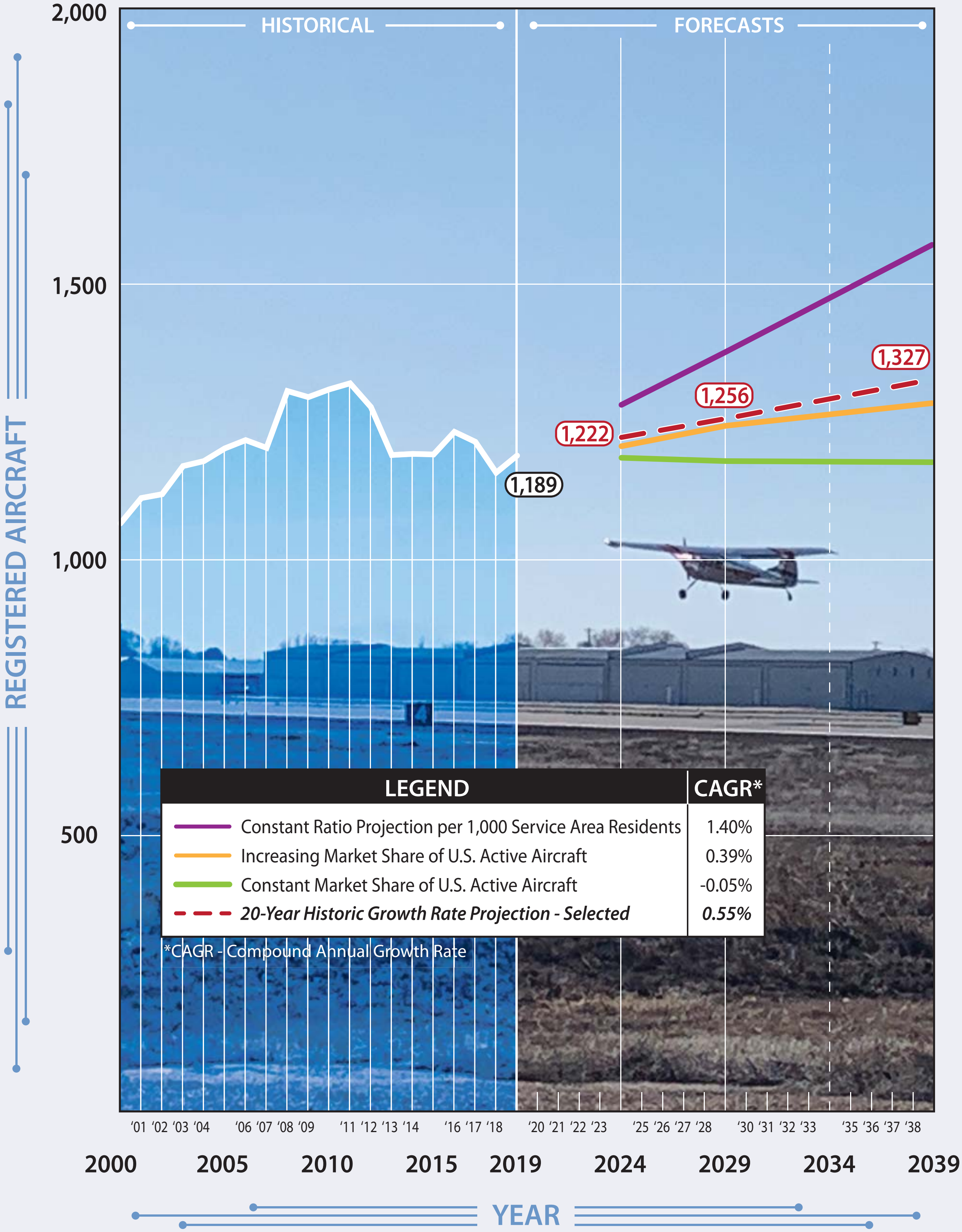
Registered Aircraft Forecast Summary

Table 2H and **Exhibit 2C** summarizes the four registered aircraft forecasts produced for the airport service area. It is at this stage that the forecast analyst must select one of the projections or choose to develop a blended forecast.

The first projection maintained a constant ratio of registered aircraft to the service area population which resulted in a long-term forecast of 1,571 registered aircraft. This projection appears aggressive as it adds nearly 200 more registered aircraft then the high point from 2011. Therefore, this projection is considered the high range of the planning envelope but is not the selected forecast.

The next two projections considered a constant and an increasing market share of U.S. active aircraft. The constant market share projection resulted in a negative growth rate and a decline in registered aircraft. The recent declines in registered aircraft and U.S. active aircraft have slowly leveled off and are projected to return to growth over time, although at a lower rate than what has been projected in the past. For this reason, a negative growth rate is not carried forward. The increasing market share forecast appears reasonable as the service area has had .611 percent of U.S. active aircraft in the past.

The last projection considered is the 20-year historical growth rate. In 2000, there were 1,066 registered aircraft in the service area and in 2019, there were 1,189 for an annual growth rate of 0.55 percent. By extending this growth rate to the plan years, the forecast results in 1,327 registered aircraft in 2039. It is the judgement of the forecast analyst that this projection is the most reasonable because it is based on known historical data and it is not overly optimistic. In fact, there have been several economic challenges during the last 20-years that are accounted for in the historical data, therefore this forecast is somewhat tempered and not overly optimistic.



Sources: Canyon and Ada Counties; FAA Aerospace Forecasts - Fiscal Years 2020-2040
Woods & Poole Complete Economic and Demographic Data Source (CEDDS) 2019

TABLE 2H | Registered Aircraft Projections
Canyon and Ada County

Year	Service Area Registrations[1]	U.S. Active Aircraft[2]	Market Share of U.S. Aircraft	Service Area Population[3]	Aircraft per 1,000 Residents
2000	1,066	217,533	0.490%	436,410	2.44
2001	1,112	211,446	0.526%	453,075	2.45
2002	1,119	211,244	0.530%	466,776	2.40
2003	1,170	209,606	0.558%	478,788	2.44
2004	1,179	219,319	0.538%	492,056	2.40
2005	1,202	224,257	0.536%	512,702	2.34
2006	1,217	221,942	0.548%	535,686	2.27
2007	1,203	231,606	0.519%	555,013	2.17
2008	1,306	228,664	0.571%	567,614	2.30
2009	1,295	223,876	0.578%	575,934	2.25
2010	1,309	223,370	0.586%	582,812	2.25
2011	1,320	220,453	0.599%	592,310	2.23
2012	1,277	209,034	0.611%	602,535	2.12
2013	1,190	199,927	0.595%	614,483	1.94
2014	1,192	204,408	0.583%	627,921	1.90
2015	1,191	210,031	0.567%	639,389	1.86
2016	1,232	211,794	0.582%	655,380	1.88
2017	1,214	211,757	0.573%	673,548	1.80
2018	1,158	211,749	0.547%	684,186	1.69
2019	1,189	212,335	0.560%	694,720	1.71
Constant Ratio Projection per 1,000 Service Area Residents (CAGR 1.40%)					
2024	1,281	211,625	0.605%	748,958	1.71
2029	1,377	210,600	0.654%	805,022	1.71
2039	1,571	210,175	0.748%	918,812	1.71
Constant Market Share of U.S. Active Aircraft (CAGR -0.05%)					
2024	1,185	211,625	0.560%	748,958	1.58
2029	1,179	210,600	0.560%	805,022	1.47
2039	1,177	210,175	0.560%	918,812	1.28
Increasing Market Share of U.S. Active Aircraft (CAGR 0.39%)					
2024	1,206	211,625	0.570%	748,958	1.61
2029	1,243	210,600	0.590%	805,022	1.54
2039	1,284	210,175	0.611%	918,812	1.40
20-YEAR HISTORIC GROWTH RATE PROJECTION (CAGR 0.55%) - SELECTED					
2024	1,222	211,625	0.577%	748,958	1.63
2029	1,256	210,600	0.596%	805,022	1.56
2039	1,327	210,175	0.631%	918,812	1.44

[1] Canyon and Ada Counties
[2] FAA Aerospace Forecasts - Fiscal Years 2020-2040
[3] Woods & Poole Complete Economic and Demographic Data Source (CEDDS) 2019

The registered aircraft projection is one variable to be used in the development of a based aircraft fore-cast. The following section will present several potential based aircraft forecasts, as well as the selected based aircraft forecast, to be utilized in this study.

Market Share of Registered Aircraft Forecast

The Airport captured 33.6 percent of aircraft registered in the service area in 2019. The first forecast maintains a constant market share of 33.6 percent as applied to the registered aircraft forecast. This projection yields 446 based aircraft by 2039, equating to a 0.54 percent CAGR. A second market share projection assumes the Airport will capture a higher percentage of registered aircraft over time. At times, the Airport has captured a higher percentage of the service area registered aircraft such as is documented in the 2009 master plan which showed a capture rate of 38 percent. This forecast considers a long-term capture rate of 41 percent which results in 544 based aircraft by 2039.

Ratio of Based Aircraft to Population Forecast

Trends comparing the number of based aircraft with the airport's service area population were also analyzed. A constant ratio of based aircraft per 1,000 people results in based aircraft growing at the same rate as the service area population. This yields 533 based aircraft by 2039, which is an annual growth rate of 1.44 percent.

Statewide TAF Growth Rate

For non-towered airports, a common forecasting methodology is to consider the growth rates in the statewide FAA TAF. The TAF for Idaho indicated there is 2,905 based aircraft in 2019. This number is projected to increase over the next 20 years to 3,581. This is an annual growth rate of 1.05 percent. When applying this growth rate, based aircraft at EUL may reach 493 by 2039.

Based Aircraft Forecast Summary

The based aircraft forecasts discussed are summarized in **Table 2J** and further depicted on **Exhibit 2D**. These forecasts represent the planning envelope because each of the four based aircraft forecasts are considered reasonable by the forecast analyst. The next step is for the forecast analyst to choose a selected forecast to be used to determine future facility needs.

Two based aircraft forecasts were based up on the Airport capturing either a constant or increasing share of registered aircraft in the airport service area. It is the forecast analyst's judgement that these two should be considered the high and low range of the planning envelope. This means that it is possible that growth will follow either of these trends but for planning purposes, something more in the mid-range of these would be preferred. This is especially true with the unknown impact of the current COVID-19 pandemic and the state of the economy.

The next forecast compared the number of based aircraft to the population by keeping the current ratio of 0.58 constant through the plan years. This resulted in a growth rate of 1.44 percent, near the high defined range. The challenge to selecting this forecast is that the based aircraft to population ratio typically declines over time for general aviation airports as population growth generally exceeds growth in aviation demand.

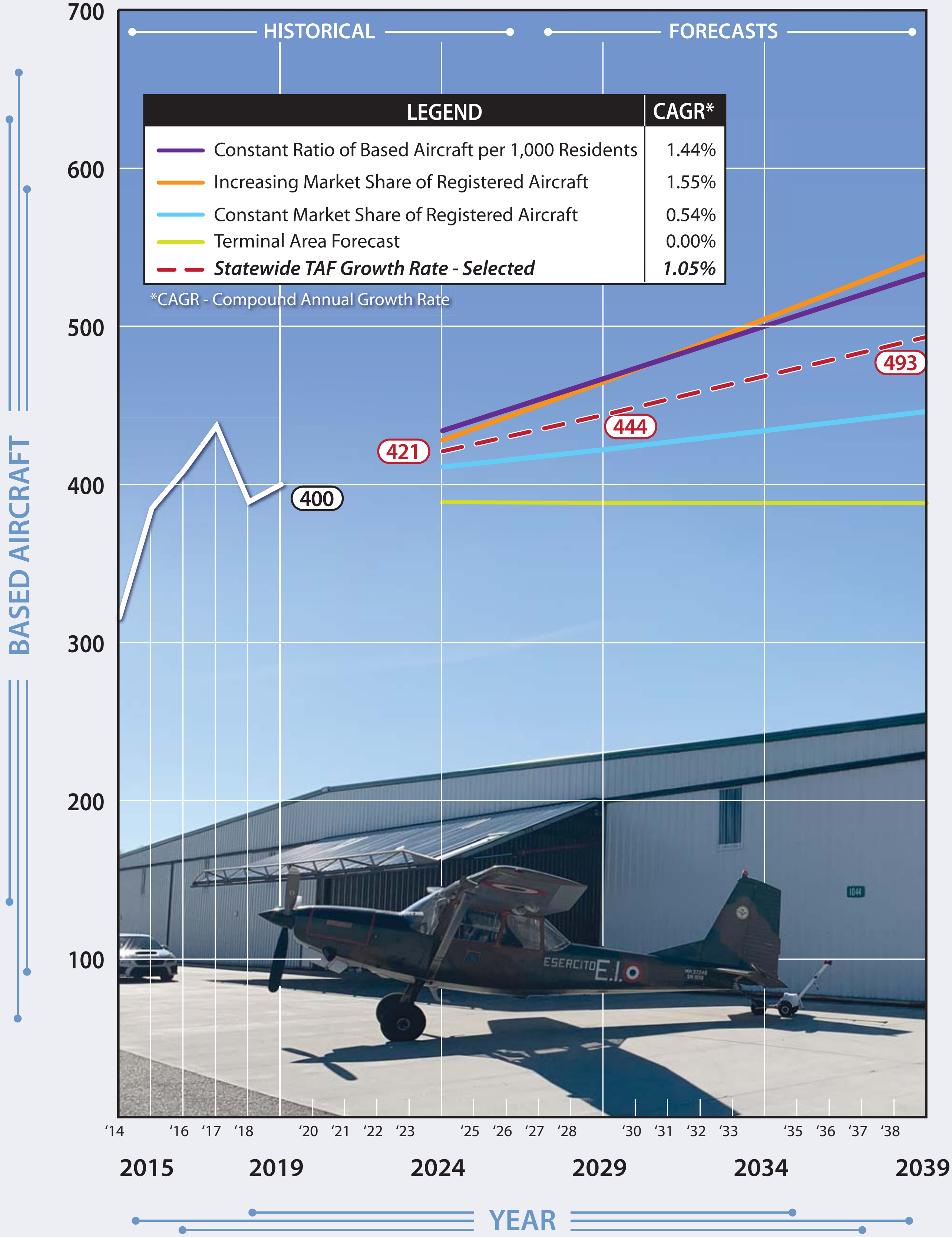

HISTORICAL
FORECASTS
LEGEND
CAGR*
Constant Ratio of Based Aircraft per 1,000 Residents 1.44%
Increasing Market Share of Registered Aircraft 1.55%
Constant Market Share of Registered Aircraft 0.54%
Terminal Area Forecast 0.00%
Statewide TAF Growth Rate - Selected 1.05%
*CAGR - Compound Annual Growth Rate
BASED AIRCRAFT
700
600
500
400
300
200
100
400
421
444
493
'14 '16 '17 '18 '20 '21 '22 '23 '25 '26 '27 '28 '30 '31 '32 '33 '35 '36 '37 '38
2015 2019 2024 2029 2034 2039
YEAR

TABLE 2J | Based Aircraft Forecasts
Treasure Valley Executive Airport

Year	Based Aircraft	Registered Aircraft[1]	Market Share of Registered Aircraft	Service Area Population[1]	Based Aircraft per 1,000 Residents
2019	400	1,189	33.6%	694,720	0.58
Constant Market Share of Registered Aircraft (CAGR = 0.54%)					
2024	411	1,222	33.6%	748,958	0.55
2029	422	1,256	33.6%	805,022	0.52
2039	446	1,327	33.6%	918,812	0.49
Increasing Market Share of Registered Aircraft (CAGR = 1.55%)					
2024	428	1,222	35.0%	748,958	0.57
2029	465	1,256	37.0%	805,022	0.58
2039	544	1,327	41.0%	918,812	0.59
Constant Ratio Projection of Based Aircraft per 1,000 Residents (CAGR = 1.44%)					
2024	434	1,222	35.5%	748,958	0.58
2029	467	1,256	37.2%	805,022	0.58
2039	533	1,327	40.2%	918,812	0.58
STATEWIDE TAF GROWTH RATE (CAGR = 1.05%) - SELECTED					
2024	421	1,222	34.5%	748,958	0.56
2029	444	1,256	35.4%	805,022	0.55
2039	493	1,327	37.2%	918,812	0.54

[1] Canyon and Ada Counties

The selected forecast is the statewide TAF growth rate. The TAF projects an annual growth rate of 1.05 percent which falls nicely within the planning envelope. This forecast results in 493 based aircraft by 2039. Because of the current unknowns with the pandemic and recession, this tempered forecast is the selected forecast for based aircraft.

BASED AIRCRAFT FLEET MIX

The fleet mix of based aircraft is oftentimes more important to airport planning and design than the total number of aircraft. For example, the presence of one, or a few business jets, can impact the design standards more than many smaller, single engine piston-powered aircraft.

Knowing the aircraft fleet mix expected to utilize EUL is necessary to properly plan for facilities that will best serve the level of activity and the type of activities occurring at the Airport. The existing fleet mix of aircraft based at the Airport is comprised of 352 single engine piston aircraft, 20 multi-engine piston aircraft, three turboprops, three jets, and 22 helicopters.

The based aircraft fleet mix, as presented on **Table 2K**, was compared to the existing and forecast U.S. general aviation fleet mix trends as presented in *FAA Aerospace Forecast – Fiscal Years 2020-2040*, as well as to trends occurring at the Airport. The national trend in general aviation continues to be toward a greater percentage of larger, more sophisticated aircraft. While single engine piston-powered aircraft will continue to account for the largest share of based aircraft at the Airport, these aircraft are forecast to drop as a percentage of the fleet mix. Multi-engine piston-powered aircraft are expected to decrease in number and decrease as a percentage of the fleet mix during the planning period of the master plan.

Consistent with national aviation trends, growth is anticipated to occur within the more sophisticated categories, including turboprop and jet categories. The turboprop and jet categories are projected to increase by 10 and 13 based aircraft each over the next 20 years, respectively. Helicopters are also considered a significant growth category, growing to 38 based helicopters through 2039.

TABLE 2K | Based Aircraft Fleet Mix
Treasure Valley Executive Airport

	EXISTING		FORECAST					
Aircraft Type	**2019**	**Percent**	**2024**	**Percent**	**2029**	**Percent**	**2039**	**Percent**
Single Engine Piston	352	88.00%	366	86.94%	379	85.36%	410	83.16%
Multi-Engine Piston	20	5.00%	19	4.51%	18	4.05%	16	3.25%
Turboprop	3	0.75%	5	1.19%	7	1.58%	13	2.64%
Jet	3	0.75%	5	1.19%	10	2.25%	16	3.25%
Helicopter	22	5.50%	26	6.18%	30	6.76%	38	7.71%
Totals	**400**	**100.00%**	**421**	**100.00%**	**444**	**100.00%**	**493**	**100.00%**

Source: Airport Records: Coffman Associates analysis

GENERAL AVIATION ANNUAL OPERATIONS

General aviation operations are classified as either local or itinerant. A local operation is a take-off or landing performed by an aircraft that operates within sight of the airport, or which executes simulated approaches or touch-and-go operations at the airport. Generally, local operations are characterized by training operations. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Typically, itinerant operations increase with business and commercial use, since business aircraft are not typically used for large scale training activities. Local operations include a portion of general aviation and military operations, while itinerant operations include general aviation, military, and air taxi (for-hire operators such as air cargo, life flight, charters, and fractionals).

Each operational segment is forecast individually, they the segments are combined to arrive at a total operations forecast.

Baseline Total Operations Estimate

As presented in Chapter One and previously discussed in this chapter, from March 2019 through February 2020, the Airport did a physical operations count. Motion activated cameras were positioned on both runway end threshold taxiways to capture fixed wing departures. Helicopter operations were estimated based on interviews with the chief pilot for Silverhawk Aviation Academy which is the busiest helicopter training company in the state. Helicopter departures were estimated at one departure per flight hour of instruction. **Table 2L** summarizes the operations count. At 147,366 operations, the physical count is slightly lower than the FAA TAF operations estimate of 148,088.

TABLE 2L | Estimated Operations by Engine Type (12-Month period from 3.2019-2.2020)
Treasure Valley Executive Airport

Propulsion Types	Observed Departures[1]	Estimated Arrivals[2]	Estimated Touch & Goes[3]	Total Operations
Single Engine	15,256	15,256	61,024	91,536
Multi-Engine Piston	835	835	3,340	5,010
Turboprop	72	72	288	432
Jet	75	75	300	450
Helicopter	8,193	8,193	32,772	49,158
Ultralight	130	130	520	780
Total	**24,561**	**24,561**	**98,244**	**147,366**

[1] *Observed Departures*: Game cameras were positioned on both runway end connector taxiways capturing fixed wing departures. Rotorcraft departures were based on Silverhawk Aviation Academy monthly flight instruction hours (assumed 1 departure per flight instruction hour).

[2] *Estimated Arrivals*: Fixed wing are estimated 1 arrival per observed departure. Rotorcraft are estimated 1 arrival per flight instruction hour.

[3] *Estimated Touch & Goes*: Based on in-person field observations, fixed wing "touch and goes" are estimated for visual counts at 2 (4 total operations) per observed departure. Based on an interview with Silverhawk Aviation Academy Chief Pilot, it is estimated 2 (4 total operations) "touch and goes" per flight instruction hour.

Source: JUB Engineers

Table 2M presents the classification of operations at EUL. Local operations account for 66.66 percent itinerant operations account for 33.33 percent of total operations. The itinerant operations category is further subdivided into general aviation, military, and air taxi. While the camera operations study did capture the local/itinerant split, it did not capture the subclassification of the itinerant operations category. Since the subclassifications of itinerant operations can have a significant impact on facility needs (especially the air taxi category, a high percentage of which tend to be operations by larger aircraft), the FAA TAF was consulted to establish the base line percentage of each category.

TABLE 2M | Operations by Category
treasure Valley Executive Airport

Operation Category	2019 Operations	Percent of Total	Percent of Local/Itinerant Total
Local GA	98,244	66.67%	100% of Local Operations
ITINERANT			
Itinerant GA	46,765	31.73%	95.2% of Itinerant Operations
Itinerant Mil	325*	0.22%	0.66% of Itinerant Operations
Itinerant Air Taxi	2,032*	1.38%	4.14% of Itinerant Operations
Itinerant Total	*49,122*	*33.33%*	
Total Operations	**147,366**		

**FAA TAF 2020*

Source: JUB Engineers

As can be seen from the table, the TAF indicated there were 325 itinerant military operations in 2019 which represented 0.22 percent of the total operations. Itinerant air taxi operations represented 1.38 percent of total operations. As a percentage of only itinerant operations, air taxi operations were 4.14 percent of the total itinerant operations.

PREVIOUS OPERATIONS FORECASTS

The 2010 master plan presented an operations forecast previously summarized in Table 2E. Operations were forecast to grow over time at an annual growth rate of 0.44 percent. At the time it was estimated that there were 480 based aircraft. This data is for historical reference to give the reader an understanding of the volatility of aviation demand forecasting. At the time, a recession had taken hold but the indicators as to how that might impact aviation demand were unclear. Nonetheless, the baseline operations estimate from the previous master plan is in the ballpark of what the camera operations study captured for 2019.

Itinerant General Aviation Operations Forecast

Several forecasts of itinerant general aviation operations have been developed and are summarized on **Exhibit 2E**. The following discusses the methodology for each of the forecasts developed. Together, these forecasts establish the planning envelope which represents the range from which actual activity may emerge. A single forecast will be selected based on the judgement of the forecast analyst.

Market Share Analysis

Utilizing the FAA Aerospace Forecasts – Fiscal Years 2020-2040, EUL accounted for 0.328 percent of national itinerant general aviation operations. By maintaining this market share as a constant through the plan years a forecast emerges. This forecast results in a 2039 total of 49,615 itinerant general aviation operations at EUL and a growth rate of 0.30 percent.

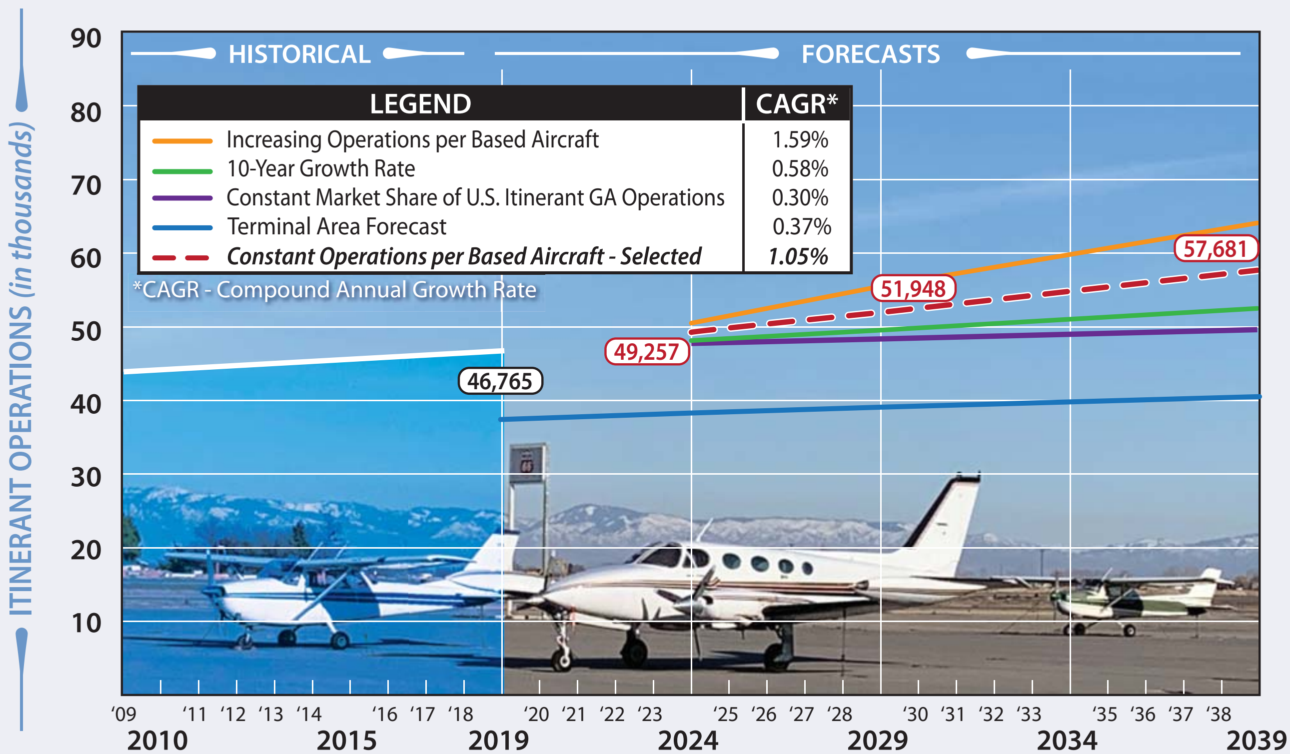
11-Year Historic Growth Rate Projection

While data is sporadic at non-towered airports, an estimate of operations is available from the 2010 master plan. In the base year of that plan, itinerant general aviation operations were estimated as 43,900. The camera operations study estimated that there were 46,765 itinerant general aviation operations in 2019. The growth rate for this 11-year period is 0.58 percent. When carrying this growth rate forward, the 2039 forecast is 52,500 itinerant general aviation operations.

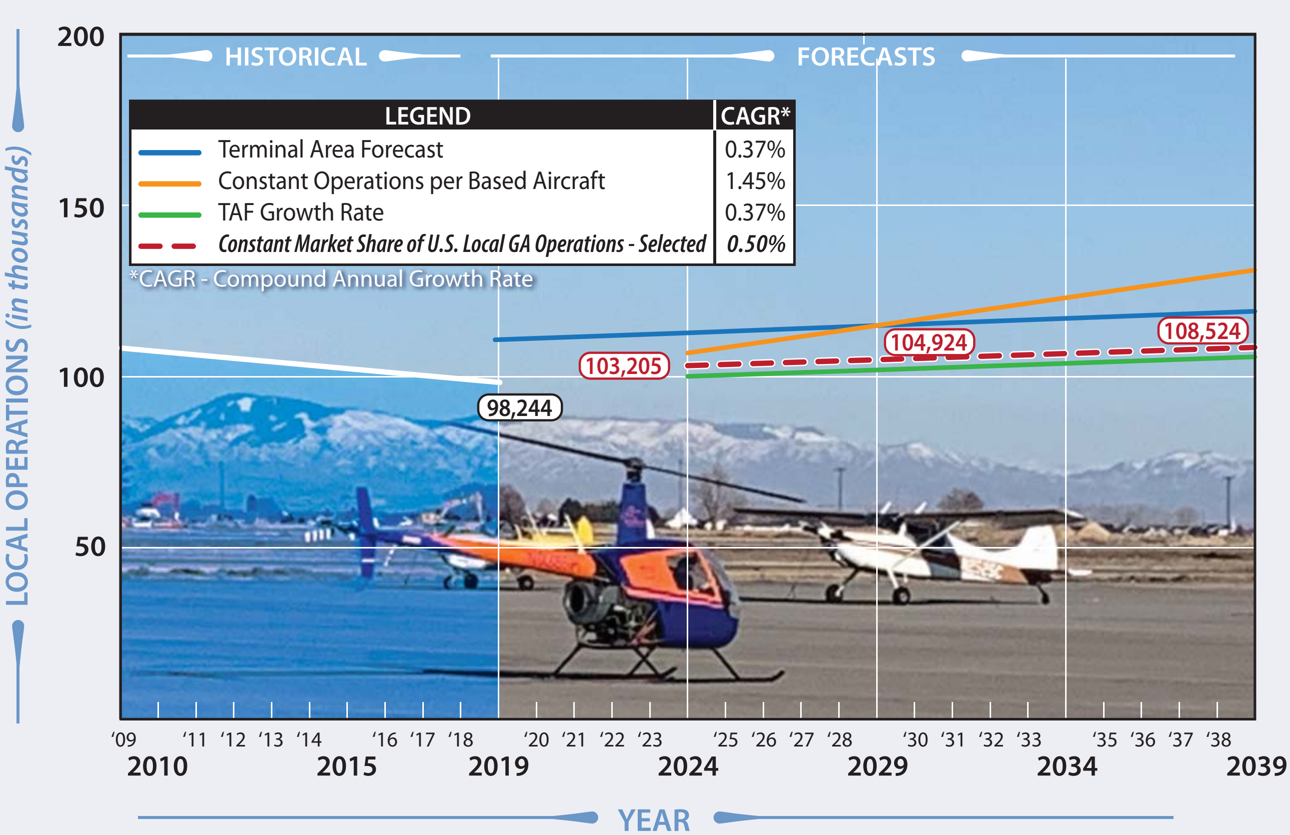
Operations per Based Aircraft

Another method for forecasting operations is to examine the number of operations per based aircraft. In 2009, there were 91 itinerant general aviation operations per based aircraft. In 2019 there were 117 itinerant general aviation operations per based aircraft. By maintaining the 117 operations per itinerant general aviation operations constant, a 2039 forecast of 57,681 itinerant general aviation operations emerges. The annual growth rate is 1.05 percent.

ITINERANT OPERATIONS FORECAST



LOCAL OPERATIONS FORECAST



Because itinerant general aviation operations have seen a noticeable increase since the last master plan, consideration was given to an increasing number of itinerant general aviation operations per based aircraft. This forecast considers the Airport reaching 130 itinerant general aviation operations per based aircraft by 2039 which results in 64,100 operations and an annual growth rate of 1.59 percent.

Itinerant General Aviation Operations Forecast Summary

Four forecasts of itinerant general aviation operations have been presented to form the planning envelop. Because itinerant general aviation operations have been on the increase over the last 10+ years, it could be reasonable to choose the forecast at the high end of the range. However, there are numerous factors to consider that may depress operations in the near term such as the current COVID-19 pandemic and the current state of the economy. For these reasons, the selected forecast is one that falls more in the middle of the planning envelope. The selected forecast is the constant itinerant operations per based aircraft which maintains 117 itinerant general aviation operations per based aircraft through the 20-year planning period. **Table 2N** presents all four forecasts in tabular format which allows for direct comparison among each.

TABLE 2N | Itinerant General Aviation Operations Forecast
Treasure Valley Executive Airport

Year	EUL Itinerant GA Operations	U.S. Itinerant GA Operations[1]	Market Share	EUL Based Aircraft	Itinerant GA Operations per Based Aircraft
2009	43,900	14,863,856	0.295%	480	91
2019	46,765	14,244,787	0.328%	400	117
Constant Market Share of U.S. Itinerant GA Operations (CAGR = 0.30%)					
2024	47,747	14,556,951	0.328%	421	113
2029	48,354	14,741,946	0.328%	444	109
2039	49,615	15,126,452	0.328%	493	101
10-Year Growth Rate (CAGR = 0.58%)					
2024	48,137	14,556,951	0.347%	421	114
2029	49,549	14,741,946	0.368%	444	112
2039	52,500	15,126,452	0.412%	493	106
Increasing Operations per Based Aircraft (CAGR 1.59 %)					
2024	50,500	14,556,951	0.347%	421	120
2029	55,500	14,741,946	0.376%	444	125
2039	64,100	15,126,452	0.424%	493	130
CONSTANT OPERATIONS PER BASED AIRCRAFT (CAGR 1.05%) - SELECTED					
2024	49,257	14,556,951	0.338%	421	117
2029	51,948	14,741,946	0.352%	444	117
2039	57,681	15,126,452	0.381%	493	117

[1] *FAA Aerospace Forecasts - Fiscal Years 2020-2040*

Local General Aviation Operations Forecast

A similar methodology was utilized to generate a planning forecast for local general aviation operations. Five forecasts were developed and are presented in **Table 2P** and on **Exhibit 2E**.

TABLE 2P | Local General Aviation Operations Forecast
Treasure Valley Executive Airport

Year	EUL Local GA Operations	U.S. Local GA Operations[1]	Market Share	EUL Based Aircraft	Local GA Operations per Based Aircraft
2009	108,278	11,716,274	0.924%	480	226
2019	98,244	13,109,215	0.749%	400	246
TAF Growth Rate (CAGR = 0.37%)					
2024	100,075	13,779,091	0.726%	434	230
2029	101,940	14,008,496	0.728%	467	218
2039	105,775	14,489,123	0.730%	533	198
Constant Operations per Based Aircraft (CAGR 1.45%)					
2024	106,900	13,779,091	0.776%	434	246
2029	114,900	14,008,496	0.820%	467	246
2039	131,100	14,489,123	0.905%	533	246
CONSTANT MARKET SHARE OF U.S. LOCAL GA OPERATIONS (CAGR 0.50%) - SELECTED					
2024	103,205	13,779,091	0.749%	434	238
2029	104,924	14,008,496	0.749%	467	225
2039	108,524	14,489,123	0.749%	533	204

[1] *FAA Aerospace Forecasts - Fiscal Years 2020-2040*

FAA Terminal Area Forecast

The first forecast considers the FAA's TAF, which projects a CAGR of 0.97 percent and 119,064 local operations by 2039. It should be noted that the 2019 TAF general aviation local operations count is slightly higher than the physical operations count at 110,569.

Market Share Analysis

The first market share projection considers the Airport maintaining a constant percentage of U.S. local general aviation operations. The second forecast applies an increasing market share percentage of U.S. local operations to the 10-year historic high of 0.952, which occurred in 2011. These forecasts generated CAGRs of 0.50 and 1.71 percent, respectively, and operational counts of 108,500 and 137,900.

Operations per Based Aircraft

Forecasts manipulating variables, such as operations per based aircraft, were also prepared. Maintaining the constant operations per based aircraft at 246 projects a total of 131,000 local general aviation operations by year 2039 and a CAGR of 1.45 percent, while increasing the operations per based aircraft to the 10-year historic average of 335 over the planning horizon projects 178,500 operations and a CAGR of 3.03 percent.

Local General Aviation Operations Forecast Summary

The constant operations per based aircraft has been selected as the planning forecast. The potential for increases in based aircraft indicates possible growth for EUL's local operational levels and increased market share of national local general aviation operations. The selected forecast maintains the current level of local operations per based aircraft at 246. Although historical local operations per based aircraft have been higher in years past, this metric has been maintained throughout the planning horizon as increasing based aircraft will drive EUL's total local operations as well as market share. The selected long-term planning forecast projects a market share of 0.905 percent and local operations totaling 131,000.

Air Taxi Operations Forecast

The air taxi category can be classified as a sub-set of the itinerant operations and includes aircraft involved in on-demand passenger charter, fractional ownership aircraft operations, small parcel transport, and air ambulance activity. While not typically a large percentage of total airport operations, air taxi operations can be conducted via more sophisticated aircraft, ranging from multi-engine piston aircraft up to large business jet aircraft. As a result, it is important to factor these types of operations at airports that experience air taxi operations.

The FAA national air taxi forecast projects a 2.4 percent decrease in air taxi operations through 2030, followed by modest increases thereafter. The primary reason for this decrease is the transition by commuter airlines to larger aircraft with more than 60 passenger seats, which are then counted as air carrier operations. While air taxi operations that are represented by commuter airlines using aircraft with fewer than 60 seats are decreasing, the business jet segment of the air taxi category is expected to continue to grow nationally. Therefore, it is reasonable to expect the business jet component of air taxi activity to increase moderately over time at EUL.

Based upon historical air taxi operations reported in the FAA TAF, it was determined that EUL experienced 2,032 annual air taxi operations, totaling approximately 1.4 percent of annual Airport operations.

Table 2Q and **Exhibit 2F** present several forecasts for air taxi operations at EUL which form the planning envelope.

The first method considers the Airport maintaining a constant market share of U.S. air taxi operations. Carrying the existing 0.014 percent market share forward through the long-term planning horizon. This results in a forecast of 2,118 air taxi operations by 2039 and a growth rate of 0.21 percent. Because the FAA forecast of air taxi operations is so heavily influenced by the transition of the commuter fleet to aircraft with more than 60 seats, this forecast for EUL is considered to be on the low end of the planning envelope.

The second forecast method applies an increasing market share up to 0.20 percent of national air taxi operations by the year 2039. This method yields a total of 3,025 air taxi operations by year 2039 and a CAGR of 2.01 percent.

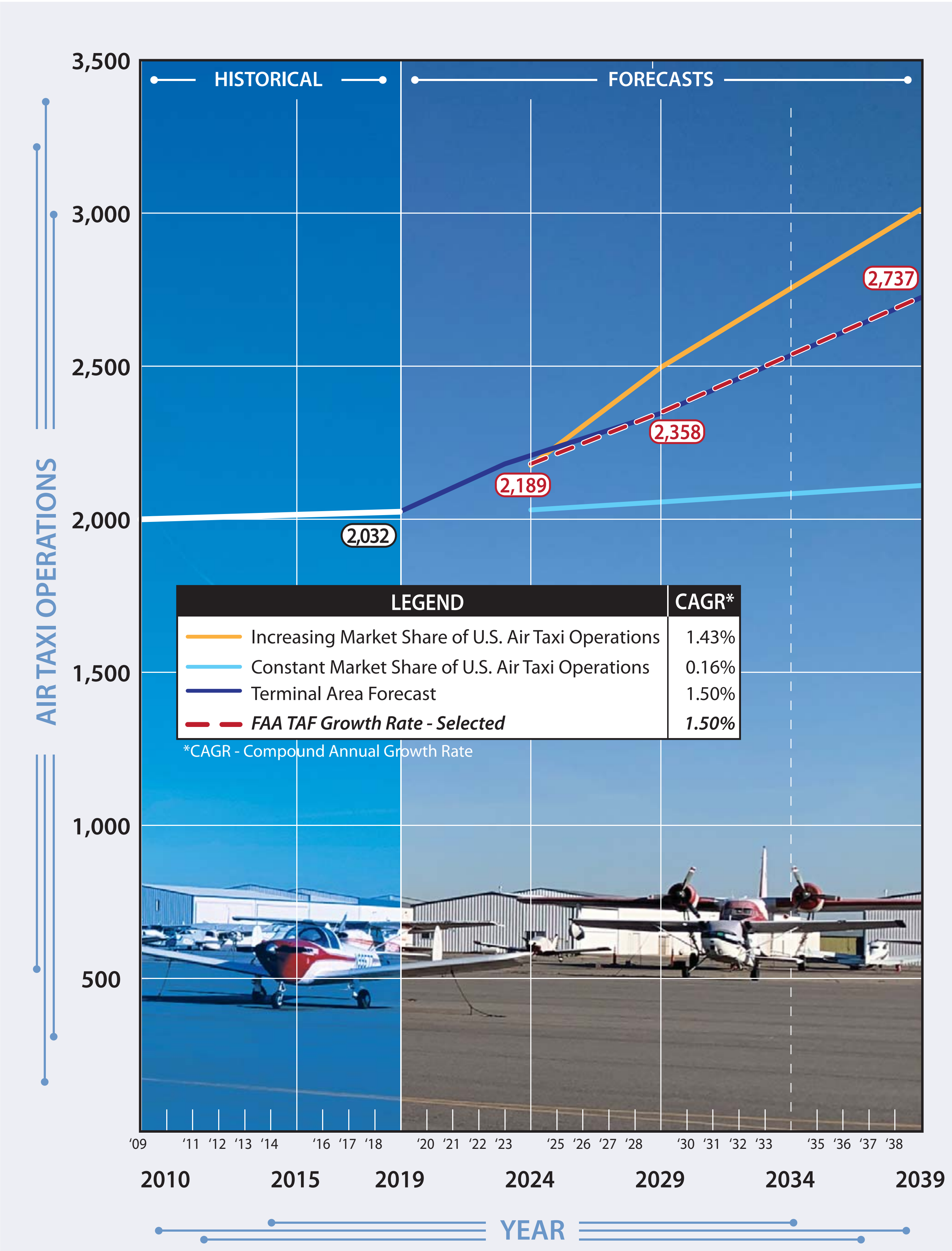

AIR TAXI OPERATIONS
3,500
3,000
2,500
2,000
1,500
1,000
500
HISTORICAL
FORECASTS
2,032
2,189
2,358
2,737
LEGEND
CAGR*
Increasing Market Share of U.S. Air Taxi Operations 1.43%
Constant Market Share of U.S. Air Taxi Operations 0.16%
Terminal Area Forecast 1.50%
FAA TAF Growth Rate - Selected 1.50%
*CAGR - Compound Annual Growth Rate
'09 '11 '12 '13 '14 '16 '17 '18 '20 '21 '22 '23 '25 '26 '27 '28 '30 '31 '32 '33 '35 '36 '37 '38
2010
2015
2019
2024
2029
2034
2039
YEAR

TABLE 2Q | Air Taxi Operations Forecast
Treasure Valley Executive Airport

Year	EUL Air Taxi Operations	U.S. Air Taxi Operations[1]	EUL Market Share
2009	2,000	14,863,856	0.013%
2019	2,032	14,244,787	0.014%
Constant Market Share of U.S. Air Taxi Operations (CAGR 0.21%)			
2024	2,038	14,556,951	0.014%
2029	2,064	14,741,946	0.014%
2039	2,118	15,126,452	0.014%
Increasing Market Share of U.S. Air Taxi Operations (CAGR 2.01%)			
2024	2,184	14,556,951	0.015%
2029	2,506	14,741,946	0.017%
2039	3,025	15,126,452	0.020%
FAA TAF GROWTH RATE (CAGR 1.50%) - SELECTED			
2024	2,189	14,556,951	0.015%
2029	2,358	14,741,946	0.016%
2039	2,737	15,126,452	0.018%

[1] FAA Aerospace Forecasts - Fiscal Years 2020-2040

The third forecast method simply applies the annual growth rate (1.5 percent) from the FAA TAF for the Airport to the baseline of 2,032 air taxi operations identified for 2019. This method results in 2,737 air taxi operations by year 2039.

The FAA TAF growth rate for air taxi operations at the Airport has been selected as the most reasonable forecast. With regular turbine aircraft traffic at EUL and the potential for additional turboprop and jet aircraft to operate at the Airport in the future, EUL could reasonably expect air taxi operations to grow. Furthermore, with long-term growth projected for this market segment nationally, EUL could experience moderate growth in this category.

Military Operations Forecast

Military aircraft can and do utilize civilian airports across the country. Forecasting of military activity is inherently difficult because of the national security nature of their operations and the fact that missions can change with little notice. Thus, it is typical for the FAA to utilize a flat-line forecast number for military operations. At EUL, the FAA TAF shows 325 itinerant military operations (zero local military operations) through the long-term planning horizon. For this forecasting effort, the TAF number of 325 itinerant military operations is utilized through the 20-year planning period.

Total Operations Forecast Summary

The selected total operations forecast to be used for planning purposes is as follows:

- 2019 – 147,366 total operations (actual)
- 2024 – 154,976 total operations
- 2029 – 159,555 total operations
- 2039 – 169,267 total operations

Table 2R presents the classification of the selected operations forecast. The Airport experiences a mix of operation types, including general aviation, air taxi, and military.

TABLE 2R | Total Operations Forecast
Treasure Valley Executive Airport

Year	LOCAL OPERATIONS	ITINERANT OPERATIONS				Grand Total
	General Aviation	General Aviation	Air Taxi	Military	Total	
2019	98,244	46,765	2,032	325	49,122	**147,366**
2024	103,205	49,257	2,189	325	51,771	**154,976**
2029	104,924	51,948	2,358	325	54,631	**159,555**
2039	108,524	57,681	2,737	325	60,743	**169,267**
CAGR	**0.50%**	**1.05%**	**1.50%**	**0.00%**	**1.07%**	**0.70%**

CAGR = Compound Annual Growth Rate

PEAKING CHARACTERISTICS

Many aspects of facility planning relate to levels of peaking activity – times when an airport is busiest. For example, the appropriate size of terminal facilities can be estimated by determining the number of people that could reasonably be expected to use the facility at a given time. The following planning definitions apply to the peak periods:

- **Peak Month** – The calendar month when peak aircraft operations occur.
- **Design Day** – The average day in the peak month.
- **Design Hour** – The peak hour within the design day.

For the purposes of this study, the peak month was estimated at ten percent of the annual operations. By 2039, the estimated peak month is projected to reach 16,927 operations. The design day is estimated by dividing the peak month by its number of days (31). The design hour is calculated at 15 percent of the design day. These projections can be viewed in **Table 2S.**

TABLE 2S | Peak Period Forecasts
Treasure Valley Executive Airport

Year	2019	2024	2029	2039
Annual Operations	147,366	154,976	159,555	169,267
Peak Month	14,737	15,498	15,955	16,927
Design Day	475	500	515	546
Design Hour	71	75	77	82

Source: Coffman Associates analysis of other non-towered airports.

OPERATIONS BY FLEET MIX

Developing an understanding of the operational fleet mix, including the approximate volume of operations by aircraft type, is an important input in determining future facility needs. The operations count utilizing motion activated cameras, previously outlined in this chapter, captured detailed fleet mix data which serves as the baseline operational fleet mix.

Table 2T presents the fleet mix operations forecast for EUL. The future operational fleet mix is primarily based on national trend in aviation by aircraft type. Piston aircraft are anticipated to continue to represent most operations but are forecast to decline as a percent of the whole over time. Multi-engine piston operations are also forecast to decline as a percent of the whole over time. Growth areas are in turbine engines and helicopters. Helicopter operations were also based on typical utilization rates, which were estimated based on an interview with the chief pilot for Silverhawk Aviation Academy and were based on flight instruction hours.

TABLE 2T | Fleet Mix Operations Forecast
Treasure Valley Executive Airport

	EXISTING		FORECAST					
Aircraft Type	2019	Percent	2024	Percent	2029	Percent	2039	Percent
LOCAL OPERATIONS								
Single Engine Piston	61,544	62.64%	63,800	61.80%	65,100	62.00%	67,300	62.00%
Multi-Engine Piston	3,340	3.40%	3,300	3.20%	2,500	2.40%	1,600	1.50%
Turboprop	288	0.29%	300	0.30%	300	0.30%	300	0.30%
Jet	300	0.31%	300	0.30%	300	0.30%	300	0.30%
Helicopter	32,772	33.36%	35,500	34.40%	36,700	35.00%	39,000	35.90%
Total Local	*98,244*	*100.00%*	*103,205*	*100.00%*	*104,924*	*100.00%*	*108,524*	*100.00%*
ITINERANT OPERATIONS								
Single Engine Piston	30,772	62.64%	30,959	59.80%	31,358	57.40%	32,194	53.00%
Multi-Engine Piston	1,670	3.40%	1,657	3.20%	1,639	3.00%	1,519	2.50%
Turboprop	144	0.29%	388	0.75%	683	1.25%	1,519	2.50%
Jet	150	0.31%	388	0.75%	956	1.75%	2,126	3.50%
Helicopter	16,386	33.36%	18,379	35.50%	19,995	36.60%	23,386	38.50%
Total Itinerant	*49,122*	*100.00%*	*51,771*	*100.00%*	*54,631*	*100.00%*	*60,743*	*100.00%*
Total Operations	**147,366**		**154,976**		**159,555**		**169,267**	

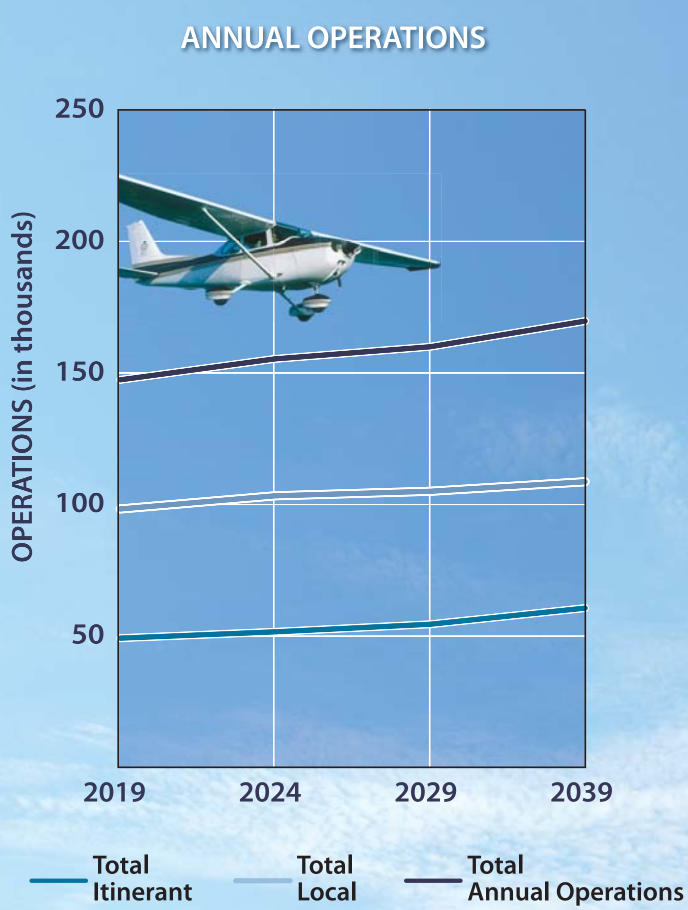
Source: Airport Records: JUB Operations Analysis; Coffman Associates analysis

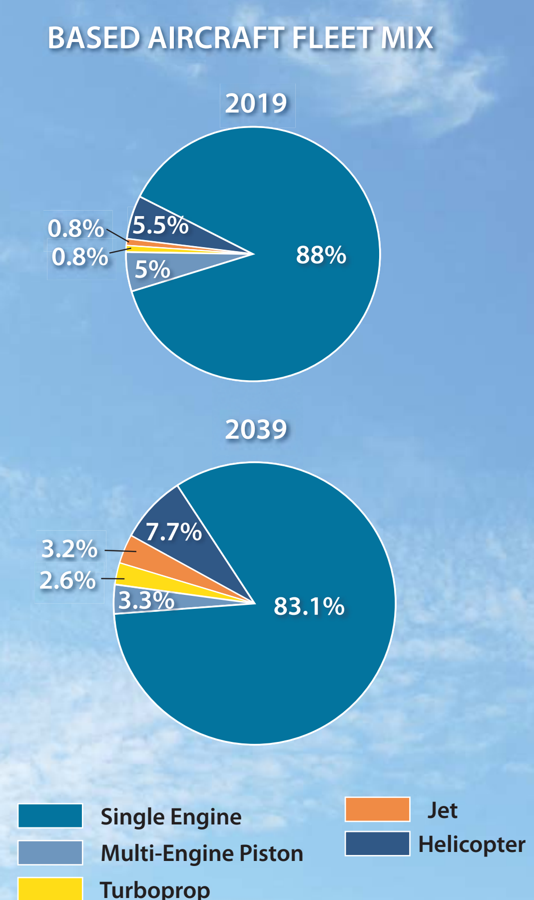
FORECAST SUMMARY

This study has outlined the various activity levels that might reasonably be anticipated over the planning period. **Exhibit 2G** presents a summary of the aviation forecasts prepared in this study. The base year for these forecasts is 2019, with a 20-year planning horizon to 2039. The primary aviation demand indicators are based aircraft and operations.

Based aircraft are forecast to increase from 400 in 2019 to 493 by 2039, for a CAGR of 1.05 percent. Total operations are forecast to increase from 147,366 in 2019 to 169,267 by 2039, which is also a CAGR of 0.70 percent. Several forecasts for each aviation demand indicator were developed to create a range of reasonable forecasts from which a single forecast was selected for use in determine facility needs.

	BASE YEAR	2024	2029	2039
ANNUAL OPERATIONS				
Itinerant				
Air Taxi	2,032	2,189	2,358	2,737
General Aviation	46,765	49,257	51,948	57,681
Military	325	325	325	325
Total Itinerant	***49,122***	***51,771***	***54,631***	***60,743***
Local				
General Aviation	98,244	103,205	104,924	108,524
Total Local	***98,244***	***103,205***	***104,924***	***108,524***
TOTAL ANNUAL OPERATIONS	**147,366**	**154,976**	**159,555**	**169,267**
BASED AIRCRAFT				
Single Engine	352	366	379	410
Multi-Engine Piston	20	19	18	16
Turboprop	3	5	7	13
Jet	3	5	10	16
Helicopter	22	26	30	38
BASED AIRCRAFT TOTAL	**400**	**421**	**444**	**493**





Projections of aviation demand will be influenced by unforeseen factors and events in the future. Therefore, future demand will not likely follow the exact projection line, but over time, forecasts of aviation demand tend to fall within the planning envelope. The need for additional facilities will be based upon these forecasts; however, if demand does not materialize as projected, then implementation of facility construction can be slowed. Likewise, if demand exceeds these forecasts, then implementation of facility construction can be accelerated.

FORECAST COMPARISON TO THE TAF

The FAA reviews the aviation demand forecasts developed in aviation planning studies and compares them to the *Terminal Area Forecast* (TAF) for the Airport. The forecasts are considered consistent with the TAF if they meet the following criteria:

- Forecasts differ by less than 10 percent in the 5-year forecast period, and 15 percent in the 10-year forecast period, or
- Forecasts do not affect the timing or scale of an airport project, or
- Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.5, *Formulation of the National Plan of Integrated Airport Systems* (NPIAS) *and Airports Capital Improvement Plan* (ACIP).

If the forecasts exceed these parameters, they may be sent to FAA headquarters in Washington, D.C., for further review. **Table 2U** presents the direct comparison of the planning forecast with the TAF published in January 2020. The forecasts for total operations and based aircraft are within the FAA range for consistency and are not expected to affect the timing or scale of any major Airport projects, and the role of the Airport as a reliever general aviation facility is not expected to change.

TABLE 2U | Forecast Comparison to the Terminal Area Forecast
Treasure Valley Executive Airport

	BASE YEAR	FORECAST			
	2019	2024	2029	2039	CAGR 2019-2039
TOTAL OPERATIONS					
Master Plan Forecast	147,366	154,976	159,555	169,267	0.70%
2020 FAA TAF	148,088	151,026	153,784	159,482	0.37%
% Difference	**-0.33%**	**1.71%**	**2.44%**	**3.93%**	
BASED AIRCRAFT					
Master Plan Forecast	400	421	444	493	1.05%
2020 FAA TAF	389	389	389	389	0.00%
% Difference	**-1.85%**	**-5.20%**	**8.61%**	**15.13%**	

CAGR - Compound Annual Growth Rate

AIRCRAFT/AIRPORT/RUNWAY CLASSIFICATION

The FAA has established several aircraft classification systems that group aircraft types based on their performance (approach speed in landing configuration) and design characteristics (wingspan and landing gear configuration). These classification systems are used to determine the appropriate airport design standards for specific airport elements, such as runways, taxiways, taxilanes, and aprons.

AIRCRAFT CLASSIFICATION

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, an airport. The critical design aircraft is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or a composite aircraft representing a collection of aircraft with similar characteristics. The design aircraft is classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA AC 150/5300-13A, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2H.**

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{REF}), if specified, or if V_{REF} if not specified, 1.3 times stall speed (V_{SO}) at the maximum certificated landing weight. V_{REF}, V_{SO}, and the maximum certificated landing weight are those values established for the aircraft by the certification authority of the country of registry.

The AAC generally refers to the approach speed of an aircraft in landing configuration. The higher the approach speed, the more restrictive the applicable design standards. The AAC, depicted by a letter A through E, is the aircraft approach category and relates to aircraft approach speed (operational characteristics). The AAC generally applies to runways and runway-related facilities, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft which relates to aircraft wingspan or tail height (physical characteristics). When the aircraft wingspan and tail height fall in different groups, the higher group is used. The ADG influences design standards for taxiway safety area (TSA), taxiway object free (TOFA), taxilane object free area, apron wingtip clearance, and various separation distances.

Taxiway Design Group (TDG): A classification of airplanes based on outer-to-outer Main Gear Width (MGW) and Cockpit to Main Gear (CMG) distance. The TDG relates to the undercarriage dimensions of the design aircraft. The TDG is classified by an alphanumeric system: 1A, 1B, 2, 3, 4, 5, 6, and 7. The taxiway design elements determined by the application of the TDG include the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet dimensions, and, in some cases, the separation distance between parallel taxiways/taxilanes. Other taxiway elements, such as the taxiway safety area (TSA), taxiway/taxilane object free area (TOFA), taxiway/taxilane separation to parallel taxiway/taxilanes or fixed or movable objects, and taxiway/taxilane wingtip clearances are determined solely based on the wingspan (ADG) of the design aircraft utilizing those surfaces. It is appropriate for taxiways to be planned and built to different TDG standards based on expected use.

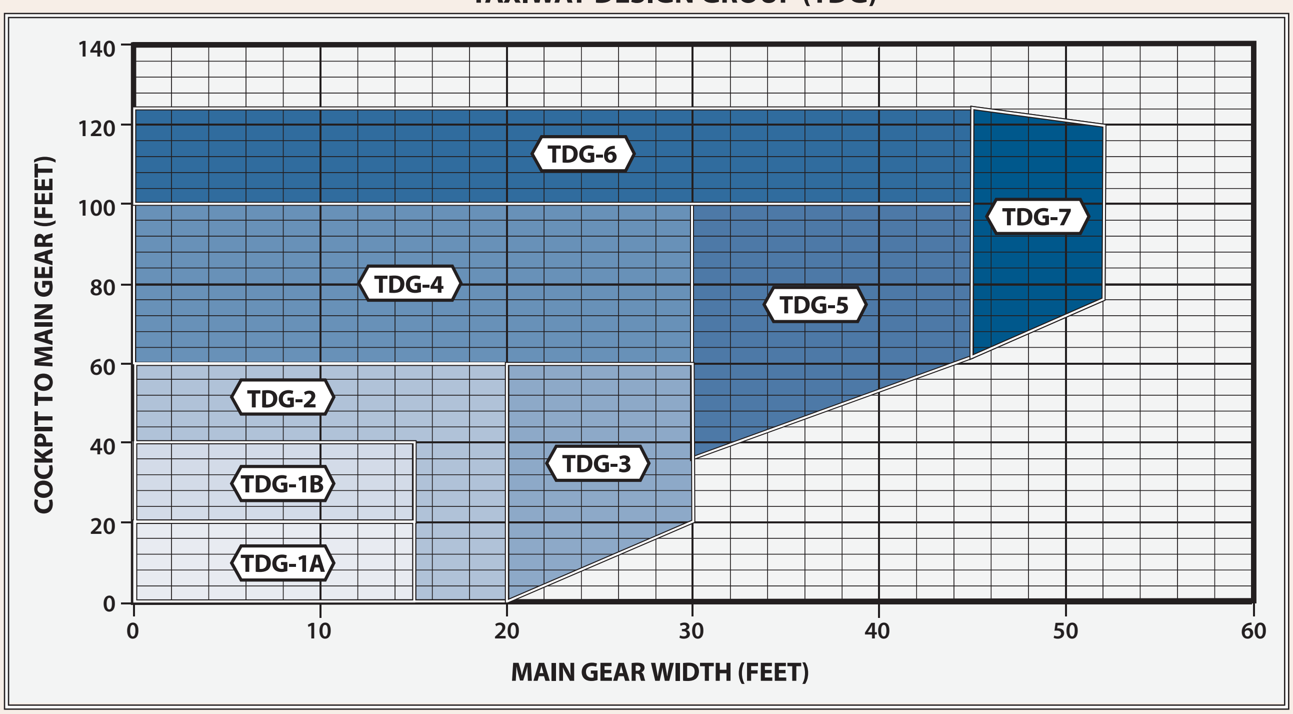
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

AIRPLANE DESIGN GROUP (ADG)		
Group #	**Tail Height (ft)**	**Wingspan (ft)**
I	<20	<49
II	20-<30	49-<79
III	30-<45	79-<118
IV	45-<60	118-<171
V	60-<66	171-<214
VI	66-<80	214-<262

VISIBILITY MINIMUMS	
RVR* (ft)	**Flight Visibility Category (statute miles)**
VIS	3-mile or greater visibility minimums
5,000	Not lower than 1-mile
4,000	Lower than 1-mile but not lower than ¾-mile
2,400	Lower than ¾-mile but not lower than ½-mile
1,600	Lower than ½-mile but not lower than ¼-mile
1,200	Lower than ¼-mile

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



Source: FAA AC 150/5300-13A, Airport Design

Exhibit 2J summarizes the classification of the most common aircraft in operation today. Generally, recreational and business piston and turboprop aircraft will fall in AAC A and B, and ADG I and II. Business jets typically fall in ACC B and C, while the larger commercial aircraft will fall in AAC C and D.

AIRPORT AND RUNWAY CLASSIFICATIONS

Airport and runway classifications, along with the aircraft classifications defined previously, are used to determine the appropriate FAA design standards to which the airfield facilities are to be designed and built.

Runway Design Code (RDC): A code signifying the design standards to which the runway is to be built. The RDC is based upon planned development and has no operational component.

The AAC, ADG, and runway visual range (RVR) are combined to form the RDC of a runway. The RDC provides the information needed to determine certain design standards that apply. The first component, depicted by a letter, is the AAC and relates to aircraft approach speed (operational characteristics). The second component, depicted by a Roman numeral, is the ADG and relates to either the aircraft wingspan or tail height (physical characteristics), whichever is most restrictive. The third component relates to the available instrument approach visibility minimums expressed by RVR values in feet of 1,200 (⅛-mile), 1,600 (¼-mile), 2,400 (½-mile), 4,000 (¾-mile), and 5,000 (1-mile). The RVR values approximate standard visibility minimums for instrument approaches to the runways. The third component reads "VIS" for runways designed for visual approach use only.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway regarding landing operations. Like the RDC, the APRC is composed of the same three components: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based upon planned development with no operational component. The APRC for a runway is established based upon the minimum runway-to-taxiway centerline separation.

Departure Reference Code (DPRC): A code signifying the current operational capabilities of a runway and associated parallel taxiway regarding takeoff operations. The DPRC represents those aircraft that can takeoff from a runway while any aircraft are present on adjacent taxiways, under meteorological conditions with no special operating conditions. The DPRC is like the APRC, but is composed of two components, AAC and ADG. A runway may have more than one DPRC depending on the parallel taxiway separation distance.

***Airport Reference Code (ARC)*:** An airport designation that signifies the airport's highest Runway Design Code (RDC), minus the third (visibility) component of the RDC. The ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at an airport. The current ARC for EUL is B-II.

A-I

Aircraft	TDG
Beech Baron 55	1A
Beech Bonanza	**1A**
Cessna 150, 172	1A
Eclipse 500	1A
Piper Archer, Seneca	1A

B-I

Aircraft	TDG
Beech Baron 58	**1A**
Beech King Air 90	1A
Cessna 421	1A
Cessna Citation CJ1 (525)	1A
Cessna Citation 1(500)	2
Piper Cheyenne III	2

A/B-II *12,500 lbs. or less*

Aircraft	TDG
Cessna Caravan 208 (A-II)	1A
Pilates PC-12 (A-II)	1A
Cessna 441 Conquest	1A
Beech Super King Air 200	**2**
Cessna Citation CJ2 (525A)	2

B-II *over 12,500 lbs.*

Aircraft	TDG
Falcon 10, 20, 50	1B
Hawker 800, 800XP, 850XP, 4000	1B
Cessna Citation CJ4 (525C)	**1B**
Beech Super King Air 350	2
Beech 1900	2
Falcon 900, 2000	2
Cessna Citation CJ3(525B), Bravo (550), V (560)	2

A/B-III

Aircraft	TDG
Bombardier Dash 7 (A-III)	3
Bombardier Dash 8	3
Bombardier Global 5000, 6000, 7000, 8000	**2**
Falcon 6X, 7X, 8X	2
ATR 72	2

C/D-I

Aircraft	TDG
Lear 25, 31, 45, 55, **60**	**1B**
Israeli Westwind	1B
Learjet 35, 36 (D-I)	1B
Piaggio Avanti II	2

C/D-II

Aircraft	TDG
Cessna Citation VII, X+	1B
Lear 70, 75	1B
Gulfstream II	1B
CRJ-200	1B
Gulfstream III	2
ERJ-135, 140, 145	2
CRJ-700	2
Gulfstream IV, 350, 450 (D-II)	2

C/D-III *less than 150,000 lbs.*

Aircraft	TDG
Gulfstream V	2
CRJ-900, 1000	2
Boeing 737-700, BBJ	3
ERJ-170, 175, 190, 195	3
Gulfstream G500, 550, 600, **650 (D-III)**	**2**
MD-81, 82, 87 (D-III)	4

C/D-III *over 150,000 lbs.*

Aircraft	TDG
Airbus A319-100, 200	3
Boeing 737 -800, 900, BBJ2 (D-III)	**3**
MD-83, 88 (D-III)	4

C/D-IV

Aircraft	TDG
Airbus A300-100, 200, 600	5
Boeing 757-200	4
Boeing 767-300, **400**	**5**
MD-11	6

D-V

Aircraft	TDG
Airbus A330-200, 300	5
Boeing 787-8, 9	**5**
Airbus A340-500, 600	6
Boeing 747-100 - 400	5
Boeing 777-300	6

Exhibit 2J
AIRCRAFT DESIGN CHARACTERISTICS

CRITICAL AIRCRAFT

The selection of appropriate FAA design standards for the development and location of airport facilities is based primarily upon the characteristics of the aircraft which are currently using, or are expected to use, an airport. The critical aircraft is used to define the design parameters for an airport. The critical aircraft may be a single aircraft or a composite aircraft representing a collection of aircraft classified by three parameters: AAC, ADG, and TDG.

The first consideration is the safe operation of aircraft likely to use an airport. Any operation of an aircraft that exceeds design criteria of an airport may result in a lesser safety margin; however, it is not the usual practice to base the airport design on an aircraft that uses the airport infrequently.

The critical aircraft is defined as the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, excluding touch-and-go operations. Planning for future aircraft use is of importance since the design standards are used to plan separation distances between facilities. These future standards must be considered now to ensure that short-term development does not preclude the reasonable long-range potential needs of the airport.

According to FAA AC 150/5300-13A, *Airport Design*, "Airport designs based only on existing aircraft can severely limit the ability to expand the airport to meet future requirements for larger, more demanding aircraft. Airport designs that are based on large aircraft never likely to be served by the airport are not economical." Selection of the current and future critical aircraft must be realistic in nature and supported by current data and realistic projections.

AIRPORT CRITICAL AIRCRAFT

There are three elements for classifying the airport critical aircraft. The three elements are the AAC, ADG, and the TDG. The AAC and ADG are examined first followed by the TDG.

The primary method for determining the critical aircraft at non-towered airports is to examine the FAA's Traffic Flow Management System Count (TFMSC) database which captures an operation when a pilot files a flight plan and/or when flights are detected by the National Airspace System, usually via radar. It includes documentation of commercial traffic (air carrier and air taxi), general aviation, and military aircraft. Due to factors such as incomplete flight plans, limited radar coverage, and VFR operations, TFMSC data does not account for all aircraft activity at an airport by a given aircraft type. However, the TFMSC does provide an accurate reflection of IFR activity. Operators of high-performance aircraft, such as turboprops and jets, tend to file flight plans at a high rate. **Exhibit 2K** shows the TFMSC data for turboprops and business jets for the last 10 years at EUL.

ARC	Aircraft	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A-I	Eclipse 400/500	48	64	46	38	36	72	72	70	48	60
	Epic Dynasty	0	8	10	0	0	2	0	2	0	0
	Express 2000	2	0	0	0	0	0	0	0	0	0
	Kodiak Quest	0	0	2	0	0	0	0	0	0	0
	Lancair Evolution/Legacy	0	0	0	12	32	28	26	22	20	30
	Piper Lance	2	0	0	0	0	0	0	0	0	0
	Piper Malibu/Meridian	4	0	2	4	12	4	12	12	4	30
	Socata TBM 7/850/900	6	0	10	2	2	4	0	4	2	0
	Total	62	72	70	56	82	110	110	110	74	120
A-II	Cessna Caravan	0	4	4	4	0	2	0	0	2	0
	De Havilland Twin Otter	2	0	2	0	0	4	0	0	0	0
	Pilatus PC-12	8	18	52	100	106	72	26	66	40	14
	Total	10	22	58	104	106	78	26	66	42	14
B-I	Beechjet 400	4	2	40	44	0	4	4	2	4	0
	Cessna 425 Corsair	0	0	2	0	0	0	0	2	0	0
	Citation CJ1	0	6	6	10	10	18	14	14	4	14
	Citation I/SP	0	0	0	0	2	0	0	0	0	0
	Citation M2	0	0	0	0	0	0	0	2	0	0
	Citation Mustang	6	2	4	2	4	0	6	6	4	2
	Falcon 10	0	2	0	0	0	0	0	0	0	0
	King Air 90/100	26	12	10	6	16	24	6	8	16	12
	L-39 Albatross	2	0	0	0	2	0	4	0	0	0
	Mitsubishi MU-2	0	2	0	0	2	14	30	20	14	12
	Phenom 100	4	0	2	0	0	2	8	0	2	4
	Piaggio Avanti	0	0	0	2	0	0	0	0	2	0
	Piper Cheyenne	4	4	2	2	2	0	2	0	0	0
	Premier 1	2	0	0	0	0	0	0	0	0	0
	Total	48	30	66	66	38	62	74	54	46	44
B-II	Aero Commander 690	8	6	2	2	0	0	12	4	4	2
	Air Tractor	0	0	0	0	0	2	0	0	0	0
	Cessna Conquest	2	4	6	8	10	2	2	12	0	2
	Challenger 300	4	2	0	0	2	2	0	2	0	0
	Citation CJ2/CJ3/CJ4	6	10	6	4	2	6	8	4	4	12
	Citation II/SP/Latitude	16	2	4	4	6	2	4	4	0	4
	Citation V/Sovereign	6	18	0	24	14	20	14	6	12	6
	Citation X	2	2	2	0	0	2	8	2	0	0
	Citation XLS	4	6	12	4	2	12	6	8	0	2
	Dornier 328	0	0	0	0	0	6	0	0	0	0
	Falcon 20/50	0	0	2	0	0	0	0	0	4	0
	Falcon 2000	2	2	0	0	0	0	0	2	4	4
	Hawker 4000	0	0	0	2	0	0	0	0	0	0
	King Air 200/300/350	46	10	14	16	34	54	66	84	62	54
	King Air F90	12	10	4	8	2	0	0	0	0	2
	Phenom 300	0	0	0	2	0	0	0	2	2	0
	Shorts 330/360	0	0	0	2	0	0	0	0	0	0
	Swearingen Merlin	0	0	2	0	2	4	2	0	0	0
	Total	108	72	54	76	74	112	122	130	92	88
B-III	Bombardier Global 5000	2	0	0	0	0	0	0	0	0	0
	Bombardier Global Express	0	0	0	0	0	0	0	0	2	0
	Total	2	0	0	0	0	0	0	0	2	0
C-I	Learjet 31	0	2	0	0	0	0	0	0	0	0
	Learjet 40 Series	2	2	8	0	0	2	6	0	2	2
	Learjet 60 Series	2	2	2	2	8	4	8	0	0	2
	Total	4	6	10	2	8	6	14	0	2	4

ARC	Aircraft	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
C-II	Challenger 600/604	0	0	4	0	0	0	0	0	2	0
	Citation III/VI	6	6	0	0	2	2	0	0	0	0
	Embraer 500/450 Legacy	0	0	0	0	0	0	0	6	0	0
	Gulfstream 100/150	0	0	0	0	0	0	0	0	0	4
	Gulfstream 280	0	0	0	0	0	0	0	0	0	2
	Gulfstream G-III	2	0	0	0	0	0	2	0	0	0
	Hawker 800 (Bae-125-800)	0	4	0	2	0	2	2	0	2	0
	Total	8	10	4	2	2	4	4	6	4	6
D-I	Learjet 35/36	0	4	0	2	0	2	0	2	0	0
	Total	0	4	0	2	0	2	0	2	0	0
D-II	Gulfstream 200	0	0	0	0	0	4	0	0	0	0
	Gulfstream 450	2	4	0	0	0	0	4	0	0	0
	Total	2	4	0	0	0	4	4	0	0	0

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A-I	62	72	70	56	82	110	110	110	74	120
A-II	10	22	58	104	106	78	26	66	42	14
B-I	48	30	66	66	38	62	74	54	46	44
B-II	108	72	54	76	74	112	122	130	92	88
B-III	2	0	0	0	0	0	0	0	2	0
C-I	4	6	10	2	8	6	14	0	2	4
C-II	8	10	4	2	2	4	4	6	4	6
D-I	0	4	0	2	0	2	0	2	0	0
D-II	2	4	0	0	0	4	4	0	0	0
Total	244	220	262	308	310	378	354	368	262	276

APPROACH CATEGORY

ARC	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
A	72	94	128	160	188	188	136	176	116	134
B	158	102	120	142	112	174	196	184	140	132
C	12	16	14	4	10	10	18	6	6	10
D	2	8	0	2	0	6	4	2	0	0
Total	244	220	262	308	310	378	354	368	262	276

DESIGN GROUP

ARC	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
I	114	112	146	126	128	180	198	166	122	168
II	128	108	116	182	182	198	156	202	138	108
III	2	0	0	0	0	0	0	0	2	0
Total	244	220	262	308	310	378	354	368	262	276

Source: FAA TFMSC 2010-2019 - Normalized Annually

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At EUL a more detailed and localized approach to the critical aircraft determination may be taken utilizing data compiled through the motion camera activated physical operations count that occurred over a 12-month period from March 2019 to February 2020. As detailed in **Table 2V**, operational observations for aircraft in AAC C and D totaled only 66. When including those operations with aircraft in AAC B, there was a total of 1,308. Therefore, the appropriate AAC for the Airport is B.

TABLE 2V | Estimated Operations by Airport Reference Code
Treasure Valley Executive Airport

AAC/ADG	Total Operations
A/I	96,492
B/I	900
A/II	408
B/II	342
C/II	36
B-CIII	30
Helicopter	49,158
Total	**147,366**

AAC: Aircraft Approach Category
ADG: Airplane Design Group

Source: JUB Engineers - 12-Month Operations Count from 3.2019-2.2020

The critical ADG for the Airport is also determined by identifying would group exceeds the 500 operations threshold. There were 816 operations by aircraft in ADG II and above. There were very few operations by aircraft in ADG III, therefore ADG II is the appropriate classification.

To further support the current classification of the Airport as B-II, the number of operations by aircraft type was estimated from the camera operations study as shown in **Table 2W**. The combination of operations by the Air Tractor and the Pilatus total 600 operations. Therefore, ADG II is supported by the camera study evidence.

TABLE 2W | Estimated Operations by Aircraft Type and Airport Reference Code (ARC)
Treasure Valley Executive Airport

Aircraft Type	ARC	Estimated Total Operations
Cessna 120-210	A-I	65,064
Piper Cherokee and Cub	A-I	6,702
Beechcraft	A-I	2,886
Cirrus	A-I	1,686
Citation/Gulfstream	B-II	264
Air Tractor	A-II	180
Experimental	A-I	8,436
Single Engine Misc.	A-I	7,830
Eclipse/Embraer Jets	A/B-I	180
Pilatus	A-II	420
Small Twin	B-I/II	4,560
Rotorcraft R-22	NA	36,870
Rotorcraft R-44	NA	12,288
Total		**147,366**

Source: JUB Engineers - 12-Month Operations Count from 3.2019-2.2020

Following initial review of the critical aircraft information, FAA requested that the subconsultant verify the methodology for documenting ADG II aircraft operations, specifically those by the Pilatus and the Air Tractor. The subconsultant (JUB Engineers) reviewed the airplane counts based on the game camera photos focusing on Pilatus operations. They verified 70 take-offs by the Pilatus aircraft. Since there are currently no Pilatus's based at Caldwell, all were assumed to transient aircraft.

Western Aircraft, based at the Boise Airport, is a licensed Pilatus dealer that also operates them as part of their charter fleet. JUB interviewed their charter operations manager and learned that they routinely do training flights with new pilots and new customers at airports around the Treasure Valley, including Caldwell. Though the cameras were not able to collect all Pilatus tail numbers, the assumption is that most of these recorded operations were training flights from Western Aircraft. Based on the discussions with Western Aircraft, a training flight usually encompassing four to six touch-and-goes, as well as several full stop operations. This would support the original assumption of four touch-and-goes per take-off that were used in the aircraft count. Since the cameras only recorded take-off operations, there is not visual data to back these numbers up. These flights typically do not involve filing a flight plan and are, therefore, VFR only.

A similar level of touch-and-goes was assumed for the Air Tractor because there is an Air Tractor maintenance facility located at Caldwell. Typically, a maintenance check flight involves several touch-and-goes to verify operational conditions of the aircraft. These flights typically do not involve filing a flight plan and are, therefore, VFR only.

The TDG is the third component of the airport critical aircraft determination. The TDG is primarily based on the main gear wheel width. Medium and large business jets, as well as turboprops, tend to have the widest wheel widths. Based on the motion camera analysis, approximately 1,000 operations were cataloged by turbine powered aircraft; however, many of the turbine aircraft cataloged fall within the TDG 1B category. Representative aircraft include the Cessna Citation series, the Gulfstream series, Eclipse/Embraer jet aircraft, as well as the Pilatus PC-12, and Air Tractor agricultural aircraft. Given the level of existing and forecast operations by turbine powered aircraft at EUL, the current TDG is best described as 1B.

In the future, the Airport can expect to continue to see increased activity by turboprops and business jets. The operational fleet mix forecast showed turbine operations increasing from about 300 annually in 2019 to more than 3,000 by 2039. Assuming a portion of this increase will be larger business jets, it is recommended that this master plan consider the potential transition of the ARC to C-II. This was considered in the 2010 master plan and is planned to remain in this master plan. Along with a transition of the ARC, this plan will consider a future transition to TDG 2.

Airport Critical Aircraft Summary

The analysis presented examined each of the three elements for classifying the airport critical aircraft. The three elements are the aircraft approach category, airplane design group, and taxiway design group. The current airplane approach category is “B.” The current airplane design group is “II.” The current taxiway design group is “1B.” Therefore, **the current Airport critical aircraft is classified as B-II-1B**. A representative aircraft that meets the criteria of the B-II-1B family is the Cessna Citation 560XL, which is consistent with the currently approved Airport Layout Plan.

Activity by turboprops and business jets at EUL is projected to continue to increase. There were 36 AAC "C" operations in 2019. Over the course of the next 20 years, AAC "C" may increase to meet or exceed the 500 operations threshold within the 20-year scope of this master plan. For these reasons, **the future Airport critical aircraft is planned to be C-II-2**, which is consistent with the ultimate condition of the currently approved ALP.

RUNWAY DESIGN CODE

The RDC relates to specific FAA design standards that should be met in relation to a runway. The RDC takes into consideration the AAC, ADG, and the RVR. In most cases, the critical aircraft will also be the RDC for the primary runway.

Runway 12-30 is 5,500 feet long, 100 feet wide, with instrument approach visibility minimums of not lower than 1-mile. Based on current activity, the current RDC is **B-II-5000**. The critical aircraft may transition to AAC C in the future and an instrument approach with ½-mile visibility minimums is considered. Therefore, the future RDC for Runway 12-30 is **C-II-2400**.

APPROACH AND DEPARTURE REFERENCE CODES

The approach and departure reference codes (APRC and DPRC) describe the current operational capabilities of each runway and the adjacent parallel taxiways, where no special operating procedures are necessary. Essentially, the APRC and DPRC describe the current conditions at an airport in runway classification terms when considering the parallel taxiway. Runway 12-30 is served by full-length parallel Taxiway A and partial parallel Taxiway B. Both Taxiway A and B have a runway to taxiway centerline separation of 400 feet. The runway/taxiway system meets the standards associated with the current and future APRC and DPRC.

CRITICAL AIRCRAFT SUMMARY

Table 2Y summarizes the airport and runway classification for EUL. The current critical aircraft is defined by those aircraft in B-II-1Band the future critical aircraft is C-II-2. The current RDC for Runway 12-30 is B-II-5000 and the future RDC is C-II-2400.

TABLE 2Y | Existing/Ultimate Runway Design Characteristics
Treasure Valley Executive Airport

	Critical Aircraft	Runway Design Code	Approach Reference Code	Departure Reference Code
Current	B-II-1B	B-II-5000	D/IV/5000 D/V/5000	D/IV and D/V
Future	C-II-2	C-II-2400	D/IV/4000 D/V/4000	D/IV and D/V

Source: FAA AC 150/5300-13A, Airport Design

SUMMARY

This study has outlined the various activity levels that might reasonably be anticipated over the planning period, as well as the critical aircraft for the Airport. Based aircraft are forecast to increase from 400 in 2019 to 533 by 2039, for an annual growth rate of 1.45 percent. Total operations are forecast to increase from 147,366 in 2019 to 196,460 by 2039, which is also an annual growth rate of 1.45 percent.

The critical aircraft for the Airport was determined by examining the FAA TFMSC database of flight plans as well as the motion camera analysis conducted by JUB Engineers. The current critical aircraft is described as B-II-1B and is best represented by the Cessna Citation 560XL. The future critical aircraft is described as C-II-2 and is best represented by a Cessna Citation X+ business jet.