

Contents

- 4 Forecasts of Aviation Activity 4-1
 - 4.1 Trends and Factors 4-1
 - 4.1.1 National General Aviation Trends 4-1
 - 4.1.2 Local General Aviation Trends 4-3
 - 4.2 Historical Activity 4-4
 - 4.3 Previous Forecasts..... 4-4
 - 4.4 Forecasting Assumptions..... 4-5
 - 4.5 Based Aircraft Forecasts 4-5
 - 4.5.1 Based Aircraft Forecast Methodologies 4-7
 - 4.5.2 Preferred Forecast..... 4-11
 - 4.5.3 Accelerated Baseline Forecast 4-12
 - 4.5.4 Based Aircraft Fleet Mix Forecast 4-12
 - 4.6 Aircraft Operations Forecasts 4-14
 - 4.6.1 Aircraft Operations Forecast Methodologies 4-14
 - 4.6.2 Preferred Forecast..... 4-18
 - 4.6.3 Accelerated Baseline Forecast 4-19
 - 4.7 Peak Activity Forecasts..... 4-22
 - 4.8 Critical Aircraft 4-23
 - 4.8.1 Airport Reference Code 4-23
 - 4.8.2 Existing Critical Aircraft..... 4-24
 - 4.8.3 Future Critical Aircraft 4-24
 - 4.9 Forecast Summary..... 4-25
 - 4.10 FAA Forecast Review and Approval..... 4-26

Tables

Table 4-1 – Previous Forecasts 4-5

Table 4-2 – Based Aircraft at FCH 2017 4-7

Table 4-3 – Socioeconomic Data (Population, Employment, Per Capita Personal Income) 4-8

Table 4-4 – Baseline: Based Aircraft Forecasts – Socioeconomic..... 4-9

Table 4-5 – Baseline: FCH Regional Market Share of Based Aircraft..... 4-10

Table 4-6 – Baseline: Based Aircraft Forecasts – Regional Market Share..... 4-11

Table 4-7 – Accelerated Baseline: Based Aircraft Forecasts – Regional Market Share 4-12

Table 4-8 – Baseline: Based Aircraft Fleet Mix Forecast 4-13

Table 4-9 – Accelerated Baseline: Based Aircraft Fleet Mix..... 4-13

Table 4-10 – Baseline: Aircraft Operations Forecasts – Socioeconomic..... 4-15

Table 4-11 – FCH Regional Market Share of Aircraft Operations..... 4-16

Table 4-12 – Baseline: Aircraft Operations Forecast – Regional Market Share 4-17

Table 4-13 – Baseline: Aircraft Operations Forecast – FAA Aerospace Fleet Mix..... 4-18

Table 4-14 – Baseline: Aircraft Operations Forecast – Operations per Based Aircraft..... 4-18

Table 4-15 – Accelerated Baseline: Aircraft Operations Forecast – Operations per Based Aircraft 4-19

Table 4-16 – Baseline: Forecast of Local/Itinerant Operations..... 4-19

Table 4-17 – Baseline: Forecast of Daytime/Evening Operations 4-20

Table 4-18 – Baseline: Forecast of Annual Instrument Approaches..... 4-21

Table 4-19 – Baseline: Forecast of Touch-and-Go Operations..... 4-22

Table 4-20 – Baseline: Peak Activity Forecasts..... 4-22

Table 4-21 – Accelerated Baseline: Peak Activity Forecasts 4-23

Table 4-22 – Aircraft Approach Category (AAC)..... 4-23

Table 4-23 – Airplane Design Group (ADG)..... 4-24

Table 4-24 – Baseline: Forecast Summary 4-25

Table 4-25 – Accelerated Baseline: Forecast Summary..... 4-26

Table 4-26 – FAA Template for Comparing Airport Planning and TAF Forecasts..... 4-27

Table 4-27 – FAA Template for Summarizing and Documenting Airport Planning Forecasts..... 4-28

Figures

Figure 4-1 – Airport SWOT Analysis..... 4-3

Figure 4-2 – Historical Aircraft Operations from FAA TMFSC 4-21

4 Forecasts of Aviation Activity

Projections of future aviation activity at an airport provide the foundation for effective decision-making in airport planning and development. Such forecasts are used to determine the type, size, and timing of new or expanded airport facilities to meet anticipated user needs. They are also used to help justify the financial investment in those improvements.

Forecasts of aviation activity for Fresno Chandler Executive Airport (FCH) include several methodologies that are typical of airport master plans, but also include methodologies that analyze the Fresno airport system, which includes Fresno Yosemite International Airport (FAT). Both FCH and FAT are owned and operated by the City of Fresno. Analysis of activity on a system level allows the City's Department of Airports to make educated decisions regarding existing and future facility needs at both airports.

Forecasts of aviation-related demand are presented in the following sections:

- Trends and Factors
- Historical Activity
- Previous Forecasts
- Based Aircraft Forecasts
- Aircraft Operations Forecasts
- Peak Activity Forecasts
- Critical Aircraft
- Forecast Summary
- FAA Forecast Review and Approval

It should be noted that the forecasts presented in this Chapter are derived using existing and historical data from various sources, which varied significantly in terms of aviation-related activity at the Airport. As such, two separate forecasts were developed for based aircraft and total operations. A Baseline Forecast that utilizes historical data from FAA sources was developed and submitted to the FAA for review and approval. An Accelerated Baseline Forecast that utilizes historical data reported by Airport Management was also developed specifically for facility planning purposes but was not submitted to the FAA. The purpose and methodologies used to define these various forecasting efforts is described in subsequent sections of this Chapter.

4.1 Trends and Factors

Local, regional, and national trends can impact aviation activity at individual airports. A general understanding of recent and anticipated trends in the aviation industry is crucial in the preparation of an airport's forecasts. This understanding provides direction and credence to the forecast methodology outcomes, and aids in the selection of a preferred forecast. Since activity at FCH is associated with general aviation (also referred to as GA), this section focuses on past and anticipated trends in the GA industry.

4.1.1 National General Aviation Trends

Historically, aviation demand has been driven by economic factors. General aviation activity in the United States has experienced decline in the past few years. The FAA projects that the number of aircraft in the national GA fleet will only increase by approximately 200 over the next 20 years; this minor increase is attributed to a projected rise in turbine (including rotorcraft), experimental, and light sport aircraft, which are anticipated to offset the decline in fixed wing piston aircraft. Overall, future growth is anticipated to be focused in the

corporate and business aviation sectors that are most often tied to turboprop and jet aircraft. These projections are identified in the *2018-2038 FAA Aerospace Forecast* (FAA 2018).

Another national trend that impacts the general aviation sector is an increasing demand for commercial airline pilots. Pilots pursuing commercial licenses utilize GA aircraft in their initial flight training phases. According to the *2018-2038 FAA Aerospace Forecast*, the number of active commercial and air transport (ATP) pilot certificates is anticipated to increase 0.7 percent annually through 2038. While tenants at the Airport do provide flight training, there is not a designated commercial pilot training program currently active at the Airport.

One aviation trend that has unknown consequences on the demand for GA activity is the requirement for the transition to unleaded aviation gas (AvGas). Multiple companies that produce petroleum products have been testing the use of unleaded AvGas in recent years. Based on a cursory examination of airports that offered both 100LL and unleaded AvGas, the two fuels were similar in cost, yet in many cases, unleaded AvGas was less expensive. While it is estimated that two-thirds of the current piston-engine GA aircraft fleet can operate with unleaded AvGas, the technology has been slow in mass distribution.

Two additional items that have impacted the aviation industry in recent years include implementation of NextGen technologies and increased use of Unmanned Aircraft Systems (UAS). NextGen is an initiative from the FAA to develop technology geared toward making air travel safer and more efficient by replacing older/existing technology to better manage airspace. There are many initiatives being developed specifically for airports to help accommodate the demand for additional capacity in a safe, efficient, and environmentally responsible manner, such as the FAA's En Route Automation Modernization (ERAM), which processes data from 64 radars and tracks 1,900 aircraft at a time. While NextGen is an FAA-driven initiative, it requires aircraft operators of both private and airline carriers to equip aircraft and pursue NextGen practices. Specifically, the FAA will require that aircraft, including those in the GA fleet, be equipped with Automatic Dependent Surveillance-Broadcast Out (ADS-B) equipment by January 1, 2020, to fly in most controlled airspace. This equipment continuously transmits aircraft data, such as airspeed, altitude, and location, to ADS-B ground stations. While certain exemptions may apply, and there are rebates for the installation of this equipment, the requirement of ADS-B equipment in all aircraft may be a minor deterrent to small and recreational aircraft activity in the future.

UAS, commonly referred to as drones, have had significant impacts on the National Airspace System (NAS) in recent years. Developments in UAS technology and growth in their demand and use in several industries have increased concerns due to the current NAS not being tailored to accommodate manned and unmanned aircraft operating in the same environment. For UAS and manned aircraft to operate safely and efficiently in an integrated system within the NAS, continued study is needed that may affect policies at multiple levels of government and administration. To compound the issue, requirements and regulations regarding the operation of UAS are ever-evolving, and, in many instances, are not followed. The FAA has promoted numerous outreach efforts, such as B4UFLY to support the safe integration of UAS into the NAS, but the effects are difficult to determine due to the difficulty involved with collecting accurate data on their use. The presence of UAS in the NAS, and the expansion of their abilities based on improved battery life, improved range, and reduced cost, will ultimately have an ever-increasing impact on the NAS and on all aviation activity, especially smaller GA aircraft that typically operate at lower altitudes. It is unknown at this juncture how UAS will impact future activity at the Airport or at other airports throughout the U.S. This growing segment of the aviation industry will continue to be monitored.

General aviation related to business travel is expected to increase in the next 20 years. According to the *2018-2038 FAA Aerospace Forecast*, the turbojet fleet is expected to increase at 2.2 percent a year (FAA 2018, 23). While FCH experiences a limited amount of small jet and turboprop activity, this upward trend could have a minor impact on the Airport’s aircraft activity. Other trends, such as the emergence of electric aircraft, and continued popularity of light sport aircraft present potential future opportunities for growth at the Airport. As noted throughout this Airport Master Plan Update, the Airport bases three electric aircraft as part of a pilot program sponsored by two nearby airports. This segment of the aviation industry has potential for significant growth in based aircraft both locally and nationally.

4.1.2 Local General Aviation Trends

Previous planning documents acknowledged a decline in aviation activity at the Airport due to the economic downturn that started in 2008 (Coffman Associates, Inc. 2009). That trend continued at most GA airports in the U.S., including FCH, through 2014, when activity began a slow recovery. While economic factors have most significantly impacted activity at the Airport, other trends also play a role. To highlight types of activity at FCH, and trends that occur at a local level, the Planning Advisory Committee (PAC) participated in a Strengths, Weaknesses, Opportunities and Threats (SWOT) analysis. The results of this analysis were used to assess the overall health of the Airport and identify opportunities for future development (see Figure 4-1).

Figure 4-1 – Airport SWOT Analysis

Strengths	Weaknesses	Opportunities	Threats
<ul style="list-style-type: none"> • Historical significance • Convenient location • GA airport focus without ATCT, military activity, or commercial service • Competitive hangar rents 	<ul style="list-style-type: none"> • Runway length • Aging infrastructure • No full-service FBO • No precision instrument approach • Security issues 	<ul style="list-style-type: none"> • Educational opportunities with local trade schools and community colleges • New aviation industries • Developable land • Flexibility to adjust rates and fees to attract regional aircraft 	<ul style="list-style-type: none"> • Encroachment • Changing FAA guidance and policy • Economic constraints • Historical area and Airport facilities

Source: Kimley-Horn & Associates, February 2018

Strengths – Though the existing fleet is comprised primarily of single-engine piston aircraft, the Airport has seen an increase in experimental and ultra-light aircraft. In March 2018, FCH became the hub for three electric aircraft obtained via a grant administered to two nearby airports. The Airport’s climate and location provide an opportunity to expand electric aircraft and other potential activities/innovations in California such as Uber Elevate, a new initiative that explores the feasibility of using electric vertical takeoff and landing (VTOL) aircraft as a common mode of transportation in the future.

Specific to the region, the Airport is in a geographically advantageous location with its proximity to the Bay Area that could help capture additional growth in the general aviation sector. Furthermore, the Airport is close to downtown Fresno and conveniently located in the region. Competitive hangar rents compared with other regional airports and the Airport’s historical significance were also identified as strengths.

Weaknesses – One of the main concerns for the Airport is that aircraft activity is limited by existing facilities – most notably runway length. Displaced thresholds on both runway ends limit the size and type of aircraft that can operate at FCH. Additionally, the Airport is not equipped with a precision approach and much of the Airport’s infrastructure is in need of improvement. These limitations were identified as the primary causes of the Airport’s lack of a full-service fixed-base operator (FBO). PAC members also identified Airport security as a weakness.

Opportunities – Members of the PAC and Airport Management identified educational opportunities for flight training and ground school at the Airport. The Airport also has developable land to the north of the airfield that could accommodate or attract new tenants/users. Airport Management also noted that they have the ability to adjust rates and fees to attract additional aircraft owners as demand merits.

Threats – Due to economic pressures, the Airport may struggle to attract new tenants and aircraft owners. Additionally, the facilities face encroachment and are spatially constrained with the property generally being bounded by residential communities on the south, east, and west, and Sequoia Kings Canyon Freeway to the north. Furthermore, due to the historic nature of the Airport, a general desire by the community to preserve the facilities may lead to a resistance to change. General trends in FAA guidance and policy (as described in the previous Section 4.1.1) may also hamper aviation activity at the Airport.

4.2 Historical Activity

At general aviation airports such as FCH, there are two primary indicators of activity: based aircraft and aircraft operations. A based aircraft is generally defined as an aircraft that is considered airworthy and is stored at an airport for the majority of the year. An aircraft operation represents either a take-off or landing conducted by an aircraft; as a result, a take-off and a landing—such as those that occur with flight training “touch-and-go” practice flights—count as two operations.

Historical data is largely limited and sporadic. While there was previously an active Air Traffic Control Tower (ATCT) at the Airport, the FAA decommissioned ATC services at the Airport meaning there is no actual count of operational activity. Previous planning documents however, do indicate historical annual based aircraft and aircraft operations. In 1998, the Airport had a total of 183 based aircraft (City of Fresno 1999). In 2003, that based aircraft count had grown to 246 according to Airport staff (Mead & Hunt 2005). In 2007, City records confirmed there were 247 based aircraft at the Airport (Coffman Associates, Inc. 2009, 14). Likewise, in 2007 it was estimated that 48,000 aircraft operations had occurred based on acoustical counters. Despite the limited historical data available, these figures provide context for forecasting efforts in this Airport Master Plan Update.

4.3 Previous Forecasts

In addition to historical activity, previous planning and forecasting efforts have also been evaluated to inform the forecasts presented in this Chapter; the results are shown in Table 4-1, and including the following:

- The *2005 Focused Master Plan for North Side Development* used a base year of 2003 and identified 246 based aircraft. The forecast projected based aircraft to increase at 0.9 percent annually for a low-growth scenario and 2.9 percent for a high-growth scenario (Mead & Hunt 2005). This was consistent with the national forecasts at that time and resulted in 277 based aircraft and 61,300 operations by 2017 for the low-growth scenario and 378 based aircraft and 87,200 operations by 2017 for the high-growth scenario.

- The 2009 Airport Layout Plan Narrative Report identified 247 based aircraft in 2007 to forecast 374 based aircraft and 87,200 operations by 2017 (Coffman Associates, Inc. 2009).

While these forecasts represented trends occurring at the time they were developed, updated forecasts were needed to accurately reflect existing and projected levels of activity and subsequent facility needs.

Table 4-1 – Previous Forecasts

Previous Forecast Source	Based Aircraft by 2017		Aircraft Operations by 2017	
	Low Growth	High Growth	Low Growth	High Growth
2005 Focused Master Plan for the North Side Development (2003 Base Year – 246 Based Aircraft)	277	378	61,300	87,200
2009 Airport Layout Plan Narrative Report (2007 Base Year – 247 Based Aircraft)	374		87,200	

Sources: 2005 Focused Master Plan for North Side Development prepared by Mead & Hunt, 2009 Airport Layout Plan Narrative Report prepared by Coffman Associates.

4.4 Forecasting Assumptions

Based aircraft and aircraft operations have fluctuated since the previous Master Plan was conducted. Aviation activity at airports is typically driven by controllable factors (hangar rents, services provided, maintenance of facilities, etc.) and non-controllable factors (local/national economic conditions, availability of funding, etc.). As such, the following assumptions have been identified as they pertain to forecast development:

- The Airport will continue to be a general aviation airport and not serve commercial activity.
- It is assumed that socioeconomic data provided by Woods & Poole Economics Inc. are indicative of existing and future conditions at the state and local level.
- The FAA will continue to include FCH in its National Plan of Integrated Airport Systems (NPIAS), meaning it will be eligible to receive grants under the Airport Improvement Program (AIP).
- Based on historical activity and existing facilities and services at the Airport, it is assumed that FCH will continue to sustain its FAA-designated “reliever” status by catering to smaller GA aircraft and divert much of that activity from nearby Fresno Yosemite International Airport. Such aircraft types include single and twin piston, and small to medium-sized turboprop and jet aircraft. Fresno Yosemite International Airport is equipped with longer runways, precision instrument approaches, FBOs and other amenities that attract a greater proportion of larger turboprop and jet aircraft. As such, the roles that these two airports provide and the aircraft they serve are anticipated to remain relatively consistent over the next 20 years as they pertain to GA activity within the region.

4.5 Based Aircraft Forecasts

As previously noted, based aircraft are defined by the FAA as those considered airworthy and stored at an airport for the majority of the year (in hangars or on tie-down spaces). The forecasts of based aircraft influence the planning and development of required hangar space, apron space, and other related facilities needed to accommodate these aircraft.

There are several sources that identify the number of based aircraft at the Airport. The reported number varies by source. The FAA's National Based Aircraft Inventory Program (sometimes referred to by its website, www.basedaircraft.com), reported 110 based aircraft with 90 'validated' or confirmed at the Airport as of April 2015 (FAA 2015). The FAA's Terminal Area Forecast (TAF) published in January 2018 indicated there were 127 based aircraft in 2017. Additionally, the latest FAA Form 5010-1, *Airport Master Record*, reported 118 based aircraft, which included five helicopters and eight ultra-lights as of May 2017. The discrepancies between sources may be due to the nature of how and when the numbers were reported. Aircraft owners sometimes choose to store their planes at more than one airport throughout the year and this can affect the reported numbers. Furthermore, historical based aircraft numbers may not be precise due to any number of reasons but provide a rough estimate.

A thorough in-person inventory of based aircraft at the Airport was conducted by the Airports Department in September 2018 which identified 140 non-itinerant aircraft that were stored on apron areas utilizing tie-downs or in hangars. The FAA's National Based Aircraft Inventory Program was updated in October 2018 to reflect these 140 aircraft; 111 of the aircraft were validated after the update was made. The remainder were either registered at other regional airports, registered out-of-state, or de-registered. Additionally, though several aircraft that were counted in the inventory were registered at other regional airports or registered out-of-state, they rented tie-downs and hangars at the Airport and were anticipated to continue to be based at FCH on a permanent or semi-permanent basis.

Based on discussions with the FAA, utilization of 118 based aircraft reported in the Form 5010-1, *Airport Master Record* in base year 2017 was identified as the recommended source for forecasting purposes. Forecasts derived using this figure were submitted to the FAA and approved and are referred to as the Baseline Forecast in this document.

Given that 140 aircraft were actually utilizing available storage space at the time this Airport Master Plan was developed (on tie-downs or in hangars) and that new aircraft that decide to base at the Airport will require additional storage facilities beyond what is occupied now, a second forecast, referred to as the Accelerated Baseline Forecast was also developed. The Accelerated Baseline Forecast utilized 140 based aircraft in base year 2017 and assumed the fleet mix identified by the Airport. This forecast is intended for facility planning purposes only, was not submitted to the FAA for approval, and is intended to provide the Airport a realistic scenario-based forecast to ensure spatial requirements for long-term apron and aircraft storage facilities are planned. Table 4-2 presents based aircraft by type for 2017 based on the Form 5010-1, *Airport Master Record* as well as the based aircraft by type identified during the on-site inventory, which are used to develop the Baseline Forecast and Accelerated Baseline Forecast, respectively.

The Accelerated Baseline Forecast for based aircraft was derived using the same methodology as the preferred methodology for the Baseline Forecast except that it utilized a base year estimate of 140 aircraft instead of 118. The following sections present the methodologies used to identify the Baseline Forecast for based aircraft. Summaries of both the Baseline and Accelerated Baseline Forecasts are presented at the end of this Section.

Table 4-2 – Based Aircraft at FCH 2017

	5010 Airport Master Record Based Aircraft – 2017 (Baseline)	Percent of Total Fleet	2018 Airport Count Based Aircraft (Accelerated Baseline)	Percent of Total Fleet
Single Engine:	102	86.4%	123	87.9%
Multi Engine:	3	2.5%	2	1.4%
Turboprop:	0	0.0%	2	1.4%
Jet:	0	0.0%	0	0.0%
Helicopters:	5	3.6%	5	3.6%
Light Sport/Experimental:	8	5.7%	8	5.7%
TOTAL:	118	100%	140	100%

Sources: Form 5010-1, Airport Master Record, City of Fresno Airports Department, inventory count in 2017 (updated in 2018).

4.5.1 Based Aircraft Forecast Methodologies

Because there has been significant fluctuation in historical aviation activity compared to current activity – attributed to volatile economic conditions and other factors – the overall approach to develop forecasts for this Airport Master Plan Update is based on analysis of existing activity and identification of trends that will most likely impact activity in the future. This analysis requires data collected from various resources including Airport records, FAA databases, Woods and Poole Inc., the U.S. Census, and previous Airport planning documents. In addition, data and qualitative information were obtained through interviews with Airport tenants and the PAC. This information provides a more thorough understanding of tenant goals, facility needs, and potential impacts to future aviation activity at the Airport. Because accurate, annual estimates of historical based aircraft are limited, the accuracy of certain types of methodologies, such as trend analysis, are not utilized.

4.5.1.1 Based Aircraft Forecast – Socioeconomic

Socioeconomic characteristics provide insight to the economic health of a specific locality or region. Population, per capita personal income (PCPI), employment, and other indicators can reflect propensity to own or operate aircraft. Socioeconomic data were provided by Woods and Poole Economics, Inc., an independent firm that specializes in long-term economic and demographic projections. Socioeconomic data were analyzed and grouped in regions: Fresno-Madera combined statistical area (CSA), 6-County area surrounding Fresno (including Fresno, Madera, Mariposa, Merced, Kings, and Tulare Counties), and the State of California. The grouping by area was done intentionally because while some airports are tied to more local conditions, other airports are influenced more by regional or statewide factors depending on the type of role that they serve. As such, an overview of several regions provides a more comprehensive analysis. The following socioeconomic factors were considered in this section and are detailed in Table 4-3:

- Population – the total number of persons residing within a specific geographic area
- Employment – the total number of employed persons within a specific geographic area
- Per capita personal income – a composite measure of market potential which indicates the general ability of persons to purchase products and services. It should be noted that PCPI data obtained from Woods and Poole was reported in constant dollars (year 2016) to adjust for inflation over time.

Table 4-3 – Socioeconomic Data (Population, Employment, Per Capita Personal Income)

Fresno-Madera CSA			6-County Region			California			
Year	Population	Employment	PCPI (\$2016)	Population	Employment	PCPI (\$2016)	Population	Employment	PCPI (\$2016)
Historic									
2000	924,880	452,590	\$28,270	1,652,710	765,550	\$25,460	33,987,980	19,280,930	\$45,190
2010	1,083,790	483,050	\$32,100	1,954,490	823,100	\$30,140	37,336,010	19,803,750	\$46,940
2017	1,162,410	558,640	\$37,030	2,081,800	937,600	\$35,210	39,943,420	23,144,510	\$53,970
CAGR 2000-2017	1.01%	2.10%	2.06%	0.91%	1.88%	2.25%	0.97%	2.25%	2.01%
Projected									
2022	1,236,020	601,990	\$39,670	2,202,030	1,006,110	\$37,740	41,943,130	24,957,950	\$57,700
2027	1,312,980	644,750	\$42,240	2,326,730	1,072,350	\$40,180	44,002,730	26,756,950	\$61,510
2037	1,467,640	727,100	\$46,290	2,574,270	1,200,110	\$43,990	47,971,810	30,258,190	\$68,930
CAGR 2017-2037	1.17%	1.33%	1.12%	1.07%	1.24%	1.12%	0.92%	1.35%	1.23%

Source: Woods & Poole Economics Inc.

Notes: CAGR = Compounded Annual Growth Rate, Income is per capita estimates in USD, the 6-county region includes Merced, Mariposa, Madera, Fresno, Kings, and Tulare Counties

Socioeconomic forecasts assumed that the number of based aircraft at the Airport (beyond base year 2017) will mimic population, employment, and PCPI projections for the compared geographic areas through 2037. The resulting forecasts for based aircraft at the Airport using this methodology are shown in Table 4-4.

Table 4-4 – Baseline: Based Aircraft Forecasts – Socioeconomic

Year	Fresno-Madera CSA			6-County Region			California		
	Population	Employment	PCPI (\$2016)	Population	Employment	PCPI (\$2016)	Population	Employment	PCPI (\$2016)
2017	118	118	118	118	118	118	118	118	118
2022	125	127	126	125	127	126	124	127	126
2027	133	136	135	132	135	135	130	136	134
2037	149	154	148	146	151	147	142	154	151
CAGR 2017- 2037	1.17%	1.33%	1.12%	1.07%	1.24%	1.12%	0.92%	1.35%	1.23%

Source: Kimley-Horn & Associates, October 2018

The based aircraft forecasts predicated on socioeconomic data indicate that based aircraft at the Airport could range from 142 to 154 by 2037 depending on the geographic areas that are considered. This range reflects compound annual growth rates of 0.92 percent to 1.35 percent over the planning horizon.

4.5.1.2 Based Aircraft Forecast – Regional Market Share

Market share forecasts compare an individual airport’s share of a certain component or indicator (such as based aircraft at FCH) with that of a larger market. The market share analysis was developed using FAA TAF projections of based aircraft at the 12 airports within a 50-mile radius of the Airport, which included: Fresno Chandler Executive Airport (FCH), Chowchilla Airport (2O6), Sequoia Field Airport (D86), Firebaugh Airport (F34), Fresno Yosemite International Airport (FAT), Hanford Municipal Airport (HJO), William Robert Johnston Municipal Airport (M90), Madera Municipal Airport (MAE), Reedley Municipal Airport (O32), Woodlake Airport (O42), Mefford Field Airport (TLR), and Visalia Municipal Airport (VIS). These data are shown in Table 4-5.

Table 4-5 – Baseline: FCH Regional Market Share of Based Aircraft

Year	FCH	2O6	D86	F34	FAT	HJO	M90	MAE	O32	O42	TLR	VIS	Total	% FCH Market Share
2008	125	20	15	12	208	49	1	97	60	21	66	140	814	15.4%
2009	126	20	15	12	208	67	0	112	60	21	66	162	869	14.5%
2010	103	12	13	12	170	67	0	82	45	19	65	161	749	13.8%
2011	103	12	13	12	142	67	0	82	45	19	65	133	693	14.9%
2012	124	13	13	12	170	39	0	79	49	2	48	154	703	17.6%
2013	132	18	11	12	174	38	0	88	49	2	46	162	732	18.0%
2014	132	19	11	12	155	38	0	87	53	2	45	161	715	18.5%
2015	122	19	9	12	152	36	0	77	45	0	43	151	666	18.3%
2016	127	19	11	12	193	35	0	140	50	16	44	148	795	16.0%
2017	118	19	11	12	193	35	0	140	50	16	44	150	797	14.8%

Source: 2018 FAA Terminal Area Forecast

The purpose for examining regional airports is to account for factors that could affect based aircraft forecasts at FCH – for example, nearby airport facilities, services, rates etc. The regional market share forecast of based aircraft included low, medium, and high growth scenarios (refer to Table 4-6).

The Low-Growth Scenario assumed that the market share at the Airport would remain 14.8 percent of total based aircraft in the region throughout the planning horizon, the same percentage that FCH represented in 2017. This figure was applied to FAA TAF forecasts of based aircraft at airports within the region and resulted in 122 based aircraft at FCH in 2037, which represents a CAGR of 0.17 percent.

The High-Growth Scenario assumed that the Airport’s market share of regional based aircraft would increase by 0.10 percent annually through the 20-year planning horizon. This modest increase is supported by a number of factors including 1) Incremental projected growth in based aircraft at regional airports as reported in the TAF, 2) Recent growth in the Airport’s based aircraft fleet including three electric aircraft in 2018, and 3) Airport Management’s ability to adjust tenant rates and fees to remain competitive with other airports the region, which could attract aircraft owners at nearby airports to FCH in the future. These factors combined with anticipated population and economic growth within the Fresno MSA support a High-Growth methodology that increases the Airport’s market share of regional based aircraft gradually over the 20-year planning horizon.

The Medium-Growth Scenario was developed by averaging the product of the high and low growth scenarios, which resulted in 135 based aircraft in 2037 and a 0.69 CAGR.

Table 4-6 – Baseline: Based Aircraft Forecasts – Regional Market Share

Year	Regional Based Aircraft	FCH Based Aircraft (Low)	FCH Market Share (Low)	FCH Based Aircraft (Medium)	FCH Market Share (Medium)	FCH Based Aircraft (High)	FCH Market Share (High)
2017	797	118	14.8%	118	14.8%	118	14.8%
2022	804	119	14.8%	122	15.2%	125	15.6%
2027	810	120	14.8%	126	15.6%	132	16.4%
2037	824	122	14.8%	135	16.4%	149	18.1%
CAGR 2017-2037	0.17%	0.17%	N/A	0.69%	N/A	1.17%	N/A

Sources: Kimley-Horn & Associates, October 2018, 2018 FAA Terminal Area Forecast

4.5.2 Preferred Forecast

The vision and mission of the Airport is to be the “general aviation airport of choice serving the economic hub of California’s Central Valley” and “provide an essential transportation link...while preserving [the Airport’s] historic tradition, serving the community, and fostering innovation in aviation.”

To realize these goals, Airport Management has indicated it has flexibility to adjust rates and fees to be competitive in the region (in accordance with the economic climate), and desires to maximize investment in innovation and attract additional tenants and aircraft owners. While the FAA TAF forecasts minimal growth in the number of based aircraft in the Fresno region and flat growth at FCH, it is anticipated that the Airport’s efforts will allow it to capture a greater share of the regional market over the next 20 years. These efforts have

already occurred to some extent, evidenced by the recent acquisition of three electric aircraft in March 2018. As such, the Regional Market Share – Medium Growth Scenario is the preferred based aircraft forecast for long-term planning at the Airport.

4.5.3 Accelerated Baseline Forecast

The Accelerated Baseline Forecast was derived utilizing the same Regional Market Share – Medium Growth Scenario identified in the Baseline Forecast but assumed a base year estimate of 140 based aircraft. As noted, the Accelerated Baseline Forecast was developed to aid the City in facility planning at the Airport. This forecast has not been submitted to the FAA for approval, although certain facility requirements for the Accelerated Baseline Forecast are described in a subsequent Chapter.

As shown in Table 4-7, the Regional Market Share – Medium Growth Scenario in the Accelerated Baseline Forecast results in 161 based aircraft by 2037.

Table 4-7 – Accelerated Baseline: Based Aircraft Forecasts – Regional Market Share

Year	Regional Based Aircraft	FCH Based Aircraft (Medium)	FCH Market Share (Medium)
2017	797	140	17.6%
2022	804	145	18.0%
2027	810	150	18.5%
2037	824	161	19.5%
CAGR 2017-2037	0.17%	0.69%	N/A

Sources: Kimley-Horn & Associates, October 2018, 2018 FAA Terminal Area Forecast

4.5.4 Based Aircraft Fleet Mix Forecast

An airport’s fleet mix dictates facility needs pertaining to size and type of aircraft storage hangars, aircraft tie-downs, aircraft parking apron, and others. As with many GA airports, most of the based aircraft fleet at the Airport is composed of single-engine piston aircraft. The current and future based aircraft fleet mix at FCH is described in Table 4-9 and Table 4-9. Table 4-7 presents the Airport’s Baseline Forecast fleet mix and Table 4-8 presents the Airport’s Accelerated Baseline Forecast fleet mix. Based on current national general aviation trends – as described in Section 4.1.1 and in the *2018-2038 FAA Aerospace Forecast* – and existing conditions at the Airport such as constraints on ultimate runway length, the following assumptions were used to project the future based aircraft fleet mix:

- The proportion of single-engine piston aircraft compared with the entire fleet is anticipated to decline gradually through 2037, although the total number of aircraft is expected to increase overall. This is consistent with FAA projections that single-engine piston aircraft in the national fleet will decline.
- Multi-engine piston and turboprop aircraft are expected to assume a slightly greater proportion of the fleet at the Airport through 2037.
- It is not anticipated that jet aircraft will be based at the Airport due to constraints that limit the ability to significantly extend Runway 12-30.
- Helicopter growth is anticipated to be linear relative to projected growth in the overall fleet. This growth is consistent with FAA projections of rotorcraft (helicopters) in the national fleet.

- Other aircraft such as light sport, experimental, and electric aircraft are anticipated to increase gradually through 2037. FCH has a significant number of ultra-light and electric aircraft, and it is anticipated that this segment of activity will continue to increase in the future. The FAA also projects significant growth in this sector through 2037.

Based on the assumptions listed above, Table 4-8 describes the existing and projected aircraft fleet mix for the Baseline Forecast and Table 4-9 describes the existing and projected aircraft fleet mix for the Accelerated Baseline Forecast.

Table 4-8 – Baseline: Based Aircraft Fleet Mix Forecast

Aircraft Type	2017		2022		2027		2037	
	#	%	#	%	#	%	#	%
Single Engine:	102	86.4%	105	85.5%	106	85.0%	114	84.2%
Multi Engine:	3	2.5%	3	2.8%	4	2.8%	4	3.1%
Turboprop:	0	0.0%	0	0.0%	1	0.4%	1	0.5%
Jet:	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Helicopters:	5	4.2%	5	4.4%	6	4.5%	6	4.5%
Experimental/Other:	8	6.8%	8	7.3%	9	7.3%	10	7.7%
TOTAL:	118	100%	121	100%	126	100%	135	100%

Source: Kimley-Horn & Associates, October 2018

Table 4-9 – Accelerated Baseline: Based Aircraft Fleet Mix

Aircraft Type	2017		2022		2027		2037	
	#	%	#	%	#	%	#	%
Single Engine:	123	87.9%	125	86.6%	128	85.4%	134	83.0%
Multi Engine:	2	1.4%	2	1.6%	3	1.7%	3	2.0%
Turboprop:	2	1.4%	2	1.6%	3	1.7%	3	2.0%
Jet:	0	0.0%	0	0.0%	0	0.0%	0	0.0%
Helicopters:	5	3.6%	5	3.9%	6	4.3%	8	5.0%
Experimental/Other:	8	5.7%	9	6.3%	10	6.9%	13	8.0%
TOTAL:	140	100%	144	100%	150	100%	161	100%

Source: Kimley-Horn & Associates, October 2018

4.6 Aircraft Operations Forecasts

Annual aircraft operations are used to determine funding and design criteria at airports. Accurately gauging aircraft operations can help inform the adequacy of the runway capacity and other facility needs at the Airport. Aircraft operations for GA airports comprise nearly all segments of the overall aviation industry, except for commercial air carrier and military operations. GA operations incorporate flight training, corporate aviation, law enforcement, medical operations, and personal/recreational activity, among others. As previously noted, an operation is defined as a takeoff or a landing. This section presents forecasts of annual aircraft operations at the Airport over the 20-year planning horizon.

FCH has a decommissioned Air Traffic Control Tower (ATCT) and as such is considered a non-towered airport. Subsequently, development of accurate operational estimates is challenging since there is no actual record of aircraft takeoffs and landings. The FAA TAF issued January 2018 estimated 24,885 total annual operations at the Airport in base year 2017. This figure is used as the base year estimate of total aircraft operations at FCH.

Similar to based aircraft, two forecasts have been developed for aircraft operations. The operational Baseline Forecast projects anticipated activity based on existing and projected trends, and the operational Accelerated Baseline Forecast projects anticipated activity that incorporates the Accelerated Baseline Forecast for based aircraft. The following sections present the methodologies used to identify the Baseline Forecast for aircraft operations. Summaries of both the Baseline and Accelerated Baseline Forecasts are presented at the end of this Section.

4.6.1 Aircraft Operations Forecast Methodologies

Aircraft operations forecasts were developed using several methodologies including socioeconomic, regional market share, local market share, operations per based aircraft (OPBA), and an FAA TAF comparison. These methodologies are presented in the following sections.

4.6.1.1 Aircraft Operations Forecast – Socioeconomic

Similar to based aircraft forecasts presented in the previous section, forecasts of aircraft operations were developed using the same socioeconomic methodologies. The forecasts were developed using a socioeconomic regression approach that utilized population, employment and PCPI data for Fresno CSA, the 6 surrounding counties, and the State of California. Socioeconomic data were shown previously in Table 4-3. Results of the socioeconomic forecast for aircraft operations are found in Table 4-10. As noted previously, PCPI data are reported in constant dollars (\$2016) to adjust for inflation over time.

Table 4-10 – Baseline: Aircraft Operations Forecasts – Socioeconomic

Year	Fresno-Madera CSA			6 County Region			California		
	Population	Employment	PGPI (\$2016)	Population	Employment	PGPI (\$2016)	Population	Employment	PGPI (\$2016)
2017	24,885	24,885	24,885	24,885	24,885	24,885	24,885	24,885	24,885
2022	26,461	26,816	26,662	26,322	26,703	26,667	26,131	26,834	26,606
2027	28,108	28,721	28,390	27,813	28,462	28,391	27,414	28,769	28,365
2037	31,419	32,389	31,110	30,772	31,852	31,086	29,887	32,534	31,786
CAGR 2017-2037	1.17%	1.33%	1.12%	1.07%	1.24%	1.12%	0.92%	1.35%	1.23%

Source: Kimley-Horn & Associates, October 2018

The aircraft operations forecasts based on socioeconomic data show compound annual growth rates of 0.92 percent to 1.35 percent over the planning horizon which translates to between 29,887 and 32,389 operations per year by 2037.

4.6.1.2 Aircraft Operations Forecast – Regional Market Share

The regional market share forecast compared the Airport’s market share of aircraft operations to GA operations at 12 airports within a 50-mile radius – as described in Section 4.5.1.2. Because FCH does not have military or commercial operations, only GA operations were evaluated. Like the regional market share forecasts for based aircraft, this methodology compared activity at the Airport with FAA TAF forecasts of GA operations at regional airports (see Table 4-11). Three regional market share forecasts were developed for aircraft operations.

Table 4-11 – FCH Regional Market Share of Aircraft Operations

Year	FCH	206	D86	F34	FAT	HJO	M90	MAE	O32	O42	TLR	VIS	Total	% FCH Market Share
2008	25,000	6,709	12,000	10,000	105,967	28,500	13,000	50,150	33,000	12,000	26,180	22,000	344,506	7.3%
2009	25,000	6,709	12,000	10,000	83,145	28,500	4,000	50,150	33,000	12,000	26,180	35,000	325,684	7.7%
2010	25,000	6,700	12,000	10,000	73,049	28,500	4,000	50,150	33,000	12,000	26,180	35,000	315,579	7.9%
2011	25,000	6,700	12,000	10,000	82,554	28,500	4,000	50,150	33,000	12,000	26,180	58,500	348,584	7.2%
2012	25,000	6,700	12,000	10,000	77,893	28,500	4,000	50,150	33,000	12,000	26,180	75,000	360,423	6.9%
2013	25,000	6,700	12,000	10,000	84,386	28,500	4,000	50,150	33,000	12,000	26,180	6,500	298,416	8.4%
2014	26,250	6,700	12,000	10,000	79,735	28,500	4,000	50,150	33,000	12,000	26,180	25,000	313,515	8.4%
2015	24,885	6,700	12,000	10,000	69,421	28,500	4,000	50,150	33,000	12,000	26,180	25,000	301,836	8.2%
2016	24,885	6,700	12,000	10,000	60,677	28,500	4,000	50,150	33,000	12,000	26,180	25,000	293,092	8.5%
2017	24,885	6,700	12,000	10,000	48,802	28,500	4,030	50,150	33,000	12,000	26,180	25,000	281,247	8.8%

Source: 2018 FAA Terminal Area Forecast, Kimley-Horn & Associates, October 2018

In 2017, FCH accounted for 8.8 percent of GA operations in the region. The Low-Growth Scenario held this figure constant throughout the 20-year planning horizon and resulted in a decrease in operations from 24,885 in 2017 to 24,680 in 2037 representing a CAGR of -0.04 percent. This decline is attributed to forecast activity in the FAA TAF, which projected a decrease in GA activity at regional airports over 20 years.

Between 2008 and 2017, the Airport’s market share of aircraft operations increased from 7.3 percent to 8.8 percent. The High-Growth Scenario assumed that the annual increase in FCH’s market share that occurred between 2008 and 2017 would continue throughout the 20-year planning horizon. The high-growth scenario resulted in 33,558 operations in 2037 (growing to 12.0% market share), representing a CAGR of 1.51 percent.

The Medium-Growth Scenario was developed by averaging the product of the high and low-growth scenarios, which resulted in an increase from 24,885 operations in 2017, to 29,119 operations in 2037 representing a CAGR of 0.79 percent. All aircraft operations forecasts based on regional market share methodology are shown in Table 4-12.

Table 4-12 – Baseline: Aircraft Operations Forecast – Regional Market Share

Year	Regional Aircraft Operations	FCH Operations (Low)	FCH Market Share (Low)	FCH Operations (Medium)	FCH Market Share (Medium)	FCH Operations (High)	FCH Market Share (High)
2017	281,250	24,885	8.8%	24,885	8.8%	24,885	8.8%
2022	277,320	24,538	8.8%	24,641	9.2%	26,744	9.6%
2027	277,850	24,585	8.8%	26,795	9.6%	29,006	10.4%
2037	278,930	24,680	8.8%	29,119	10.4%	33,558	12.0%
CAGR 2017-2037	-0.04%	-0.04%	N/A	0.79%	N/A	1.51%	N/A

Sources: Kimley-Horn & Associates, March 2018, 2017 FAA Terminal Area Forecast

4.6.1.3 Aircraft Operations Forecast – FAA Aerospace Forecast Fleet Mix

As noted previously, the FAA reports aviation trends and forecasts in its annual Aerospace Forecast. The operational fleet mix methodology assumed that growth rates by aircraft type at FCH would mimic projections of GA hours flown by aircraft type described in the *2018-2038 FAA Aerospace Forecast*:

- Single-engine piston operations will decrease at an annual rate of 1.10 percent through 2037.
- Multi-engine piston operations will decrease at an annual rate of 0.30 percent through 2037.
- Turboprop operations will increase at an annual rate of 1.80 percent through 2037.
- Helicopter operations will increase at an annual rate of 2.20 percent through 2037.
- “Other” operations, which include light sport and experimental activity will increase at an annual rate of 2.60 percent through 2037.
- Though the Airport does experience some small jet operations, the proportion of jet operations compared with total annual operations is so small that it was not considered in this methodology.

These annual growth rates were applied to base year operations by aircraft type. Base year operations by aircraft type were determined by applying the based aircraft fleet mix percentages presented in Table 4-9 to the

base year estimate of aircraft operations described in Section 4.6. Results of these forecasts are shown in Table 4-13. As shown, this methodology projects a decrease in operations from 24,885 in 2017 to 22,427 by 2037, which reflects an annual growth rate of -0.52 percent.

Table 4-13 – Baseline: Aircraft Operations Forecast – FAA Aerospace Fleet Mix

Year	Single-Engine Piston	Multi-Engine Piston	Turboprop	Helicopter	Other/ Experimental	Total
2017	21,401	498	249	995	1,742	24,885
2022	20,250	490	272	1,110	1,980	24,102
2027	19,160	483	297	1,237	2,252	23,430
2037	17,154	469	356	1,538	2,837	22,427
AAGR 2017-2037	-1.10%	-0.30%	1.80%	2.20%	2.60%	-0.52%

Sources: Kimley-Horn & Associates, October 2018, 2018-2038 FAA Aerospace Forecast

4.6.1.4 Aircraft Operations Forecast – Operations per Based Aircraft

The OPBA estimate utilized in this Airport Master Plan Update was based on an actual based aircraft count and acoustical counter samples of operations developed for the previous Airport Master Plan Update. At the time those forecasts were developed, each based aircraft represented 194 total annual operations performed at the Airport. The OPBA methodology applied 194 operations to the preferred forecast for based aircraft presented in Section 4.6; the resulting forecasts are presented in Table 4-14.

Table 4-14 – Baseline: Aircraft Operations Forecast – Operations per Based Aircraft

Year	OPBA	Preferred Methodology - Based Aircraft	Total Operations
2017	--*	118	24,885
2022	194	122	23,682
2027	194	126	24,482
2037	194	135	26,273
CAGR 2017-2037	N/A		0.27%

Source: Kimley-Horn & Associates, October 2018

*Note: 194 OPBA for 2017 is not presented because total operations are derived from the FAA Terminal Area Forecast and are independent from the OPBA calculation.

As shown, this methodology forecasted an increase in operations from 24,885 in 2017 to 26,273 in 2037, representing a CAGR of 0.27 percent.

4.6.2 Preferred Forecast

Based on data provided by the FAA TAF and feedback received from Airport management and tenants, it was identified that operational activity at the Airport has remained relatively flat in recent years, though the introduction of electric aircraft and increases in turboprop and helicopter operations should foster modest growth at FCH throughout the 20-year planning horizon. It is estimated that operational growth will roughly mimic projected growth in based aircraft at the Airport. As such, it is recommended that the Regional Market Share – Medium Growth Scenario be used for long-range operational forecast-related planning.

4.6.3 Accelerated Baseline Forecast

In order to plan for anticipated based aircraft growth under the Accelerated Baseline Forecast, a subsequent Accelerated Baseline Forecast for aircraft operations was developed. This forecast was derived by applying the OPBA figure of 194 developed in the previous Airport Master Plan to the Accelerated Baseline Forecast for based aircraft described in Section 4.5.3.

As shown in Table 4-15, the Accelerated Baseline Forecast results in 31,172 total operations by 2037.

Table 4-15 – Accelerated Baseline: Aircraft Operations Forecast – Operations per Based Aircraft

Year	OPBA	Preferred Methodology - Based Aircraft	Total Operations
2017	--*	140	24,885
2022	194	145	28,097
2027	194	150	29,047
2037	194	161	31,172
CAGR 2017-2037	N/A	1.13%	

Source: Kimley-Horn & Associates, October 2018

*Note: 194 OPBA for 2017 is not presented because total operations are derived from the FAA Terminal Area Forecast and are independent from the OPBA calculation.

4.6.3.1 Forecast of Local/Itinerant Operations

General aviation operations are classified as either local or itinerant operations. Local operations are those that remain within a 20-mile radius of an airport and include touch-and-go and most training activity. Itinerant operations are performed by an aircraft that lands at an airport, arriving from outside the airport area, or departs an airport and leaves the airport’s 20-mile radius prior to its return.

In 2017, the Airport experienced approximately 72 percent local operations and 28 percent itinerant operations based on historical TAF data. As confirmed by the PAC, and based on limitations to the Airport’s runway length, it was assumed that the 72/28 split of local and itinerant traffic is likely to remain consistent throughout the forecasting period. Local and itinerant operations forecasts are presented in Table 4-16.

Table 4-16 – Baseline: Forecast of Local/Itinerant Operations

Year	Total Operations	Local Operations	Itinerant Operations	Percent Local/Itinerant	
				Local	Itinerant
2017	24,885	17,955	6,930	72%	28%
2022	25,641	18,500	7,141	72%	28%
2027	26,795	19,333	7,462	72%	28%
2037	29,119	21,010	8,109	72%	28%

Sources: Kimley-Horn & Associates, January 2017, 2017 FAA Terminal Area Forecast

4.6.3.2 Forecast of Daytime/Evening Operations

Identification of daytime and evening operations is an important element to include in the planning process because noise impacts created by aircraft arriving or departing at night are greater than during the day. The forecast of daytime and evening operations can also help drive facility requirements such as improvements to airport lighting and NAVAIDs.

The FAA defines nighttime operations as those that are conducted between 10:00PM and 7:00AM. Based on conversations with Airport staff and the PAC, approximately three percent of aircraft operations are estimated to occur between these hours. This is consistent with the previous ALP Narrative (Coffman Associates, Inc. 2009). It is anticipated that the percentage of daytime/evening operations will remain constant throughout the planning horizon (see Table 4-17).

Table 4-17 – Baseline: Forecast of Daytime/Evening Operations

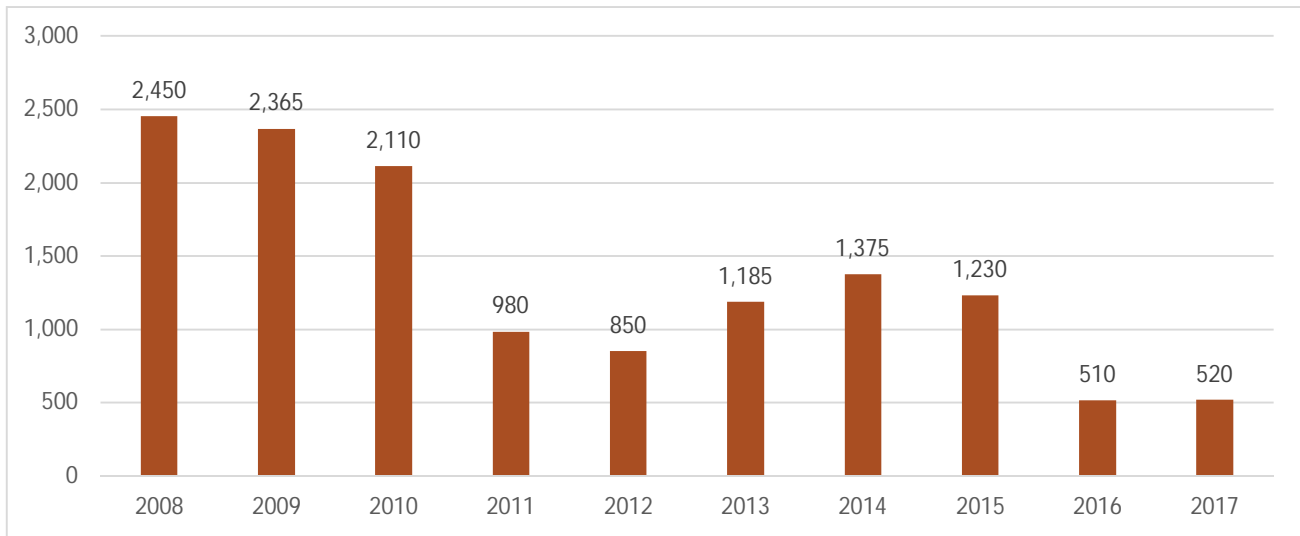
Year	Total Operations	Daytime Operations	Evening Operations	Percent Daytime/Evening Split	
				Daytime	Evening
2017	24,885	24,138	747	97%	3%
2022	25,641	24,872	769	97%	3%
2027	26,795	25,992	804	97%	3%
2037	29,119	28,245	874	97%	3%

Sources: Kimley-Horn & Associates, January 2017, 2017 FAA Terminal Area Forecast

4.6.3.3 Forecast of Annual Instrument Approaches

Because the Airport does not have a functioning air traffic control tower, the precise number of annual instrument approaches (AIA) cannot be decisively established. However, the FAA’s Traffic Flow Management System Counts (TFMSC) database includes data for flights that fly under Instrument Flight Rules (IFR) and are captured by the FAA’s enroute computers. Most Visual Flight Rule (VFR) and some non-enroute IFR traffic is excluded from reported data. Figure 4-2 depicts annual instrument operations from 2008 to 2017 as reported in the TFMSC database.

Figure 4-2 – Historical Aircraft Operations from FAA TFMSC



Sources: Traffic Flow Management System Counts (TFMSC), Aviation System Performance Metrics (ASPM), Kimley-Horn & Associates, March 2018

The TFMSC database identified that between 2008 and 2017 instrument operations accounted for an average of 5.4 percent of annual operations at the Airport. This figure is held constant throughout the 20-year projection period to forecast IFR operations. It was assumed that instrument approaches account for half of total IFR operations. Table 4-18 presents forecast annual instrument approaches.

Table 4-18 – Baseline: Forecast of Annual Instrument Approaches

Year	Total Operations	IFR Operations	Annual Instrument Approaches	VFR Operations	Percent IFR/VFR Split	
					IFR	VFR
2017	24,885	520	260	24,365	2.1%	97.9%
2022	25,641	1,388	694	24,253	5.4%	94.6%
2027	26,795	1,451	725	25,345	5.4%	94.6%
2037	29,119	1,576	788	27,543	5.4%	94.6%

Source: Kimley-Horn & Associates, October 2018

4.6.3.4 Forecast of Touch-and-Go Operations

A touch-and-go operation is defined as an operation conducted by an aircraft that lands and departs on a runway without stopping or exiting. This type of operation is typically associated with flight training. Touch-and-go operations forecasts are important to identify because they impact airfield capacity, which is presented in a subsequent chapter.

As confirmed by the PAC, it was assumed that touch-and-go operations account for approximately 65 percent of total activity at the Airport (see Table 4-19). This figure was held constant throughout the 20-year planning horizon to identify annual touch-and-go operations. It should be noted that touch-and-go operations are not permitted on Runway 12 due to noise sensitive residential areas south east of the Airport.

Table 4-19 – Baseline: Forecast of Touch-and-Go Operations

Year	Total Operations	% Touch and Go	Touch-and-Go Operations
2017	24,885	65%	16,175
2022	25,641	65%	16,667
2027	26,795	65%	17,417
2037	29,119	65%	18,927

Sources: Kimley-Horn & Associates, January 2017, 2017 FAA Terminal Area Forecast

4.7 Peak Activity Forecasts

The capacity of an airport relates to activity levels during a peak (or design) period. Annual forecasts are used to determine the operational peaking characteristics and are used to inform the facility requirements.

To ensure that a facility isn't overbuilt, several factors are used to analyze needs. The average day of the peak month, or the design day, is an accepted industry methodology used in evaluating peaking characteristics. Metrics such as average annual day don't adequately take into consideration increased activity at certain times of the year. Planning for only the busy or peak day of the peak month, however, may result in facilities that are overbuilt.

The periods used in the capacity analysis and facility requirements are as follows:

- Peak Month — the calendar month when peak passenger volumes of aircraft operations occur
- Peak Month Average Day (PMAD) — the average day in the peak month; derived by dividing the peak month operations by the number of days in a month
- Design Hour — the peak hour within the design day

Without an operational ATCT or physical operations counts, it is difficult to gauge peak activity at the Airport. The 2009 ALP Narrative identified 12 percent of annual activity occurred in the peak month, and 15 percent of operations during PMAD occurred within the peak hour (Coffman Associates, Inc. 2009). These estimates were considered acceptable based on existing levels of activity at the Airport and were held constant throughout the 20-year planning horizon for both the Baseline Forecast and the Accelerated Baseline Forecast (shown in Table 4-20 and Table 4-21).

Table 4-20 – Baseline: Peak Activity Forecasts

Year	Total Operations	Peak Month Operations	Peak Month Average Day	Peak Hour
2017	24,885	2,986	100	15
2022	25,641	3,077	103	15
2027	26,795	3,215	107	16
2037	29,119	3,494	116	17

Source: Kimley-Horn & Associates, October 2018

Table 4-21 – Accelerated Baseline: Peak Activity Forecasts

Year	Total Operations	Peak Month Operations	Peak Month Average Day	Peak Hour
2017	24,885	2,986	100	15
2022	28,097	3,372	112	17
2027	29,047	3,486	116	17
2037	31,172	3,741	125	19

Source: Kimley-Horn & Associates, October 2018

4.8 Critical Aircraft

The FAA has established design criteria and guidance for airport facility planning based on the operational and physical characteristics of aircraft that operate at an airport. This design criteria – as described in FAA Advisory Circular 150/5300-13A, Change 1, *Airport Design* – include runway and taxiway dimensions, separation distances between aircraft and various objects, airspace protection requirements, and land use controls (FAA 2014). In support of these requirements, the FAA classifies and groups aircraft with similar approach speeds and sizes into an Airport Reference Code (ARC). Furthermore, each airport has a ‘critical’ or ‘design’ aircraft – as designated by its ARC – which represents the most demanding aircraft or grouping of aircraft with similar characteristics currently using or anticipated to use an airport on a ‘regular basis’, defined as 500 annual operations, excluding touch-and-go operations. The following section describes the ARC classification system and identifies the existing and future critical aircraft for FCH.

4.8.1 Airport Reference Code

There are two components that comprise the ARC. The first is the Airport Approach Category (AAC), which relates to the approach speed of an aircraft and consists of grouping aircraft based on reference landing speed at the maximum certificated landing weight. This classification affects runway length requirements and exit taxiway locations; the AAC is depicted as a letter. Approach categories, corresponding approach speed thresholds, and example aircraft are depicted in Table 4-22.

Table 4-22 – Aircraft Approach Category (AAC)

Approach Category	Approach Speed	Example Aircraft
A	Less than 91 knots	Cessna 172, Beech Bonanza A36
B	91 knots or more but less than 121 knots	Cessna Citation CJ3/4, King Air 200
C	121 knots or more but less than 141 knots	Airbus A319/320, Boeing 737-700
D	141 knots or more but less than 166 knots	Boeing 737-800/900, MD-83/88
E	166 knots or more	Boeing F-15 Eagle/F-18 Hornet

Source: FAA AC 150/5300-13A *Airport Design*; prepared by Kimley-Horn & Associates, June 2017

The second component of the ARC is the Airplane Design Group (ADG), which relates to the physical size of the aircraft, namely the wingspan and tail height (FAA 2014, 3). The ADG is represented by a Roman numeral. Dimensional standards of aircraft affect airfield geometry design including separation criteria for runways, taxiways and aircraft parking areas. ADG design groups, corresponding aircraft tail height and wingspan thresholds, and example aircraft are depicted in Table 4-23.

Table 4-23 – Airplane Design Group (ADG)

Design Group	Aircraft Tail Height	Aircraft Wingspan	Example Aircraft
I	Less than 20'	Less than 49'	Beechcraft Bonanza 35, King Air 90
II	20' but less than 30'	49' but less than 79'	Cessna Citation III, Gulfstream IV
III	30' but less than 45'	79' but less than 118'	Airbus A319/320, Boeing 737-800
IV	45' but less than 60'	118' but less than 171'	Boeing 757-200F, Lockheed C-130
V	60' but less than 66'	171' but less than 214'	Airbus A340, Boeing 777
VI	66' but less than 80'	214' but less than 262'	Airbus A380, C-5 Galaxy

Source: FAA AC 150/5300-13A Airport Design; prepared by Kimley-Horn & Associates, June 2017

The AAC and ADG collectively identify the ARC, which is used to classify both airports and aircraft. It is worth noting that the ARC is used for planning and design only and does not limit the aircraft that may be able to operate safely at the airport (FAA 2014, 3). A lower ARC typically represents smaller, slower aircraft used for recreation/training. Higher ARCs usually indicate larger commercial or military aircraft. ARC designations in the middle categories usually include turboprops and corporate jets.

4.8.2 Existing Critical Aircraft

The 2009 ALP Narrative cited the Cessna Mustang (ARC B-I Small) as the critical aircraft for FCH (Coffman Associates, Inc. 2009). Small aircraft are those that weigh less than 12,500 pounds. The 2011 approved ALP identified a Beechcraft 58P as the critical aircraft (also an ARC B-I Small).

Without a functioning ATCT or operational monitoring equipment at the Airport, the exact number of annual operations by aircraft type is unknown. The FAA’s TFMSC database was used to obtain information on operations recorded between 2010 and 2017. In 2017, TFMSC did not show 500 operations conducted by any single aircraft type or grouping of aircraft. The aircraft models with the highest number of operations reported in the database in 2017 included the Cirrus SR 22, Cessna Skyhawk 172, and the Piper PA-28 Cherokee with 59, 50, and 50 operations, respectively. The TFMSC database identified that in 2017 there were 76 operations at the Airport conducted by aircraft with an ARC greater than A-I, and five operations conducted by aircraft weighing more than 12,500 pounds. While the TFMSC database captures only a fraction of operational activity at non-towered airports, discussions with Airport Management, tenants, the FAA, and PAC members concluded that A-I (Small) was an appropriate existing ARC designation.

Because no individual aircraft type or grouping of aircraft with similar ARCs could be identified as having conducted 500 operations in 2017, an existing critical aircraft based on FAA criteria could not be determined. Based on feedback from the FAA, it was recommended that the existing critical aircraft be considered the entire fleet of A-I (Small) aircraft, but that justification for specific potential improvements such as an extension to the runway be based on composite characteristics of an individual or grouping of aircraft within the A-I (Small) ARC designation.

4.8.3 Future Critical Aircraft

Based on the forecasts presented in this chapter, there is not enough evidence to suggest that the Airport’s existing A-I (Small) ARC or entire fleet of A-I (Small) aircraft as the critical aircraft will change during the 20-year planning horizon. However, it is recommended that the Airport obtain operational monitoring equipment to more accurately track operations by aircraft type in the future. This would provide additional data that would

accurately record operational activity that could be used to provide justification for requisite changes in the critical aircraft or ARC.

A significant proportion of future growth in general aviation activity nationwide is anticipated to occur among turboprop and jet type aircraft. Although FCH may experience a small increase in this type of activity, it is expected that the majority of jet and turboprop operations in the region will remain at Fresno Yosemite International Airport.

A change in ARC would necessitate different dimensional criteria that would be hampered by the Airport’s runway length. It should also be noted that a change to the Airport’s ARC (and its Runway Design Code or RDC) would have a substantial impact on RPZs. A change in the Airport’s ARC from A-I (Small) to A-I or B-I without the “Small” designation would expand the size of the RPZs – from approximately 8 acres to nearly 14 acres – and require additional off-Airport areas to be controlled by the Airport via easements or fee simple acquisition. As such, it is recommended that the Airport’s ARC remain A-I (Small) in the future. Based on feedback provided by the FAA, without adequate operational data, the future critical aircraft should also be considered the entire fleet of A-I (Small) aircraft.

4.9 Forecast Summary

Table 4-24 and Table 4-25 present the preferred Baseline Forecast and Accelerated Baseline Forecast for based aircraft and aircraft operations at FCH. As noted, aircraft operations are anticipated to increase relatively commensurate with based aircraft, which is consistent with historical activity at FCH. While the number of based aircraft and operations declined locally following the 2008 economic recession, both have slowly increased in recent years – a trend that is anticipated to continue at the Airport and nationwide throughout the 20-year planning horizon for small/light sport aircraft (FAA 2018, 23). Historically, FCH has captured a relatively constant share of the regional GA market. Airport Management has indicated that it has the ability to adjust rates and fees to ensure that FCH can not only remain competitive within the region, but potentially enhance its market share. These trends, coupled with a growing local population base, proximity to Fresno’s central business district, and continued investments in innovative technologies such as electric aircraft, should sustain steady growth in aviation activity for the long-term.

Table 4-24 – Baseline: Forecast Summary

Year	Total Based Aircraft	Total Operations
2017	118	24,885
2022	122	25,641
2027	126	26,795
2037	135	29,119
CAGR 2017-2037	0.69%	0.79%

Source: Kimley-Horn & Associates, October 2018

Table 4-25 – Accelerated Baseline: Forecast Summary

Year	Total Based Aircraft	Total Operations
2017	140	24,885
2022	145	28,097
2027	150	29,047
2037	161	31,172
CAGR 2017-2037	0.69%	1.13%

Source: Kimley-Horn & Associates, October 2018

4.10 FAA Forecast Review and Approval

FAA Airport District Offices (ADOs) or Regional Airports Divisions are responsible for forecast approvals. When reviewing a sponsor’s forecast, the FAA must ensure that the forecast is based on reasonable planning assumptions, uses current data, and is developed using appropriate forecast methods. Additional discussion on assumptions, data, and methodologies can be found in the APO report, *Forecasting Aviation Activity by Airport* (GRA, Inc. 2001). After a thorough review of the forecast, FAA then determines if the forecast is consistent with the TAF.

For all classes of airports, forecasts for based aircraft and total operations are considered consistent with the TAF if they meet the following criterion: Forecasts differ by less than 10 percent in the five-year forecast period, and 15 percent in the 10-year forecast period. If forecasts are not consistent with the TAF, they are subject to FAA Headquarters review. Differences must be resolved if the forecast is to be used in FAA decision-making. This may involve revisions to the airport sponsor’s submitted forecasts, adjustments to the TAF, or both. If a forecast is inconsistent with the TAF, it may still be reviewed by an ADO if:

- Five and ten-year forecasts do not exceed 200 based aircraft or 200,000 total annual operations, AND
- Any related development associated with the forecasts will not require an Environmental Impact Study (EIS) and/or Benefit/Cost Analysis (BCA)

FAA-template comparisons of Baseline Forecasts and the TAF are presented in

Table 4-26 and Table 4-27. As shown, forecasts of based aircraft and total aircraft operations are consistent with the TAF based on FAA criteria.

Table 4-26 – FAA Template for Comparing Airport Planning and TAF Forecasts

Template for Comparing Airport Planning and TAF Forecasts ⁽¹⁾

	<u>Year</u>	<u>FCH Forecast</u>	<u>TAF</u>	<u>FCH/TAF % Difference</u>
Based Aircraft				
Base yr.	2017	118	127	-7.1%
Base yr. + 5yrs.	2022	122	127	-3.9%
Base yr. + 10yrs.	2027	126	127	-0.6%
Base yr. + 15yrs.	2032	131	127	2.9%
Itinerant GA Operations				
Base yr.	2017	6,930	6,930	0.0%
Base yr. + 5yrs.	2022	7,141	6,930	3.0%
Base yr. + 10yrs.	2027	7,462	6,930	7.7%
Base yr. + 15yrs.	2032	7,785	6,930	12.3%
Local GA Operations				
Base yr.	2017	17,955	17,955	0.0%
Base yr. + 5yrs.	2022	18,500	17,955	3.0%
Base yr. + 10yrs.	2027	19,333	17,955	7.7%
Base yr. + 15yrs.	2032	20,170	17,955	12.3%
Total GA Operations				
Base yr.	2017	24,885	24,885	0.0%
Base yr. + 5yrs.	2022	25,641	24,885	3.0%
Base yr. + 10yrs.	2027	26,795	24,885	7.7%
Base yr. + 15yrs.	2032	27,954	24,885	12.3%

Note: TAF data is on a U.S. government fiscal year basis (October through September).

(1) Table is developed from Appendix C in the FAA Report, "Forecasting Aviation Activity By Airport."

Source: Kimley-Horn & Associates, October 2018

Table 4-27 – FAA Template for Summarizing and Documenting Airport Planning Forecasts

Template for Summarizing and Documenting Airport Planning Forecasts (1)

A. Forecast Levels and Growth Rates

Airport Name:	Fresno Chandler Airport (FCH)	Specify base year:				Average Annual Compound Growth Rates		
		2017	2022	2027	2032	Base Yr. to +5	Base Yr. to +10	Base Yr. to +15
	<u>Base Yr. Level</u>	<u>Base Yr.+5yrs.</u>	<u>Base Yr.+10yrs.</u>	<u>Base Yr.+15yrs.</u>				
Operations								
<u>Itinerant</u>								
General aviation	6,930	7,141	7,462	7,785	0.6%	0.7%	0.8%	
<u>Local</u>								
General aviation	17,955	18,500	19,333	20,170	0.6%	0.7%	0.8%	
TOTAL OPERATIONS	24,885	25,641	26,795	27,954	0.6%	0.7%	0.8%	
Instrument Operations	520	1,388	1,451	1,513	21.7%	10.8%	7.4%	
Peak Hour Operations	15	15	16	17	0.6%	0.7%	0.8%	
Based Aircraft								
Single Engine (Nonjet)	102	105	106	110	0.6%	0.4%	0.5%	
Multi Engine (Nonjet)	3	3	4	4	2.6%	2.9%	1.8%	
Turbo-Prop	0	0	1	1	N/A	N/A	N/A	
Jet Engine	0	0	0	0	N/A	N/A	N/A	
Helicopter	5	5	6	6	0.7%	1.8%	1.1%	
Other	8	9	9	10	2.4%	1.2%	1.2%	
TOTAL	118	123	126	130	0.8%	0.7%	0.7%	

B. Operational Factors

	<u>Base Yr. Level</u>	<u>Base Yr.+5yrs.</u>	<u>Base Yr.+10yrs.</u>	<u>Base Yr.+15yrs.</u>
GA operations per based aircraft	211	209	213	215

(1) Table is developed from Appendix B in the FAA Report, "Forecasting Aviation Activity By Airport."

Source: Kimley-Horn & Associates, October 2018