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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

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 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 are 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 is capable of operating 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 increasing 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 to replace older/existing technology to manage the 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 all levels. 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 needs to 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 aircraft activity. Other trends, such as increasing electric aircraft motors, and continued popularity of light sport aircraft present potential future opportunities for growth at the Airport.

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
•Historical significance •Convenient location •GA airport focus without ATCT, military activity, or commercial service •Competitive hangar rents	•Runway length •Aging infrastructure •No full-service FBO •No precision instrument approach •Security issues	•Educational opportunities with local trade schools and community colleges •New aviation industries •Developable land •Flexibility to adjust rates and fees to attract regional aircraft	•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 to 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 are likely responsible for 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 could adjust rates and fees to attract additional aircraft owners in the region if demand exists for GA activity that can operate at FCH.

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 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 Fresno Chandler Executive, 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 the 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 are 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 to establish a baseline for 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, fixed base operators (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 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 indicates there were 127 based aircraft in 2017, which is the base year for forecasts presented in this Chapter. Likewise, the latest FAA

Form 5010-1, *Airport Master Record,* shows 118 based aircraft reported, including five helicopters and eight ultra-lights, as reported in May 2017. The discrepancies between sources may be due to the nature of how and when the numbers are 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. It was assumed that de-registered aircraft would be repaired and re-registered at some point in the 20-year planning horizon as they are in various states of being repaired. Additionally, though several aircraft that were counted in the inventory were registered at other regional airports or registered out-of-state, they rent tie-downs and hangars at the Airport, and are anticipated to continue to be based at FCH on a permanent or semi-permanent basis.

Given that 140 aircraft are utilizing available storage spaces (either tie-downs or hangars) and that new aircraft that decide to base at the Airport will require additional storage facilities beyond what is occupied now, 140 is used as the 2017 baseline for forecasting purposes. This is critical to ensure spatial requirements for long-term apron and aircraft storage facilities are planned for the new aircraft anticipated to base at FCH. Table 4-2 presents based aircraft by type for 2017 based on the on-site inventory.

Table 4-2 – Based Aircraft at FCH 2017

	Based Aircraft at FCH 2017	Percent of Total Fleet
Single Engine:	123	87.9%
Multi Engine:	2	1.4%
Turboprop:	2	1.4%
Jet:	0	0.0%
Helicopters:	5	3.6%
Light Sport/Experimental:	8	5.7%
TOTAL:	140	100%

Source: 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 was based on analysis of existing activity and identification of trends that will most likely impact activity in the future. This analysis required data collected from various resources including Airport records, FAA databases, Woods and Poole Inc., U.S. Census, and previous Airport planning documents.
In addition, data and qualitative information were obtained from 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 particular 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 all 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 are 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 is 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 assume 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 – Based Aircraft Forecasts – Socioeconomic

	Fresno-Madera CSA			6-County Region			California		
Year	Population	Employment	PCPI ($2016)	Population	Employment	PCPI ($2016)	Population	Employment	PCPI ($2016)
2017	140	140	140	140	140	140	140	140	140
2022	149	151	150	148	150	150	147	151	150
2027	158	162	160	156	160	160	154	162	160
2037	177	182	175	173	179	175	168	183	179
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 168 to 183 by 2037 depending on the geographic area that are considered. This range reflects compound annual growth rates of 0.92 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 includes the following: 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). This data is shown in Table 4-5.

Table 4-5 – 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	127	19	11	12	193	35	0	140	50	16	44	150	797	15.9%

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 17.6 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 145 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) modest, 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 161 ased aircraft in 2037 and a 0.69 CAGR.

Table 4-6 – 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	140	17.6%	140	17.6%	140	17.6%
2022	804	141	17.6%	145	18.0%	148	18.5%
2027	810	142	17.6%	150	18.5%	157	19.4%
2037	824	145	17.6%	161	19.5%	177	21.4%
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 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 4-7. Based on current national general aviation trends – as described in Section 4.1.1 and in the *2018-2038 FAA Aerospace Forecast* – and current conditions at the Airport such as constraints on ultimate runway length, the following assumptions were used to project the future based aircraft fleet mix:

- Single-engine piston aircraft will decline from 87.9 percent of total based aircraft at the Airport in 2017 to 83.0 percent by 2037. 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 each increase from 1.4 percent of based aircraft in 2017 to 2.0 percent by 2037. While this is a modest increase, the Airport's runway length (existing and future) will likely limit the number of multi-engine piston and turboprop aircraft that are based at FCH as they typically require greater takeoff and landing distances compared with single-engine piston aircraft.
- It is not expected that jet aircraft will be based at the Airport due to the limited runway length required for those types of aircraft.
- Helicopters are anticipated to increase from 3.6 percent of the total based aircraft fleet in 2017 to 5.0 percent in 2037. 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 from 5.7 percent of total based aircraft in 2017, to 8.0 percent in 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 2038.

Based on the assumptions listed above, Table 4-7 describes the projected based aircraft fleet mix over the planning horizon at the Airport.

Table 4-7 – Based Aircraft Fleet Mix Forecast

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%	6	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%	145	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. For purposes of this Airport Master Plan Update, a more deliberate methodology is used to estimate base year aircraft operations.

Aircraft operations can be determined by using an operations per based aircraft (OPBA) methodology. Airport Cooperative Research Program (ACRP) Report 129, *Evaluating Methods for Counting Aircraft Operations at Non-Towered Airports* recommends utilizing 350 OPBA for busier GA airports with moderate itinerant traffic, and 450 OPBA for busy reliever airports (Johnson and Muia 2015). However, based on conversations with Airport Management and tenants, these recommended estimates exceeded what is considered the likely current activity levels at FCH.

The 2009 ALP Narrative Report cited 48,000 operations in 2007 based on samples obtained from acoustical counters (Coffman Associates, Inc. 2009). The document also reported 247 based aircraft at the Airport, which translated to 194 OPBA. Because this ratio was developed using actual data recorded at the Airport, it is considered the most reliable OPBA estimate available, and valid for the purposes of this Airport Master Plan Update. As such, estimates of aircraft operations were developed by applying 194 OPBA to the documented 140 based aircraft identified by Airport Management, resulting in 27,160 operations in base year 2017. This number will be used as the base year estimate as it applies to various aircraft operations forecast methodologies presented in this Chapter. The 27,160 operations are approximately 9 percent higher than the 24,855 estimated 2017 aircraft operations reported in the FAA TAF issued January 2018. The FAA TAF also identified that all

aircraft operations at the Airport were classified as either local or itinerant GA (no commercial or military activity).

4.6.1 Aircraft Operations Forecast Methodologies

Aircraft operations forecasts were developed using several methodologies including socioeconomic, regional market share, local market share, 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 methodology. The socioeconomic forecasts for aircraft operations were developed using a socioeconomic regression approach that utilized population, employment and PCPI data for Fresno CSA, the 6 surrounding counties, and State of California. Socioeconomic data was shown previously in Table 4-3. Results of the socioeconomic forecast for aircraft operations are found in Table 4-8. As noted previously, PCPI data are reported in constant dollars ($2016) to adjust for inflation over time.

Table 4-8 – Aircraft Operations Forecasts – Socioeconomic

	Fresno-Madera CSA			6 County Region			California		
Year	Population	Employment	PCPI ($2016)	Population	Employment	PCPI ($2016)	Population	Employment	PCPI ($2016)
2017	27,160	27,160	27,160	27,160	27,160	27,160	27,160	27,160	27,160
2022	28,880	29,270	29,100	28,730	29,140	29,110	28,520	29,290	29,040
2027	30,680	31,350	30,990	30,360	31,060	30,990	29,920	31,400	30,960
2037	34,290	35,350	33,950	33,590	34,760	33,930	32,620	35,510	34,690
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 to 1.35 percent over the planning horizon which translates to between 32,620 and 35,510 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 4-9). Three regional market share forecasts were developed for aircraft operations.

Table 4-9 – FCH Regional Market Share of Aircraft Operations

Year	FCH	2O6	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	27,160	6,700	12,000	10,000	48,802	28,500	4,030	50,150	33,000	12,000	26,180	25,000	281,247	9.7%

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

In 2017, FCH accounted for 9.7 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 27,160 in 2017 to 26,940 in 2037 representing a CAGR of -0.04 percent. This decline is attributed to the FAA TAF, which projects 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 9.7 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 40,330 operations in 2037 (growing to 14.5% market share), representing a CAGR of 2.0 percent.

The Medium-Growth Scenario was developed by averaging the product of the high and low-growth scenarios, which resulted in an increase from 27,160 operations in 2017, to 33,630 operations in 2037 representing a CAGR of 0.93 percent. All aircraft operations forecasts based on regional market share methodology are shown in Table 4-10.

Table 4-10 – 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	27,160	9.7%	27,160	9.7%	27,160	9.7%
2022	277,320	26,780	9.7%	28,450	10.3%	30,110	10.9%
2027	277,850	26,830	9.7%	30,170	10.9%	33,500	12.1%
2037	278,930	26,940	9.7%	33,630	12.1%	40,330	14.5%
CAGR 2017-2037	-0.04%	-0.04%	N/A	1.07%	N/A	2.00%	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, the FAA reports aviation trends and forecasts in its annual Aerospace Forecast. The 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 1.1 percent through 2037.
- Multi-engine piston operations will decrease at an annual rate of 0.3 percent through 2037.
- Turboprop operations will increase at an annual rate of 1.8 percent through 2037.
- Helicopter operations will increase at an annual rate of 2.2 percent through 2037.
- "Other" operations, which include light-sport and experimental activity will increase at an annual rate of 2.6 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 4-7 to the

base year estimate of aircraft operations described in Section 4.6. Results of these forecasts are shown in Table 4-11. It should be noted that although these annual growth rates differ slightly from those described for the based aircraft fleet mix presented in Section 4.5.3, this is to account for itinerant operations, which comprise approximately 25 percent of all activity at FCH. It was assumed that when itinerant activity was accounted for, operational growth rates would mimic national trends. As shown, this methodology projects a decrease in operations from 27,160 in 2017 to 24,140 by 2037, which reflects an annual growth rate of -0.59 percent.

Table 4-11 – Aircraft Operations Forecast – FAA Aerospace Fleet Mix

Year	Single-Engine Piston	Multi-Engine Piston	Turboprop	Helicopter	Other/ Experimental	Total
2017	23,860	390	390	970	1,550	27,160
2022	22,580	380	420	1,080	1,770	26,230
2027	21,360	380	460	1,210	2,010	25,420
2037	19,130	370	550	1,500	2,590	24,140
AAGR 2017-2037	-1.10%	-0.30%	1.80%	2.20%	2.60%	-0.59%

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

4.6.1.4 Aircraft Operations Forecast – Operations per Based Aircraft

As noted, the OPBA estimate utilized in this Airport Master Plan Update was based on an actual based aircraft count and acoustical counter samples of operations. As such, it is the most reasonable and reliable source of historical data available. 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 4-12.

Table 4-12 – Aircraft Operations Forecast – Operations per Based Aircraft

Year	OPBA	Preferred Methodology - Based Aircraft	Total Operations
2017	194	140	27,160
2022	194	145	28,100
2027	194	150	29,050
2037	194	161	31,170
CAGR 2017-2037	N/A	0.69%	

Source: Kimley-Horn & Associates, October 2018

As shown, this methodology forecasted an increase in operations from 27,160 in 2017 to 31,170 in 2037, representing a CAGR of 0.69 percent.

4.6.2 Preferred Forecast

Previous planning efforts established a reliable estimate of operations based on an OPBA derived from a physical based aircraft inventory and acoustical counters described in the previous ALP Narrative (Coffman Associates 2009, 18). This OPBA figure was applied to the 2017 count of based aircraft conducted for this study to estimate base year operations for this Airport Master Plan Update. Since the majority of operational activity at the Airport is local, a trend that is anticipated to continue throughout the planning period, it is anticipated that future activity at the Airport will be tied closely with the number of based aircraft at the Airport. Consequently, the OPBA methodology is recommended as the preferred aircraft operations forecast for long-term planning.

4.6.2.1 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.

Between 2008 and 2017, the Airport averaged approximately 75 percent local operations and 25 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 75/25 split of local and itinerant traffic will remain consistent throughout the forecasting period. Local and itinerant operations forecasts are presented in Table 4-13.

Table 4-13 – Forecast of Local/Itinerant Operations

Year	Total Operations	Local Operations	Itinerant Operations	Percent Local/Itinerant	
				Local	Itinerant
2017	27,160	20,370	6,790	75%	25%
2022	28,100	21,080	7,020	75%	25%
2027	29,050	21,790	7,260	75%	25%
2037	31,170	23,380	7,790	75%	25%

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

4.6.2.2 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 (refer to Table 4-14).

Table 4-14 – Forecast of Daytime/Evening Operations

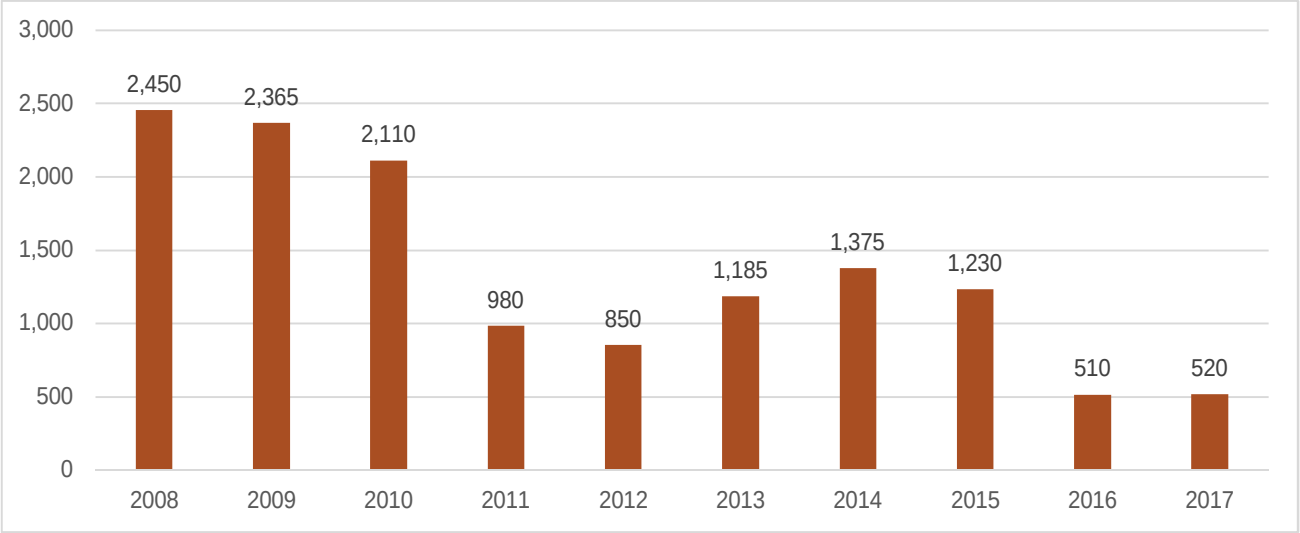
Year	Total Operations	Daytime Operations	Evening Operations	Percent Daytime/Evening Split	
				Daytime	Evening
2017	27,160	26,340	820	97%	3%
2022	28,100	27,260	840	97%	3%
2027	29,050	28,180	870	97%	3%
2037	31,170	30,230	940	97%	3%

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

4.6.2.3 Forecast of Annual Instrument Approaches

Because the Airport does not have a functioning 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 Rules (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 instrument operations. It is assumed that instrument approaches account for half of instrument operations. Table 4-15 presents forecasted annual instrument approaches.

Table 4-15 – Forecast of Annual Instrument Approaches

Year	Total Operations	IFR Operations	Annual Instrument Approaches	VFR Operations	Percent IFR/VFR Split	
					IFR	VFR
2017	27,160	520	260	26,640	5.4%	94.6%
2022	28,100	1,510	755	26,590	5.4%	94.6%
2027	29,050	1,570	785	27,480	5.4%	94.6%
2037	31,170	1,680	840	29,490	5.4%	94.6%

Source: Kimley-Horn & Associates, October 2018

4.6.2.4 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 identified 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 4-16). 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 4-16 – Forecast of Touch-and-Go Operations

Year	Total Operations	% Touch and Go	Touch-and-Go Operations
2017	27,160	65%	17,650
2022	28,100	65%	18,260
2027	29,050	65%	18,880
2037	31,170	65%	20,260

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

4.7 Peak Activity Forecasts

The capacity of an airport relates to the activity levels during a peak (or design) period. The aviation demand 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. Considering 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 are held constant throughout the 20-year planning horizon (shown in Table 4-17).

Table 4-17 – Peak Activity Forecasts

Year	Total Operations	Peak Month Operations	Peak Month Average Day	Peak Hour
2017	27,160	3,260	109	16
2022	28,100	3,370	112	17
2027	29,050	3,490	116	17
2037	31,170	3,740	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 the 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 the runway length and exit taxiway locations; the AAC is depicted as a letter. Approach categories, corresponding approach speed thresholds, and example aircraft are depicted in Table 4-18.

Table 4-18 – 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 groups, corresponding aircraft tail height and wingspan thresholds, and example aircraft are depicted in Table 4-19.

Table 4-19 – 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 become the Airport Reference Code (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 turbo-props 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 an operational ATCT 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. During 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, and PAC members concluded that A-I (Small) was an appropriate existing ARC designation.

In addition to the TFMSC data, based aircraft were also examined. The most common aircraft type based at the Airport in 2017 was the Piper PA-28 Cherokee. In 2017, there were 15 Piper PA-28 Cherokee aircraft at the Airport, which have wingspans of 30.0 feet and approach speeds of 62 knots. Based on both the review of TFMSC data and based aircraft, the existing critical aircraft was determined to be the Piper PA-28 Cherokee, which has an ARC of A-I (Small).

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 ARC or critical aircraft will merit a change during the 20-year planning horizon. 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 regional jet and turboprop operations 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 anticipated that the Airport's future ARC will remain A-I (Small) represented by the Piper PA-28 Cherokee as the design aircraft.

4.9 Forecast Summary

Table 4-20 presents the preferred forecast for based aircraft and aircraft operations at FCH. As noted, aircraft operations are anticipated to increase commensurate with based aircraft, which has been a consistent theme historically at FCH. While activity declined locally following the 2008 economic recession, it has steadily 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 4-20 – Forecast Summary

Year	Total Based Aircraft	Total Operations
2017	140	27,160
2022	145	28,100
2027	150	29,050
2037	161	31,170

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 forecasts and the TAF are presented in Table 4-21 and Table 4-22. As shown, forecasts of based aircraft and total aircraft operations are not consistent with the TAF. However, the forecasts are still reviewable at the ADO level – as the 200-based aircraft and 200,000 annual aircraft operations thresholds were not exceeded, nor are the forecasts anticipated to recommend development that would require an EIS or a BCA.

Table 4-21 – FAA Template for Comparing Airport Planning and TAF Forecasts

Template for Comparing Airport Planning and TAF Forecasts (1)

Based Aircraft	Year	FCH Forecast	TAF	FCH/TAF % Difference
Base yr.	2017	140	127	10.2%
Base yr. + 5yrs.	2022	145	127	14.0%
Base yr. + 10yrs.	2027	150	127	17.9%
Base yr. + 15yrs.	2032	155	127	22.1%
Itinerant GA Operations				
Base yr.	2017	6,790	6,930	-2.0%
Base yr. + 5yrs.	2022	7,020	6,930	1.3%
Base yr. + 10yrs.	2027	7,260	6,930	4.8%
Base yr. + 15yrs.	2032	7,520	6,930	8.5%
Local GA Operations				
Base yr.	2017	20,370	17,955	13.5%
Base yr. + 5yrs.	2022	21,080	17,955	17.4%
Base yr. + 10yrs.	2027	21,790	17,955	21.4%
Base yr. + 15yrs.	2032	22,560	17,955	25.6%
Total GA Operations				
Base yr.	2017	27,160	24,885	9.1%
Base yr. + 5yrs.	2022	28,100	24,885	12.9%
Base yr. + 10yrs.	2027	29,050	24,885	16.7%
Base yr. + 15yrs.	2032	30,080	24,885	20.9%

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 4-22 – FAA Template for Summarizing and Documenting Airport Planning Forecasts

Appendix B
Template for Summarizing and Documenting Airport Planning Forecasts (1)

A. Forecast Levels and Growth Rates

Airport Name: Fresno Chandler Airport (FCH) Specify base year: 2017

	2017	2022	2027	2032	Average Annual Compound Growth Rates		
	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.	Base Yr. to +5	Base Yr. to +10	Base Yr. to +15
Operations							
Itinerant							
General aviation	6,790	7,020	7,260	7,520	0.7%	0.7%	0.7%
Local							
General aviation	20,370	21,080	21,790	22,560	0.7%	0.7%	0.7%
TOTAL OPERATIONS	27,160	28,100	29,050	30,080	0.7%	0.7%	0.7%
Instrument Operations	520	1,510	1,570	1,620	23.8%	11.7%	7.9%
Peak Hour Operations	16	17	17	18	0.7%	0.7%	0.7%
Based Aircraft							
Single Engine (Nonjet)	123	125	128	131	0.4%	0.4%	0.4%
Multi Engine (Nonjet)	2	2	3	3	2.6%	4.1%	2.5%
Turbo-Prop	2	2	3	3	2.6%	2.5%	2.5%
Jet Engine	0	0	0	0	N/A	N/A	N/A
Helicopter	5	6	6	7	3.7%	2.4%	2.4%
Other	8	9	10	11	2.4%	2.4%	2.4%
TOTAL	140	145	150	155	0.7%	0.7%	0.7%

B. Operational Factors

	Base Yr. Level	Base Yr.+5yrs.	Base Yr.+10yrs.	Base Yr.+15yrs.
GA operations per based aircraft	194	194	194	194

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

Source: Kimley-Horn & Associates, October 2018