Chapter 3 – Aviation Activity Forecasts

The overall goal of aviation activity forecasting is to provide reasonable projections of future activity that can be translated into specific airport facility needs anticipated during the next twenty years and beyond.

Overview and Purpose

This chapter provides updated aviation activity forecasts for Hermiston Municipal Airport (HRI) for the twenty-year master plan horizon (2017-2037). The most recent Federal Aviation Administration (FAA) approved aviation activity forecasts for HRI were developed for the 1995-2015 planning period in the 2001 Airport Layout Plan update.

The forecasts presented in this chapter are consistent with the current and historic role of HRI as a community general aviation airport, capable of accommodating a wide range of activity, including agricultural aircraft, business class turboprops and jets. It is recognized that the limited number of public use airports in northeastern Oregon often result in service areas that extend well beyond the local communities.

The forecasts of activity are unconstrained and assume the City of Hermiston will be able to make the facility improvements necessary to accommodate the anticipated demand, unless specifically noted. The City of Hermiston will consider if any unconstrained demand will not or cannot be reasonably met through the evaluation of airport development alternatives later in the master plan.

FAA FORECASTING PROCESS

The FAA provides aviation activity forecasting guidance for airport master planning projects. FAA Advisory Circular (AC) 150/5070-6B, Airport Master Plans, outlines seven standard steps involved in the forecast process:

1) **Identify Aviation Activity Measures**: The level and type of aviation activities likely to impact facility needs. For general aviation, this typically includes based aircraft and operations.
2) **Previous Airport Forecasts**: May include the FAA Terminal Area Forecast (TAF), state or regional system plans, and previous master plans.
3) **Gather Data**: Determine what data are required to prepare the forecasts, identify data sources, and collect historical and forecast data.
4) **Select Forecast Methods**: There are several appropriate methodologies and techniques available, including regression analysis, trend analysis, market share or ratio analysis, exponential smoothing, econometric modeling, comparison with other airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgment.
5) **Apply Forecast Methods and Evaluate Results**: Prepare the actual forecasts and evaluate for reasonableness.
6) **Summarize and Document Results**: Provide supporting text and tables as necessary.
7) **Compare Forecast Results with FAA's TAF**: Follow guidance in FAA Order 5090.3C, Field Formulation of the National Plan of Integrated Airport Systems. In part, the Order indicates that forecasts should not vary significantly (more than 10 percent) from the TAF. When there is a greater than 10 percent variance, supporting documentation should be supplied to the FAA. The aviation demand forecasts are then submitted to the FAA for their approval.

KEY ACTIVITY ELEMENTS

As noted above, general aviation airport activity forecasting focuses on two key activity segments: **based aircraft** and **aircraft operations** (takeoffs & landings). Detailed breakdowns of these activity segments include:

- Aircraft fleet mix;
- Peak activity;
- Distribution of local and itinerant operations; and
- Determination of the critical aircraft (also referred to as the design aircraft).

The critical aircraft represents the most demanding aircraft type or family of aircraft that uses an airport on a regular basis (a minimum of 500 annual takeoffs & landings). The critical aircraft is used to establish a variety of FAA design categories, which then establish design standards for airfield facilities. FAA airport design standard groupings reflect the physical requirements of specific aircraft types and sizes. Design items, such as runway length evaluations, are determined by the requirements of current/future critical aircraft. The activity forecasts also support the evaluation of several demand-based facility requirements including runway and taxiway capacity, aircraft parking, and hangar capacity.

Airport Service Area

An airport service area refers to the geographic area surrounding an airport that has the greatest influence on its activity. The population and economic conditions, and the number and type of airports within a service area can directly influence individual airport activity. For general aviation airports, a 30- or 60-minute surface travel time is often used to approximate the boundaries of its service area.

A significant portion of general aviation airport activity is normally generated by aircraft that are owned and operated by individuals, businesses, or government agencies located within its service area. Other activity is generated by transient aircraft that chose to operate at the airport, instead of a nearby competing airport. Transient aircraft activity includes both enroute and origin-destination travel. In many cases, the airport itself is the destination, when the purpose of flight is to access FBO and related services, fuel, an airport restaurant, or specific flight training needs.

Convenience, choice, and cost are three primary considerations that every airport user weighs when making their consumer choice. Surface travel time to or from an airport is a primary measure of convenience, although facility capabilities, available services, and user costs may outweigh convenience for many users.

Figure 3-1 illustrates the approximate service area boundaries for HRI. **Table 3-1** lists the public use airports within a thirty-five-nautical mile (air miles) radius of HRI, which incorporates the majority of the defined service area for HRI.

Service areas for commercial airports often extend well beyond a one-hour drive time due to the relatively small number of airports with scheduled airline service. Hermiston is located within overlapping service areas for several commercial airports: Eastern Oregon Regional Airport, Walla Walla Regional Airport, Tri-Cities (Pasco) Airport, and Portland International Airport.

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AIRPORT SERVICE AREA
FIGURE 3-1

HERMISTON MUNICIPAL AIRPORT
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

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TABLE 3-1: PUBLIC USE AIRPORTS IN VICINITY OF HRI
(WITHIN 35 NAUTICAL MILES)

Airport	Location	Runway Length(s) (Feet)	Surface	Lighted Runway	Fuel Available
Boardman Airport (M50)	24 NM W	4,200	Asphalt	Yes	None
Eastern Oregon Regional Airport (PDT)	19NM SE	6,301 5,582	Asphalt	Yes	100LL, Jet-A
Tri-Cities Airport (PSC)	27NM N	7,711	Asphalt	Yes	100LL, Jet-A
Richland Airport (RLD)	29NM N	4,009	Asphalt	Yes	100LL, Jet-A
Lexington Airport (9S9)	29NM SW	4,156	Asphalt	Yes	100LL
Prosser Airport (S40)	32 NM NW	3,451	Asphalt	Yes	100LL

Economic Conditions and Population

AREA ECONOMY

Historically, downturns in general aviation activity often occur during periods of weak economic conditions while growth typically coincides with favorable economic conditions. The recent economic recession and the slow recovery that followed, has constrained general aviation activity locally, statewide, and throughout the national airport system. However, the FAA's national long-term aviation forecasts[1] reflect overall strength in both the U.S. and regional economies. This forecast economic strength is expected to sustain modest growth in aviation activity over the long-term.

The economy of the City of Hermiston and Umatilla County have historically been led by agriculture, manufacturing, government, healthcare and social assistance, wholesaling, and retailing. Financial & business services and construction have also expanded as the region has grown.[2]

EMPLOYMENT

Oregon Employment Department data indicates total employment for Umatilla County in 2015 was 32,450, up 1.71 percent from 2014. In 2016 the average income among all industry segments in Umatilla County was $37,457, below Oregon's statewide average of $49,467. The leading employment sectors and average annual wages for Umatilla County are summarized in **Table 3-2** and **Table 3-3**.

[1] FAA Aerospace Forecast (Fiscal Years 2016-2036)
[2] City of Hermiston Economic Opportunities Analysis (May 2011).

TABLE 3-2: TOP FIVE EMPLOYMENT SECTORS IN UMATILLA COUNTY (2016)

UMATILLA COUNTY		
Sector	**Total Employment by Sector**	**% of Total Employment**
1. Government	7,440	26.6%
2. Trade, Transportation, and Utilities	6,940	24,8%
3. Manufacturing	3,480	12.5%
4. Education and Health Services	3,350	12.0%
5. Retail Trade	3,200	11.5%
All other industries	3,490	12.5%
Total Employment	27,900	100%
Source: State of Oregon Employment Department, Umatilla County 2016		

TABLE 3-3: LEADING EMPLOYMENT SECTORS AND WAGES IN UMATILLA COUNTY (2016)

Sector	Umatilla County Annual Average Wage	Oregon Annual Average Wage
1. Government	$45,881	$52,766
2. Trade, Transportation, and Utilities	$38,041	$41,405
3. Manufacturing	$36,595	$67,493
4. Education and Health Services	$41,978	$49,269
5. Retail Trade	$26,468	$29,678
Source: State of Oregon Employment Department, Umatilla County and State of Oregon 2016		

Employment Forecasts

The 2011 City of Hermiston Comprehensive Plan includes a 2010-2030 baseline employment forecast for Hermiston. The Baseline Forecast projects employment within the city to grow by 18.5 percent over the twenty-year period, which results in annual average growth of 0.85 percent. The anticipated growth in employment is slightly slower than forecast population.

2,087 additional jobs are anticipated in Hermiston by 2030. The composition of local employment includes several industries that currently contribute to activity at HRI. These include natural resources; wholesale trade; manufacturing; construction; transportation, warehousing, and utilities; and education & health. Forecast employment growth in the community and region represents a positive factor affecting future activity at HRI.

POPULATION

The population within an airport's service area, in broad terms, affects the type and scale of aviation facilities and services that can be supported. Although a large number of airport-specific factors can affect activities at an airport, changes in population often reflect other broader economic conditions that may also affect airport activity. For HRI, majority of airport activity is related to the population of Umatilla County and the City of Hermiston.

Historic Population

Certified estimates of population for Oregon counties and incorporated cities are developed annually by the Population Research Center at Portland State University (PRC-PSU). The annual PRC-PSU estimates, coupled with U.S. Census conducted every ten years, provide an indication of local area population trends over an extended period.[3] The 2017 PRC-PSU certified population estimate for the City of Hermiston was 17,985 and Umatilla County was 80,500.

The City of Hermiston and Umatilla County's population has steadily increased since the most recent (2010) Census. During this period, Hermiston has outpaced county wide growth, and local population growth trailed Oregon's overall growth rate. Recent historic population data and average growth rates for the City of Hermiston, Umatilla County, and Oregon are summarized in **Table 3-4**.

TABLE 3-4: HISTORIC POPULATION DATA

Year	Umatilla County	City of Hermiston (Incorporated Area)	City Share (%) of Umatilla County	Oregon
1990[1]	59,249	10,047	16.9%	2,842,321
2000[1]	70,548	13,260	18.8%	3,421,399
2010[1]	75,889	16,745	22.1%	3,831,074
2017[2]	80,500	17,985	22.3%	4,141,100
Average Annual Rates (AAR) of Growth (%)				
Year	**Umatilla County**	**City of Hermiston (Incorporated Area)**		**Oregon**
1990-2000	1.76%	2.81%		1.87%
2000-2010	0.73%	2.36%		1.14%
2000-2017	0.78%	1.81%		1.13%
2010-2017	0.85%	1.03%		1.11%

Sources:
1. U.S. Census Data (April 1)
2. Portland State University, Certified Population Estimate (July 1, 2017)

[3] Portland State University Population Research Center (July 1, 2017); Estimates 1990, 2000, 2010 U.S. Census

POPULATION FORECASTS

Population Research Center – Portland State University

The Oregon legislature recently assigned development of coordinated population forecasts for Oregon counties and cities to the Population Research Center at Portland State University (PRC-PSU). Previously, long-term population forecasts were prepared by the Oregon Office of Economic Analysis (OEA) to support local and statewide planning. The first PRC forecast for Umatilla County was published in June 2016.[4]

The current PRC forecast provides a fifty-year projection (2066), with one intermediate projection (2035). The 2035 projection approximates the end of the current airport master plan planning period (2017-2037) and provides relevant information about future population expectations for Hermiston and Umatilla County. The PRC forecast projects modest, sustained population growth for Hermiston and Umatilla County through 2066. Population forecasts for Umatilla County and the City of Hermiston are summarized below and in **Table 3-5**.

City of Hermiston

Hermiston's population is projected to increase from 21,488 in 2016 to 41,104 in 2066. The forecast reflects a near doubling of population over the next fifty years, with an average annual growth rate of 1.31 percent. A slightly higher growth (1.53% AAR) is anticipated early in the forecast period (between 2016 and 2035).

Umatilla County

Umatilla County's population is projected to increase from 81,438 in 2016 to 118,308 in 2066. The forecast reflects an average annual growth rate of 0.75 percent over the fifty-year period. As with the Hermiston forecast, a slightly higher growth (0.80% AAR) is anticipated between 2016 and 2035.

TABLE 3-5: FORECAST POPULATION

Year	Umatilla County	City of Hermiston (Incorporated Area)	City Share (%) of Umatilla County
2016	81,438	21,488	26.4%
2035	94,765	28,667	30.3%
2066	118,308	41,104	34.7%
Annual Average Growth Rate (AAR %)			
2016-2035	0.80%	1.53%	--
2016-2066	0.75%	1.31%	--

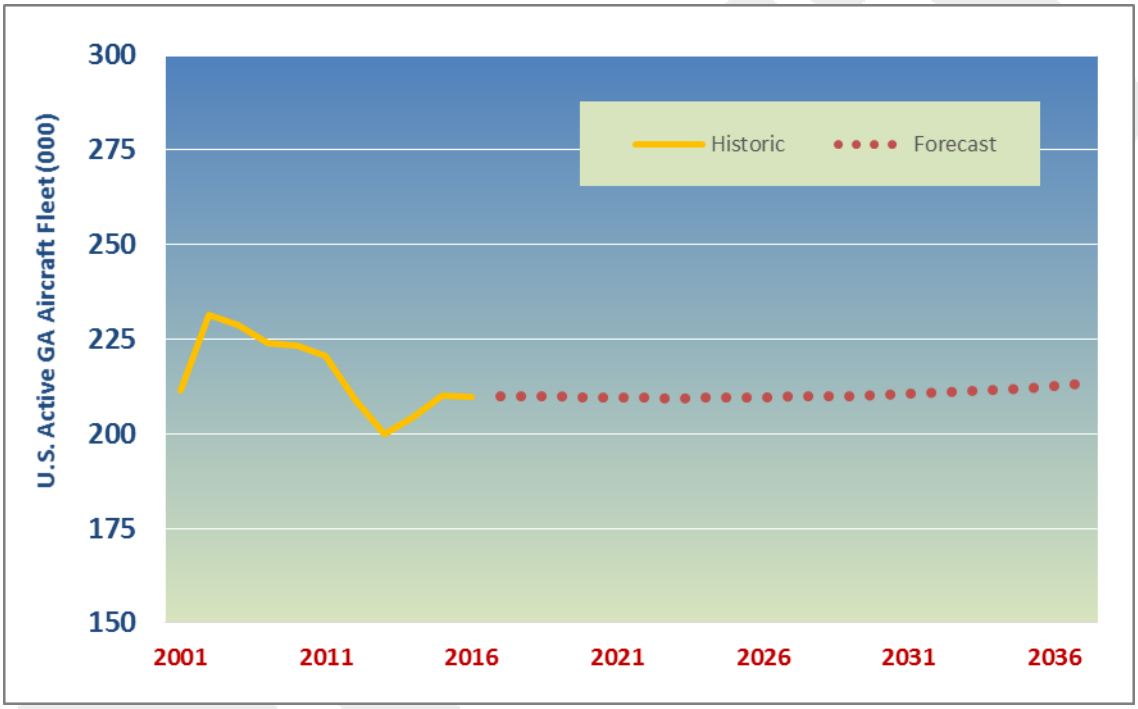
[4] Coordinated Population Forecast for Umatilla County, its Urban Growth Boundaries (UGB), and Area of outside UGBs 2016-2066, Population Research Center Portland State University, June 30, 2016.

National General Aviation Activity Trends

The early years of the 21st Century have presented numerous challenges for general aviation (GA). On a national level, most measures of GA activity declined sharply during "The Great Recession" and have only modestly improved in recent years.

As depicted in **Figure 3-2**, the active U.S. GA fleet has fluctuated within a slight overall decline since 2001. This trend coincides with other GA industry trends including annual aviation fuel consumption, hours flown, IFR enroute air traffic, operations at towered airports, active pilots, etc.

FIGURE 3-2: US ACTIVE GENERAL AVIATION FLEET



The FAA performs an annual assessment of U.S. civil aviation through its FAA Aerospace Forecast.[5] The twenty-year forecasts are updated annually by evaluating recent events and established trends affecting a wide range of commercial and general aviation segments. Broad economic conditions and current forecasts are examined in order to provide reasonable expectations for aviation within the broader U.S. and global economy. The FAA forecasts examine in detail several key aviation industry indicators including fuel prices, production and supply; aircraft manufacturing trends; aircraft ownership trends; fleet and pilot attrition; flight training trends; advances in fuel, engine, avionics, and airspace technology (ADS-B

[5] FAA Aerospace Forecast Fiscal Years 2017-2037.

NextGen, etc.); and on-demand air travel. This array of factors is reflected in the FAA's overall assessment of future U.S. aviation activity.

The FAA currently predicts that the active GA aircraft fleet will grow at an average annual rate of approximately 0.1 percent between 2016 and 2037. Although the FAA maintains a modestly favorable long-term outlook for general aviation, many of the activity segments associated with piston engine aircraft and AVGAS consumption are not projected to return to "pre-recession" levels within the 20-year forecast. It should be noted however, that the FAA forecasts do include some bright spots for specific activity segments that are relevant to HRI. Key takeaways from the FAA 2017-2037 Aerospace Forecast Highlights are summarized below:

Positive

- Turbine aircraft (turboprop, turbojet, helicopter) fleet and hours flown will grow;
- Sport and Experimental aircraft fleet and hours flown will grow;
- Piston Rotorcraft fleet and hours flown will grow;
- Jet fuel consumption will grow;
- The number of Student, Sport, Airline Transport, Rotorcraft Only, and Instrument rated pilots will grow;
- GA enroute IFR air traffic will grow; and
- GA Operations at towered airports will grow.

Negative

- Fixed wing Piston aircraft fleet and hours flown will shrink;
- AVGAS consumption will shrink; and
- The number of Private and Commercial pilots will shrink.

Neutral

- Overall GA fleet will grow by less than 2% over the next 20 years.

The FAA's annual growth assumptions for individual general aviation activity segments are summarized in **Table 3-6.**

TABLE 3-6: FAA LONG RANGE FORECAST ASSUMPTIONS (U.S. GENERAL AVIATION)

Activity Component	Forecast Annual Average Growth Rate (2016-2037)
Aircraft in U.S. Fleet	
Single Engine Piston Aircraft in U.S. Fleet	-0.9%
Multi-Engine Piston Aircraft in U.S. Fleet	-0.5%
Turboprop Aircraft in U.S. Fleet	1.4%
Turbojet Aircraft in U.S. Fleet	2.3%
Experimental Aircraft in U.S. Fleet	1.0%
Sport Aircraft in U.S. Fleet	4.1%
Piston Helicopters in U.S. Fleet	1.3%
Turbine Helicopters in U.S. Fleet	1.8%
Active GA Fleet (# of Aircraft)	0.1%
Active Pilots in U.S.	
Private Pilots	-0.7%
Commercial Pilots	-0.6%
Airline Transport Pilots	0.5%
Instrument Rated Pilots	0.3%
Sport Pilots	4.1%
Student Pilots (Indicator of flight training activity)	0.4%
Active GA Pilots (All Ratings)	0.1%
Hours Flown in U.S.	
Piston AC	-0.8%
Turbine AC	2.5%
Experimental AC	2.0%
Sport AC	4.6%
Total GA Fleet Hours	0.9%
Fuel Consumption in U.S.	
AVGAS (Gallons consumed - GA only)	-0.4%
Jet Fuel (Gallons consumed – GA only)	1.9%

Source: FAA Long Range Aerospace Forecasts (FY 2017-2037)

Overview of Recent Local Events

AVIATION FUELING ACTIVITY

Historic fuel data often provides a general indication of airport activity. The Fixed Base Operator (FBO) at HRI provides self-service 100 low lead (100LL) aviation gasoline (AVGAS) and jet fuel (Jet-A) to locally based and transient aircraft. Private fueling facilities are also used by the local aerial applicators, although fueling activity is not reported to airport management.

A review of historic FBO fueling activity shows that both AVGAS and jet fuel volumes at HRI have fluctuated considerably over the last ten years. Overall, jet fuel activity at HRI has trended slightly upward, while AVGAS activity has trended slightly downward. The historic FBO fueling data for HRI are summarized in Table 3-7.

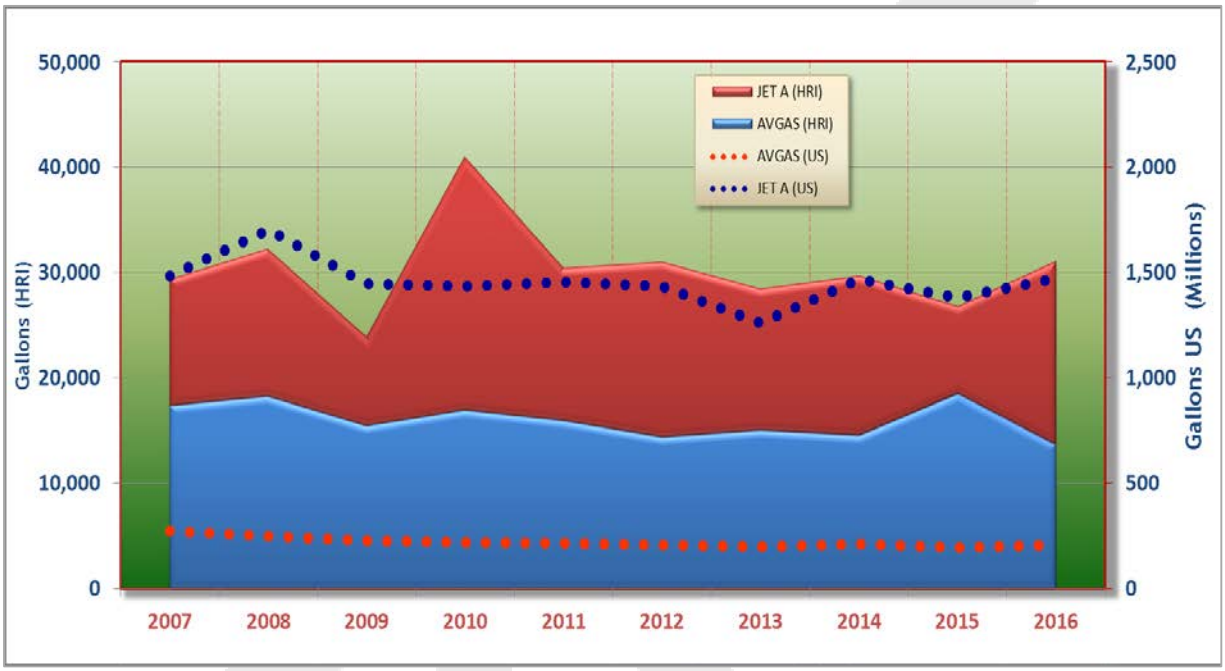
TABLE 3-7: HRI - AIRCRAFT FUELING ACTIVITY

Year	AVGAS 100LL (Gallons)	Net Change % Year to Year	Jet-A (Gallons)	Net Change % Year to Year
2007	17,325	--	12,118	--
2008	18,236	+5.3%	14,079	+16.2%
2009	15,406	-15.5%	8,535	-39.4%
2010	16,943	+10.0%	24,095	+182.3%
2011	15,961	-5.8%	14,554	-60.4%
2012	14,386	-9.9%	16,681	+14.6%
2013	15,053	+4.6%	13,454	-19.4%
2014	14,489	-3.8%	15,235	+13.2%
2015	18,512	+27.8%	8,334	-45.3%
2016	13,631	-26.4%	17,469	+109.6%
10-Year Average	15,994 *(2007-2016 Mean)*	*-1.37% (Average Annual Fluctuation)*	14,455 *(2007-2016 Mean)*	*+17.14% (Average Annual Fluctuation)*

A variety of local factors can contribute to year over year changes in fueling activity at an airport. Regional economic conditions, seasonal weather, changes in individual aircraft fueling practices, and airport-specific events such as airfield construction or maintenance projects can contribute to changes in annual fueling activity. As such, periodic fluctuations do not necessarily reflect a predictable trend, but may instead highlight unique market volatility or a traceable anomaly. It is also important to note that the FBO fueling data does not reflect activity generated by aircraft that do not purchase fuel through the FBO. At HRI, self-fueled local aerial applicators and scheduled air cargo flights represent a significant portion of aircraft operations that may not be reflected in the data.

On a national basis, general aviation fuel consumption declined significantly during the Great Recession and has yet to return to recent pre-recession levels. In contrast, fueling levels at HRI in recent years have periodically reached or exceeded pre-recession levels, and have also dipped below pre-recession levels. **Figure 3-3** depicts fueling data for HRI and the U.S. General Aviation between 2007 and 2016 (note: AVGAS volume as reported by FAA does not identify grade, although current AVGAS production is predominately 100-octane low lead – 100LL).

FIGURE 3-3: HISTORIC FUELING ACTIVITY (HRI & US)



HANGAR CONSTRUCTION

A review of current aerial photography and the Airport Layout Plan drawing (November 2000) indicates that three new conventional hangars have been constructed at HRI since the last plan was completed. Airport management reports that a new four-unit hangar proposal is currently being considered.

CHANGES IN BASED AIRCRAFT FLEET

The fall 2017 airport management count of 39 based aircraft is an increase of 4 aircraft above the 1998 based aircraft count of 35. During this period, HRI added one business jet and now accommodates six turbine aircraft.

AIR CARGO ACTIVITY

In 2015, HRI began accommodating scheduled air cargo flights by the UPS contract carrier Ameriflight. Ameriflight currently operates on a five day per week schedule, with two flights per day. Based on an average of 10 flights per week (20 operations), HRI accommodates approximately 1,040 scheduled cargo operations per year; actual numbers vary based on weather conditions and flights added during busy

periods. In 2017, Ameriflight operated three different multi-engine turboprop models (Swearingen Metro III/Expediter aircraft (SA-227), Beechcraft C-99 Airliner, and Beechcraft 1900) and one multi-engine piston aircraft (Piper PA-31 Navajo) at HRI.

INSTRUMENT FLIGHT ACTIVITY

The FAA tracks flight activity for aircraft operating under instrument flight rules (IFR) in the national airspace system using TFMSC. The TFMSC data captures all filed civil aircraft instrument flight plans by originating or destination airports. Military aircraft are not included in the FAA instrument flight plan data.

For non-towered airports such as HRI, TFMSC data currently provides the only FAA operational data specifically attributed to the airport. Although instrument flight plans account for only a small percentage of aircraft operations at most non-towered airports, they reliably capture the majority of activity generated by turbine business-class and cargo aircraft, which operate predominantly on IFR flight plans. At HRI, this data provides the best indication of turbine aircraft activity for the purposes of defining the design aircraft.

TFMSC data for HRI was obtained and analyzed for 2012-2017. The data are summarized in **Table 3-8** by the corresponding Airport Reference Code (ARC) for each aircraft. See **Figure 3-8**, on Page 34 for information of ARC categories and typical aircraft types.

A detailed breakdown of 2017 TFMSC data is presented in **Table 3-9**. The data provides an indication of business class aircraft activity at HRI that would be considered in the evaluation of critical aircraft. This includes turboprop activity generated by business users and the scheduled express/air cargo carrier (Ameriflight), and a variety of locally-based and transient business jets and turboprops.

Based on FAA Traffic Flow Management System Counts (TFMSC) instrument flight plan data, HRI had 844 Metro III/Expediter operations in 2017, which represented the largest portion of Ameriflight operations at HRI. The Metro III/Expediter is a large multi-engine turboprop included in Aircraft Approach Category B and Airplane Design Group II (ARC B-II) with a maximum gross takeoff weight of up to 16,500 pounds. This aircraft represents the most demanding aircraft at HRI with at least 500 annual operations.

TABLE 3-8: HRI INSTRUMENT ACTIVITY (2012-2017)

ARC	2012	2013	2014	2015	2016	2017
A-I	104	121	114	61	46	118
A-II	71	42	124	150	124	122
B-I	574	502	573	493	195	142
B-II	731	797	807	657	867	1,002
C-I	2	2	0	4	4	6
C-II	14	10	12	12	16	16
C-III	0	0	0	0	0	2
D-I	2	0	4	2	2	0
D-II	0	0	0	0	0	0
HELI	0	2	0	0	4	4
	1,498	1,476	1,634	1,379	1,258	1,412
Source: FAA TFMSC Data (normalized)						

TABLE 3-9: HRI INSTRUMENT ACTIVITY DETAIL (2017)

Aircraft Type	ARC	2017
Single Engine Piston	A-I	84
Multi-Engine Piston	B-I	38
Single Engine Turboprop	A-I	10
Single Engine Turboprop	A-II	128
Multi-Engine Turboprop	B-I	54
Multi-Engine Turboprop	B-II	946
Business Jet	B-I	68
Business Jet	B-II	56
Business Jet	C/D-I & II	22
Military	C-III	2
Helicopter	--	4
Total Aircraft Operations Related to Instrument Flight Plans		1,412

Existing Aviation Activity Forecasts

Updating aviation activity forecasts for the master plan requires an updated assessment of current conditions and a review of existing aviation activity forecasts. Several existing forecasts relevant to HRI are available for review, including the 2001 Airport Layout Plan Report, the 2007 Oregon Aviation Plan (OAP), and the 2017 FAA Terminal Area Forecast (TAF). **Table 3-10** summarizes the based aircraft and operations forecasts currently available for HRI. The 2001 ALP forecasts are not included in the summary since their last forecast year (2015) has passed.

TABLE 3-10: HRI BASED AIRCRAFT & GA OPERATIONS FORECAST SUMMARY

Forecast	2017	2022	2027	2032	2037	AAR
2017 FAA Terminal Area Forecast (TAF) **Operations**	25,062	26,113	27,167	28,257	29,395	0.80%[1]
2017 FAA Terminal Area Forecast (TAF) **Based Aircraft**	44	46	47	47	47	0.32%[1]
Operations Per Based Aircraft **(OPBA)**	570	567	578	601	625	--
2007 Oregon Aviation Plan **Operations**	16,609[i]	17,943[i]	18,960[e]	--	--	0.80%[2]
2007 Oregon Aviation Plan **Based Aircraft**	43[i]	45[i]	48[e]	--	--	0.81%[2]
Operations Per Based Aircraft **(OPBA)**	386	399	395	--	--	--

1. AAR: annual average rate of growth (2016-2037)
2. AAR: annual average rate of growth (2005-2025)
(i) Interpolation of original forecast to fit current forecast year
(e) Extrapolation of original forecast to fit current forecast year

Estimating annual operations is particularly challenging at non-towered airports. With few exceptions, annual aircraft operations data are estimates, and the associated forecasts are heavily dependent on the accuracy of the estimates. It is common practice for state aviation system plans, and some airport master plans to rely on the FAA TAF as the single definitive operations estimate for non-towered airports. However, a study of TAF operations data for individual airports often reveals significant data events that do not appear to relate to the airport itself and cannot be independently verified. The resulting uncertainty should be considered when gauging the reliability of any related forecasts.

It is important to note that aviation activity forecasts prepared prior to "The Great Recession," that began in Q4 of 2007, became largely obsolete due to the effects of the severe economic downturn. General aviation airports routinely saw sustained, double-digit declines in annual activity during the recession that was characterized by closed businesses, reduced fuel sales, loss of based aircraft, increased hangar vacancy

rates, lower aircraft utilization, and a dearth of new hangar construction. In general, the recovery of airport activity segments has been slower than their preceding declines. None of these conditions were anticipated in forecasts prepared prior to the recession, and as a result, pre-recession forecasts tend to significantly overestimate activity compared to actual events.

For this reason, it is recommended that a current estimate of based aircraft and aircraft operations be used as the basis for updated forecasts.

HERMISTON MUNICIPAL AIRPORT – AIRPORT LAYOUT PLAN REPORT (2001)

Assessment: The forecasts of based aircraft and aircraft operations provided reasonable projections of activity, although the forecasts have now passed their end point (2015). Although now outdated, the detail contained in the ALP forecasts provides a valuable reference in developing updated forecasts of aviation activity for HRI.

The Airport Layout Plan Report provides airport activity forecasts for a 1995-2015 planning period. The forecasts include based aircraft, based aircraft fleet mix, annual aircraft operations, activity peaking, and local/itinerant traffic distributions. The analysis of critical aircraft was developed in the facility requirements element of the master plan, using overall numbers contained in the forecast.

Based Aircraft

The forecast projected based aircraft at HRI would increase from 35 to 43 between 1998 and 2015, which translates into an annual average growth rate of **1.22 percent** over the period. As noted earlier, the fall 2017 based aircraft count for HRI was 39, which is within 10 percent of the 2015 forecast.

Annual Aircraft Operations

The aircraft operations forecast at HRI began with a base year (1995) estimate of 12,400 annual operations. Annual aircraft operations were forecast to increase from 12,400 to 15,500 between 1995 and 2015, which translates into an annual average growth rate of **1.12 percent** over the period.

The forecast analysis referenced four onsite acoustical aircraft activity counts conducted at HRI between 1981 and 1995. The on-site acoustical aircraft activity counting program, previously managed by ODA, was discontinued in the mid-1990s, but provided activity assessments that were statistically reliable. The activity counts at HRI ranged from a low of 9,069 to a high of 15,596 annual aircraft operations during this period. The activity counts paired with available based aircraft data resulted in operations per based aircraft (OPBA) ratios ranging from 203 to 326 over the fourteen-year period.

The 1995 base year forecast of 12,400 operations and 35 based aircraft reflected an OPBA of 354. The remaining forecast years (2000-2015) used a fixed ratio of 360 OPBA applied to the based aircraft forecast.

FAA TERMINAL AREA FORECAST (2017-2037)

Assessment: The FAA TAF based aircraft projections for HRI provide a reasonable estimate of short term activity (through 2024) within the current twenty-year planning period. However, beyond 2024, the TAF projection is maintained without any projected increase or decline. The validity of TAF operations data and the subsequent forecast for HRI cannot be definitively determined and does not provide a reliable projection for use in evaluating aviation activity at HRI.

The FAA Terminal Area Forecast (TAF) for HRI was reviewed as one of the estimates of activity currently available for the airport. The current TAF base year is 2016, with projections extending to 2045.

The current FAA Airport Master Record Form (5010-1) for HRI (effective 12 months ending 9/11/2017) lists 39 based aircraft and 24,850 annual aircraft operations. The 5010 based aircraft numbers do not correlate to the TAF, although the 5010 aircraft operations listing duplicates the 2016 TAF.

Based Aircraft

The TAF for HRI projects an increase from 44 to 47 based aircraft between 2016 and 2037 (the end of current master planning period). This forecast translates into an annual average growth rate of **0.32 percent** over the 21-year period (2016-2037). However, it is noted that the TAF reaches 47 based aircraft in 8 years (2024), and then maintains a static projection through 2045. A static TAF projection is an indication in inadequate data in the TAF system to support any particular growth rate, rather than an expectation of no growth. Based on this factor, the TAF projection of based aircraft for HRI does not provide adequate analysis to justify its use as the recommended based aircraft forecast in the master plan.

Annual Aircraft Operations

The TAF for HRI projects an increase in annual aircraft operations from a base estimate of 24,850 in 2016 to 29,395 by 2037. This forecast translates into an annual average growth rate of **0.8 percent** over the period. A review of the TAF operations forecast and the underlying historic data for HRI identifies several items of note:

- The 2016 operations estimate (24,850) for HRI was maintained without adjustment for seven consecutive years from 2010 to 2016 (TAF relies on 5010 data; updates provided by sponsor);
- The estimate of 24,850 operations, when first applied in 2010, represented a single-year increase of 53.1 percent over the preceding year (2009: 16,233); and
- The operations estimates for HRI during the recession years of 2008 and 2009, or in any subsequent year, do not reflect any adjustments in activity.

As noted earlier, a static TAF projection is often an indication of inadequate data updates rather than an expectation of no growth. The FAA notes that the historical TAF data pulls data from the 5010 airport record forms, which are updated every three years. Airport sponsors are responsible for providing updated activity data during the 5010 updates. While tracking based aircraft is greatly aided by the

www.basedaircraft.com database, estimating aircraft operations at non-towered airports simply reflects a "best guess." The best outcome that could reasonably be expected is to estimate annual operations over time between two forecast points—assuming that the forecasts were accurate.

The use of a static operations estimate for HRI over the last seven years strongly suggests that the TAF does not reflect recent events or current conditions. In addition, the basis for establishing the current operations estimate (one time 53% increase from prior year) does not appear valid. Based on these factors, the TAF aircraft operations forecast at HRI is not recommended for use in evaluating future aircraft operations at HRI.

It should be noted that despite questions about the accuracy of the TAF aircraft operations data for HRI, the annual average growth rate (0.8%) reflected in the long term forecast for HRI is consistent with the FAA's overall expectations for system wide general aviation growth. This suggests that applying the TAF growth rate to an adjusted aircraft operations baseline would provide a useable projection of future activity at HRI.

For reference, the TAF 2017 forecast (25,062 annual operations) corresponds to an operation to based aircraft ratio (OPBA) of 570, when paired with the 2017 TAF based aircraft forecast of 44. This ratio is considerably higher than previously documented at HRI on the basis of actual aircraft operations counts.

OREGON AVIATION PLAN (2007)

Assessment: The OAP forecasts provide estimates of activity at HRI that are within a reasonable range established by other forecasts.

The OAP provided aviation activity forecasts for a 2005-2025 planning period. Forecasts were developed for general aviation activity (based aircraft and annual aircraft operations) individual airports and statewide.

Based Aircraft

The OAP projected the number of based aircraft at HRI to increase from 40 to 47 between 2005 and 2025, which reflects an average annual rate of **0.83 percent.**

Annual Aircraft Operations

The OAP base year (2005) estimate of aircraft operations at HRI was taken directly from the FAA TAF. The issues related to the TAF data described earlier also extend to a certain degree the OAP forecasts that were developed using TAF data. However, the 2005 TAF data used in the OAP forecast is more consistent with HRI's historic activity levels, and the data preceded the large 2009-2010 increase noted earlier.

The OAP forecast of aircraft operations at HRI projected to increase from to 15,800 to 18,546 between 2005 and 2025, which reflects an average annual rate of **0.80 percent.**

Current Air Traffic Estimate

Based on the limited availability of activity data for HRI, an updated estimate of annual aircraft operations was developed to approximate baseline activity for the updated aircraft operations forecasts. Air traffic activity at HRI includes general aviation and business aviation, two commercial segments (aerial applicators and scheduled air cargo), and military. Each segment of activity has a unique operational profile and are estimated separately, then combined to determine overall airport operations levels.

- The current level of non-commercial flight activity at HRI is estimated using an operations per based aircraft (OPBA) ratio of 300. This ratio is within the range recommended by FAA for general aviation airports located in non-urban areas. The 2017 airport management based aircraft count was 39, including 4 aerial applicator aircraft (not included in the OPBA calculation).

- Aerial applicator activity at HRI is primarily fixed wing and is generated by four locally based aircraft and occasional transient aircraft. It is estimated that this activity generates approximately 400 annual operations (takeoffs and landings) at HRI for each aircraft; local operators report additional flight activity occurs off-airport closer to spray locations.

- HRI accommodates scheduled air cargo flights by the UPS contract carrier Ameriflight on a twice-daily, five days per week schedule. This activity is generated by transient aircraft and does not impact HRI's based aircraft count or the OPBA calculated below.

- Military aircraft activity at HRI is relatively limited (estimated at 100 annual operations), consisting of helicopters and business class turboprops, such as the Beechcraft C-12.

Based on current conditions, activity components/levels at HRI include the following:

A. Non AG Based Aircraft (35) x 300 operations per based aircraft ratio (captures local and transient aircraft activity);
B. Aerial Applicator Aircraft: Estimated at 400 annual operations per aircraft (x 4 aircraft);
C. Scheduled Air Cargo/Express Activity: Average 10 flights per week x 52 weeks; and
D. Military Activity (static estimate of 100 annual aircraft operations).

A. 35 x 300 OPBA = 10,500 Operations ***B. 4 x 400 OPBA = 1,600 Operations*** ***C. 10 Flights Per Week x 2 Operations per flight = 1,040 Operations*** ***D. 100 Operations***
2017 Total (A+B+C+D): 13,240 Operations ***13,240 operations / 39 based aircraft = 339.5 OPBA***

Updated Aviation Activity Forecasts

BASED AIRCRAFT

Four new based aircraft forecasts were developed for HRI, for comparison with the existing forecasts described earlier. Three of the forecasts are based on HRI's market share within the FAA's seven state Northwest-Mountain Region,[6] utilizing the FAA's current long term-based aircraft forecast for the region.[7] The fourth forecast applies the Oregon Aviation Plan 2005-2025 forecast growth rate for HRI based aircraft to the updated (2017) based aircraft count for HRI.

According to available data, HRI's based aircraft total increased from 35 to 39 between 1998 and 2017. For reference, the net increase of 4 aircraft over 19 years reflects an annual average growth of 0.57 percent.

A review of historic local and regional population and based aircraft activity at HRI did not identify any statistical correlations that supported using population as the basis for estimating future based aircraft activity at HRI. As a result, no population-based projections were developed. Despite the absence of a statistical correlation and a measurable cause and effect, it is important to emphasize that population growth is generally recognized as one of many factors needed to contribute to growth in airport activity.

Two airport-specific conditions are included in the updated forecasts to reflect pending changes in the HRI based aircraft fleet: 1) a new four-unit hangar is currently being developed with construction to be completed by summer 2018; and 2) a new aeronautical service provider (ASP) relocated to HRI in January 2018 with plans to relocate two to four aircraft currently based at Columbia Gorge Regional/The Dalles Municipal (DLS). The ASP currently owns two aircraft, and two are leased back to the ASP by private owners.

For forecasting purposes, it is assumed that the new hangar construction will attract three aircraft that are currently located off airport. For the ASP, it is assumed that the two owned aircraft will relocate to the airport (the certainty of the leaseback aircraft relocating to HRI is unknown at this time). These additions will be applied to the first forecast year (2022).

Each of the projections represent the net change in based aircraft compared to current levels, which includes loss of existing aircraft through attrition. HRI, like other airports is expected to lose existing aircraft through fleet attrition, retiring pilots, etc.

[6] ANM – FAA Northwest Mountain Region (WA, OR, ID, MT, WY, UT, CO)

[7] Terminal Area Forecast Summary Fiscal Years 2016-2045

FAA NORTHWEST-MOUNTAIN REGION (ANM) MARKET SHARE

A regional market share analysis was conducted that evaluated HRI's based aircraft fleet as part of the FAA's Northwest-Mountain Region. In 2017, the FAA estimated total based aircraft in the region at 22,720. The September 2017 HRI based aircraft total of 39 aircraft reported to FAA through the www.basedaircraft.com database accounted for approximately 0.172 percent[8] of the regional market in 2017.

Projections were developed that maintain, increase, and decrease HRI's market share based on the FAA's regional Terminal Area Forecast and the one-time adjustment of five additional based aircraft noted earlier. The market share-based aircraft forecasts are summarized in **Table 3-11** and depicted on **Figure 3-4**, following this section.

The FAA projects the based aircraft fleet in the Northwest-Mountain Region to grow at an average annual rate of 0.93 percent between 2015 and 2045. This rate exceeds the growth rate projected for five of the nine FAA regions and it is well above the annual projected growth for the nation (0.63 percent). The overall takeaway is that although the forecast rate of growth is modest, our region is expected to be among the strongest in the nation for general aviation-based aircraft fleet growth over the next thirty years.

The **Decreasing ANM Market Share** forecast establishes the HRI market share at 0.184 percent in 2022 based on the one-time increase of 5 based aircraft noted earlier. The forecast then gradually reduces HRI's share of the ANM region from 0.184 to 0.175 percent, which equates to about a 5 percent reduction in market share over the subsequent fifteen years (2022-2037). Despite the slight decline in market share, the projection results in an increase from 39 to 48 based aircraft (+9) by 2037, which represents **1.04 percent** average annual growth. It is important to recognize the impact of adding 5 aircraft in a brief period since it represents a significant one-time increase (+13%) and therefore skews long term growth rates upward more than would otherwise occur with normal changes in the based aircraft fleet.

This projection assumes that HRI's based aircraft fleet will grow at a slightly slower pace than the overall region from 2022 to 2037. As noted earlier, the region's forecast growth in its based aircraft fleet offsets the slight decline in market share for HRI.

The **Maintain ANM Market Share** forecast includes the same 2022 adjustment noted in the previous projection. The 0.184 percent market share established for 2022 is then maintained through the planning period. The projection results in an increase from 39 to 50 based aircraft (+11) by 2037, which represents an average annual growth rate of **1.25 percent**. This projection assumes that HRI's growth in based aircraft beyond the one-time 2022 adjustment will mirror regional growth through 2037.

[8] HRI 2017 Share of ANM Market

The **Increasing ANM Market Share** forecast includes the same 2022 adjustment noted earlier, then gradually increases HRI's share of the ANM region from 0.184 to 0.193 percent, which equates to about a 5 percent reduction in market share over the subsequent fifteen years (2022-2037). The projection results in an increase from 39 to 53 based aircraft (+14) by 2037, which represents an average annual growth rate of **1.55 percent**. This projection assumes that HRI's growth in based aircraft beyond the one-time 2022 adjustment will slightly outpace regional growth through 2037.

TABLE 3-11: HRI MARKET SHARE BASED AIRCRAFT FORECAST

Year	HRI Based Aircraft	NW Mtn. Region (ANM) Based Aircraft[1]	% of ANM Based Aircraft at HRI
Forecast – Decreasing Share (1.04% AAR) [2]			
2017	39	22,720	0.172%
2022	44	23,896	0.184%
2027	45	25,046	0.181%
2032	47	26,174	0.178%
2037	48	27,359	0.175%
Forecast – Maintain Share (1.25% AAR) [2]			
2017	39	22,720	0.172%
2022	44	23,896	0.184%
2027	46	25,046	0.184%
2032	48	26,174	0.184%
2037	50	27,359	0.184%
Forecast – Increasing Share (1.55% AAR) [2]			
2017	39	22,720	0.172%
2022	44	23,896	0.184%
2027	47	25,046	0.187%
2032	50	26,174	0.190%
2037	53	27,359	0.193%

1. FAA Terminal Area Forecasts FY 2016-2045
2. AAR: annual average rate of growth (2017-2037)

OAP GROWTH RATE APPLIED TO UPDATED BAC

This forecast was developed by applying the 2007 OAP forecast growth rate for HRI based aircraft to the fall 2017 airport management-based aircraft count. The 2007 OAP projected based aircraft at HRI to grow at an annual rate of 0.83 percent between 2005 and 2025. Despite the intervening recession, which likely slowed both local and statewide based aircraft growth, the underlying growth rate of the OAP forecast remains consistent with the FAA's current long-term expectations for general aviation. As noted earlier, the 2017 FAA TAF for HRI projects-based aircraft to increase at an average annual rate of 0.83 percent between 2016 and 2024. The OAP growth rate forecast is summarized in **Table 3-12** and depicted on **Figure 3-4**. This forecast does not include the one-time based aircraft increase in 2022 contained in the three new forecasts described above. As such, it provides a useful baseline projection at the low range of all forecasts.

Summary (Recommended Based Aircraft Forecast)

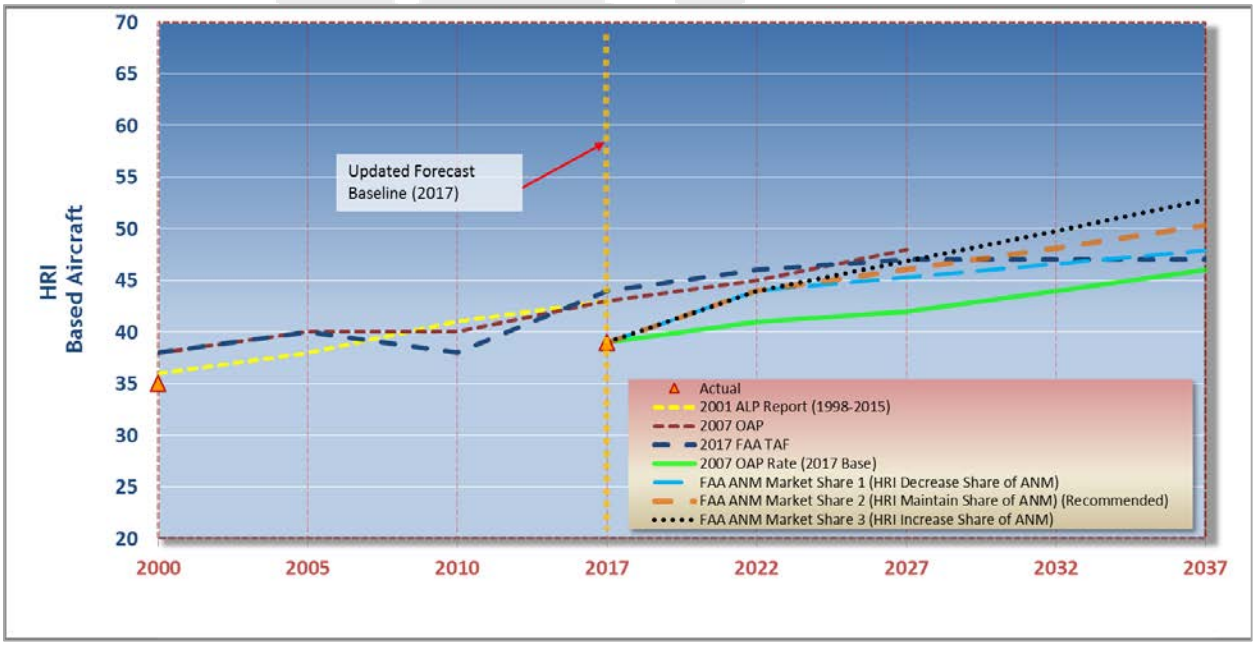
The **Maintain ANM Market Share forecast is recommended as the preferred based aircraft forecast for use in the airport master plan.** This projection assumes that HRI will be able sustain long term growth in its based aircraft fleet that is in line with the FAA's anticipated growth in the Northwest-Mountain region. **The selected forecast results in a net increase of 11 based aircraft over the twenty-year planning period (2017-2037), which reflects an average annual growth of 1.25 percent.** After the initial bump in based aircraft in 2022 noted earlier, average annual growth through the remaining 15 years of the 20-year planning period is 0.86 percent. The recommended based aircraft forecast is summarized in **Table 3-12** and depicted on **Figure 3-4.**

TABLE 3-12: HRI BASED AIRCRAFT FORECAST SUMMARY

Projection	2017	2022	2027	2032	2037	AAR
2007 OAP Forecast (Unadjusted)	43	45	--	--	--	0.83%[1]
2017 FAA Terminal Area Forecast (TAF)	44	45	47	47	47	0.31%[2]
HRI : ANM Market Share 1	39	44	45	47	48	1.04%[3]
HRI : ANM Market Share 2 (Recommended)	**39**	**44**	**46**	**48**	**50**	**1.25%[3]**
HRI : ANM Market Share 3	39	44	47	50	53	1.55%[3]
2007 OAP Growth Rate: HRI 2017 BAC	39	41	42	44	46	0.83%[3]
Selected Forecast	39	44	46	48	50	1.25%[1]

1. AAR: annual average rate of growth (2005-2025)
2. AAR: annual average rate of growth (2016-2037)
3. AAR: annual average rate of growth (2017-2037)

FIGURE 3-4: HRI - BASED AIRCRAFT FORECASTS



The primary purpose of the based aircraft forecast is to define future related facility needs, particularly aircraft storage (aircraft parking and hangar space). The use of development reserves is recommended for planning activity-dependent facility needs as a way to compensate for the uncertainty associated with long term forecasts. A development reserve equal to 100 percent of projected net increase in based aircraft will be adequate to absorb any significant, unanticipated increases in landside facilities demand well into the planning period.

Based Aircraft Fleet Mix

The airport's current mix of based aircraft consists of single-engine and multi-engine piston aircraft, and single and multi-engine turbine aircraft. **Table 3-13** summarizes the projected based aircraft fleet mix for the planning period. **Figures 3-5** and **3-6** depict the current (2017) and long-term (2037) distribution of based aircraft by type. The based aircraft fleet mix during the planning period is expected to become slightly more diverse to include light sport aircraft, additional turbine aircraft, and helicopters.

TABLE 3-13: HRI FORECAST BASED AIRCRAFT FLEET MIX

Aircraft Type	2017	2022	2027	2032	2037
Single Engine Piston	29	32	32	30	29
Multi-Engine Piston	1	2	2	2	2
Turboprop	5	5	5	6	7
Business Jet	1	1	1	2	2
Helicopter	0	0	1	2	3
LSA/Experimental (non-AG)	3	4	5	6	7
Total Based Aircraft	**39**	**44**	**46**	**48**	**50**

FIGURE 3-5: HRI BASED AIRCRAFT FLEET MIX (2017)

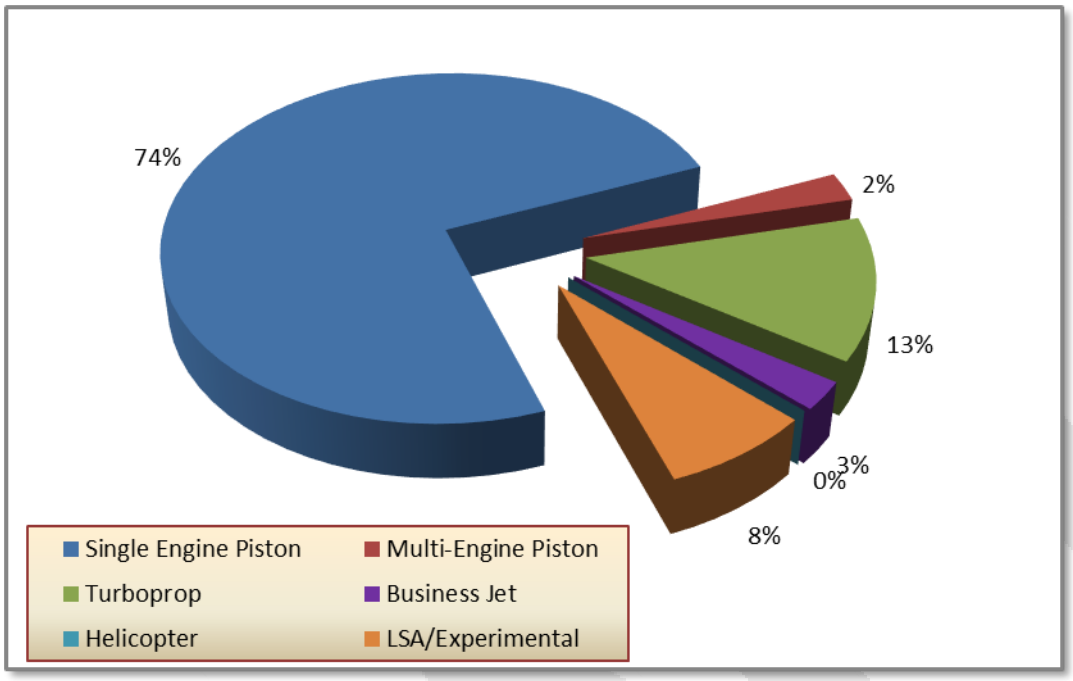
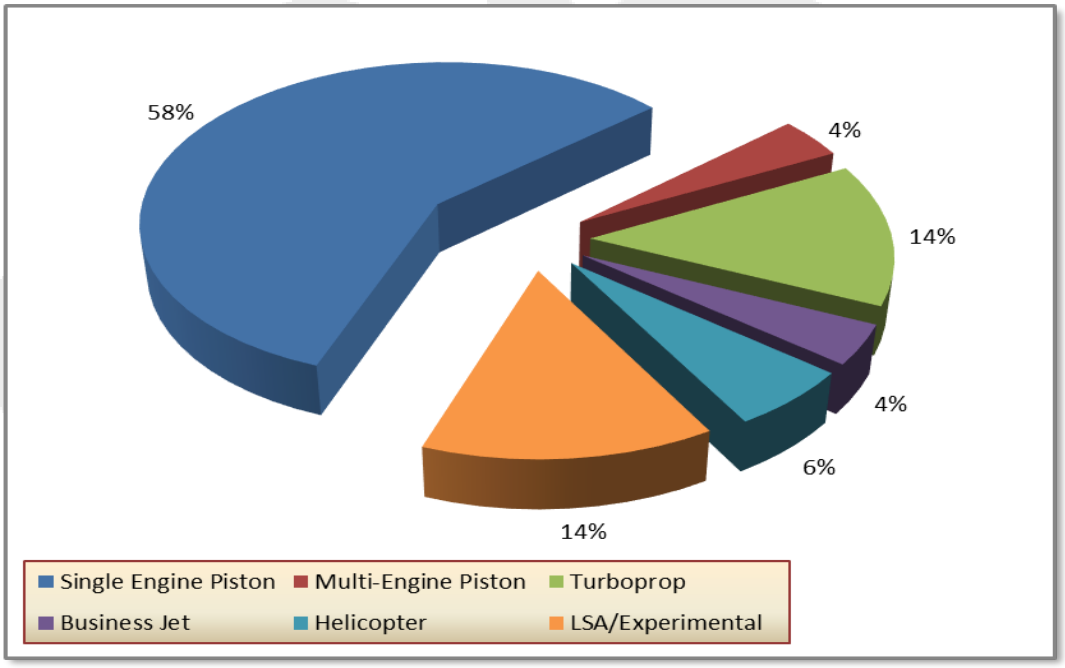


FIGURE 3-6: HRI FORECAST BASED AIRCRAFT FLEET MIX (2037)



Aircraft Operations

As a non-towered airport, overall operational data (total number of takeoffs and landings) for HRI is limited to estimates. Due to limited data, defining current operations levels, and therefore future activity, presents a challenge. The estimate of 2017 airport activity presented earlier in the chapter provides a reasonable baseline for use in developing forecasts. This analysis identified four distinct segments of aircraft operations:

- General Aviation & Business Aviation Activity;
- Aerial Applicator Activity;
- Scheduled Air Cargo Activity; and
- Military Activity.

Three new forecasts were prepared for the master plan. The new forecasts are compared to the existing FAA TAF and OAP 2007 forecasts presented earlier. One forecast was developed by using a mathematical regression model developed for FAA that incorporates several airport-specific and regional inputs to generate a baseline operation estimate. Future year forecasts were then developed using fixed growth in population and other inputs defined in the model. Two additional forecasts were developed using an operations per based aircraft (OPBA) formula combined with additional commercial activity segments (aerial applicators and air cargo) that were individually defined at HRI.

2017 FORECAST – FAA NPIAS FORMULA

FAA Order 5090.3C. Field Formulation of the National Plan of Integrated Airport Systems, suggests a forecast methodology for non-towered airports that relies on a general formula for estimating operations by utilizing an activity ratio that is applied to current and forecast based aircraft. The Order 5090.3C identifies a typical range of 250 to 450 operations per based aircraft (OPBA) for different types of general aviation airports. The FAA recognizes that these ratios approximate activity, and that individual airports may vary. As with the based aircraft forecasts, aircraft operations levels also reflect steeper growth in the first five years compared to the latter fifteen years due to the tenant-specific increase in based aircraft in 2022.

Two separate projections were developed using this methodology. The forecasts are summarized in **Table 3-14** and depicted on **Figure 3-6**. Both projections maintain current levels of aerial applicator and air cargo activity at current levels through the planning period. Current aerial applicator activity is estimated at 1,600 annual operations. Current air cargo/express activity is approximately 1,040 annual operations based on a 5-day per week schedule (2 flights per day).

The first projection **(NPIAS 1)** uses a fixed OPBA of 300 for non-AG aircraft, which is applied to the recommended based aircraft forecast at HRI. The OPBA is within the FAA's range for general aviation airports with moderate levels of itinerant traffic. This assumption is consistent with HRI's ability to attract business aviation and general aviation activity within the region. This projection increases annual general aviation operations from 13,140 to 16,440 by 2037, which reflects an average annual growth rate of **1.13 percent.**

The second projection **(NPIAS 2)** uses a variable OPBA of 300-350 for non-AG aircraft, which is applied to the recommended based aircraft forecast at HRI. The OPBA is within the FAA's range for general aviation airports with higher levels of itinerant traffic. This assumption depends on HRI's ability to ability to attract increased levels of both itinerant and locally-generated air traffic above its previously documented historic levels. This projection increases annual general aviation operations from 13,140 to 18,740 by 2037, which reflects an average annual growth rate of **1.79 percent.**

The most recent acoustical activity count conducted at HRI was in 1995 with 12,380 annual operations. With a thirty-eight-based aircraft listed for 1995, the corresponding OPBA was 326, which included all general aviation activity. Although the airport-specific data is dated, the ability to compare actual activity ratios with the generic OPBA ratios recognized by FAA suggests that the basic drivers of activity at HRI have remained relatively stable over the last twenty years.

2017 FORECAST – FAA REGRESSION MODEL FOR ESTIMATING AIRCRAFT OPERATIONS AT NON-TOWERED AIRPORTS

This forecast uses a statistical regression model approved by the FAA to estimate operations at non-towered airports. The report, entitled Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data (GRA, Inc., 2001) presents the methodology and formula for the model. Several independent variables are used in the model, including airport characteristics, demographics, and geographic features. The model was created by using a combined data set for small towered and non-towered general aviation airports with the addition of a dummy variable to distinguish the two airport types. The following variables are included in the model:

- Based Aircraft (at the subject airport);
- Percent of aircraft based at the airport among general aviation airports within 100 miles;
- Number of FAR Part 141 flight training schools at the airport;
- Population within 100 miles; and
- Ratio of population within 25 miles and 100 miles.

The model is designed to consider a variety of elements that directly and indirectly affect airport activity. This forecast uses the current year analysis of the model to estimate annual aircraft operations. The accompanying forecast of operations is developed from the based aircraft forecast and reflects several key assumptions: 1 percent annual population growth; no changes in the number of FAR Part 141 flight schools at the airport; and no change in the number of airports located in the 100-mile radius surrounding the airport. The worksheets for the regression analysis are provided in **Appendix C**, at the end of the master plan report.

The regression model developed for HRI produced 8,800 aircraft operations for 2017. The associated forecast increases annual aircraft operations to 11,500 by 2037, which reflects an average annual growth rate of **1.35 percent** between 2017 and 2037. The regression analysis model was developed independently, which is noted in its base year (2017) activity level. This projection is summarized in **Table 3-14** and depicted on **Figure 3-7**.

The FAA regression model produces operations levels that are lower than the previously-documented aircraft activity counts conducted at HRI in past years, with similar or fewer based aircraft. It appears that the model may not provide an accurate assessment of activity for HRI based on the specific features of northeastern Oregon. However, the model does provide a useful baseline projection at the low range of all forecasts.

Summary (Aircraft Operations Forecast)

Table 3-14 summarizes the general aviation operations forecasts for HRI. The forecasts of general aviation operations are presented in **Figure 3-6**.

The **NPIAS Formula 1 forecast is the recommended operations forecast for HRI**. This projection reflects the airport's ability to sustain growth in itinerant activity while maintaining established levels of commercial (cargo) and agricultural aviation activity. **The forecast projects an increase from 13,140 to 16,440 general aviation operations by 2037, which reflects an average annual growth rate of 1.13 percent.**

TABLE 3-14: GA AIRCRAFT OPERATIONS FORECASTS – HRI

Projection	2017	2022	2027	2032	2037
NPIAS Formula 1[1] (1.13% AAR 2017-2037)	13,140	14,640	15,240	15,840	16,440
NPIAS Formula 2[1] (1.79% AAR 2017-2037)	13,140	15,040	16,080	17,160	18,740
FAA Non-Towered Equation[2] (1.35% AAR 2017-2037)	8,800	10,000	10,500	11,000	11,500
2017 FAA Terminal Area Forecast (0.80% AAR 2016-2037)	25,062	26,113	27,167	28,257	29,395
Selected Forecast – FAA NPIAS Formula 1 (1.13% AAR 2017-2037)	13,140	14,640	15,240	15,840	16,440

[1] *FAA Field Formulation for NPIAS, with specific adjustment commercial for flight activity*
[2] *Model for Estimating General Aviation Operations at Non-Towered Airports (FAA 2001)*
AAR: Average Annual Rate (Growth)

FIGURE 3-7: HRI - GENERAL AVIATION OPERATIONS FORECAST

Local and Itinerant Operations

General aviation (GA) operations consist of aircraft takeoffs and landings conducted by GA aircraft. All aircraft operations are classified as local or itinerant. **Local operations** are conducted in the vicinity of an airport and include flights that begin and end at the airport. These include aerial applicators, flight training, touch and go operations, and other flights that do not involve a landing at another airport. **Itinerant operations** include flights between airports, including cross-country flights. Itinerant operations reflect specific travel between multiple points, often associated with business and personal travel.

The aircraft operations data presented in the FAA 5010 Airport Record Form and the current FAA TAF for HRI reflects a 65/35 percent split between local and itinerant aircraft operations. This operational split appears slightly high but is acceptable for use in evaluating overall aircraft activity. It is recommended that the 65/35 air traffic distribution be applied to forecast aircraft operations during the current planning period.

Aircraft Operations Fleet Mix

Single engine piston aircraft (including light sport and experimental) currently account for approximately 78 percent of airport operations, followed by single-engine and multi-engine turboprops, business jets, multi-engine piston, and helicopters. It is expected that the mix of air traffic at HRI will shift slightly during the twenty-year planning period to include more turbine aircraft (turboprops and jets) and helicopters based on current trends in aircraft manufacturing and the composition of airport users. The growing popularity of single-engine turboprops for personal and business use is also expected to affect the operational fleet mix at HRI. The aircraft operations fleet mix forecast is summarized in **Table 3-15.**

TABLE 3-15: GENERAL AVIATION FORECAST AIRCRAFT OPERATIONS FLEET MIX

Aircraft Type	2017	%	2022	%	2027	%	2032	%	2037	%
Single Engine Piston*	10,194	78	11,250	77	11,430	75	11,810	75	11,910	73
Multi Engine Piston	200	<2	280	2	300	2	220	1	240	1
Turboprop	2,400	18	2,670	18	2,780	18	3,050	19	3,330	20
Jet	146	1	160	1	290	2	300	2	460	3
Helicopter	200	<2	280	2	440	3	460	3	500	3
Total Operations	13,140	100	14,640	100	15,240	100	15,840	100	16,440	100

**Includes Sport and LSA*

Note: Percentages may not sum due to independent rounding

Critical Aircraft (FAA Planning Guidance)

As noted earlier, the selection of design standards for airfield facilities is based upon the characteristics of the aircraft that are expected to use the airport. This aircraft or aircraft type is designated as the "critical aircraft." The FAA provides the following definition of critical aircraft:

"The critical aircraft is the most demanding aircraft type, or grouping of aircraft with similar characteristics, that make regular use of the airport. Regular use is 500 annual operations, including both itinerant and local operations, but excluding touch-and-go operations. An operation is either a takeoff or landing." [9]

The FAA groups aircraft into five categories (A-E) based upon their approach speeds. Aircraft Approach Categories A and B include small propeller aircraft, many small or medium business jet aircraft, and some larger aircraft with approach speeds of less than 121 knots (nautical miles per hour). Categories C, D, and E consist of the remaining business jets as well as larger jet and propeller aircraft with approach speeds of 121 knots or more. The FAA also establishes six airplane design groups (I-VI), based on the wingspan and tail height of the aircraft. The categories range from Airplane Design Group (ADG) I, for aircraft with wingspans of less than 49 feet, to ADG VI for the largest commercial and military aircraft.

The combination of airplane design group and aircraft approach speed for the critical aircraft creates the Airport Reference Code (ARC), which is used to define applicable airfield design standards. It is noted that each runway is assigned an ARC through the facility requirements runway use analysis, and the *Airport* ARC is based on the most demanding runway-derived ARC at the airport.

Typical general aviation and business aviation aircraft and their respective design categories are presented in **Table 3-16 and Figure 3-8.**

[9] FAA Advisory Circular (AC) 150/5000-17 Critical Aircraft and Regular Use Determination

TABLE 3-16: GENERAL AVIATION AIRCRAFT & DESIGN CATEGORIES

Aircraft	Aircraft Approach Category	Airplane Design Group	Maximum Gross Takeoff Weight (lbs)
Cessna 182 (Skylane)	A	I	3,100
Cirrus Design SR22	A	I	3,400
Beechcraft Bonanza A36	A	I	3,650
Socata/Daher TBM 700-930	A	I	6,579-7,394
Grumman Widgeon (G-44)	A	I	4,525
Beechcraft Baron 58	B	I	5,500
Cessna 340	B	I	5,990
Cessna Citation Mustang (CE-510)	B	I	8,645
Embraer Phenom 100	B	I	10,472
Cessna Citation I/SP (CE-501)	B	I	11,850
Piper Malibu (PA-46)	A	II	4,340
Cessna Caravan 675	A	II	8,000
Pilatus PC-12	A	II	10,450
Beech King Air C90-1	B	II	9,650
Air Tractor 602 (AT-602)	B	II	12,500
Cessna Citation CJ2+ (CE-525A)	B	II	12,500
Cessna Citation Bravo (CE-550)	B	II	14,800
Beech King Air 350	B	II	15,000
Swearingen Metro III/Expediter (SA227)	B	II	16,500
Cessna Citation CJ4 (CE-525C)	B	II	16,950
Embraer Phenom 300	B	II	17,968
Cessna Citation XLS+ (CE-560XL)	B	II	20,200
Dassault Falcon 20/200	B	II	28,660
Bombardier Learjet 55	C	I	21,500
Beechcraft Hawker 800XP	C	II	28,000
Gulfstream 200	C	II	34,450
Bombardier Challenger 300	C	II	37,500
Learjet 35A/36A	D	I	18,300
Gulfstream G450	D	II	73,900

Source: AC 150/5300-13, as amended; aircraft manufacturer data.

A-I

12,500 lbs. or less (small)

Beech Baron 55
Beech Bonanza
Cessna 182
Piper Archer
Piper Seneca

B-I

12,500 lbs. or less (small)

Beech Baron 58
Beech King Air 100
Cessna 402
Cessna 421
Piper Navajo
Piper Cheyenne
Cessna Citation I

A-II, B-II

12,500 lbs. or less (small)

Super King Air 200
Pilatus PC-12
DHC Twin Otter
Cessna Caravan
King Air C90

B-II

Greater than 12,500 lbs.

Super King Air 300, 350
Beech 1900
Cessna Citation Excel
Falcon 20, 50
Falcon 200, 900
Citation II, Bravo XLS+
Citation CJ3

A-III, B-III

Greater than 12,500 lbs.

DHC Dash 7, Dash 8
Q-200, Q-300
DC-3
Convair 580
Fairchild F-27
ATR 72
ATP

C-I, D-I

Lear 25, 35, 55, 60
Israeli Westwind
HS 125-700

C-II, D-II

Gulfstream II, III, IV
Canadair 600
Canadair Regional Jet
Lockheed JetStar
Citation X
Citation Sovereign
Hawker 800 XP

C-III, D-III

Boeing Business Jet
Gulfstream 650
B 737-300 Series
MD-80, DC-9
Q-400
A319, A320
Gulfstream V
Global Express

C-IV, D-IV

B-757
B-767
DC - 8-70
DC - 10
MD - 11
L 1011

D-V

B - 747 Series
B - 777

AIRPORT REFERENCE CODES (ARC)
FIGURE 3.7

HERMISTON MUNICIPAL AIRPORT
AIRPORT MASTER PLAN

CENTURY WEST ENGINEERING

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Current and Future Critical Aircraft

The identification of the existing and future critical aircraft for the airport is required to define the appropriate design standards for various airport facilities. **Table 3-17** summarizes the selected operations forecast at HRI by aircraft type, aircraft approach speed (AAC), and airplane design group (ADG).

TABLE 3-17: HRI – GA FORECAST ACTIVITY FLEET MIX (BY AAC + ADG)

Aircraft Type (Representative)	AAC + ADG	Historic	Forecast			
		2017	2022	2027	2032	2037
Cessna 172	A-I	9,994	11,250	11,430	11,810	11,910
TBM 900	A-I	20	40	40	80	120
Beechcraft Baron 58	B-I	200	280	300	220	240
Piper Cheyenne II (PA-31T)	B-I	40	60	80	120	140
Cessna Citation CJ2	B-I	68	72	120	120	160
Air Tractor 602	A-II	1,600	1,600	1,660	1,720	1,800
Swearingen Metro III	B-II	940	970	1,000	1,130	1,260
Cessna 550 - Citation Bravo	B-II	56	58	110	120	220
Bombardier Learjet 60	C-I	6	8	20	20	30
Bombardier Challenger 300	C-II	16	20	30	30	40
Learjet 35	D-I	0	2	10	8	10
Gulfstream IV	D-II	0	0	0	2	10
Total Operations (Fixed Wing)		12,940	14,360	14,800	15,380	15,940
Helicopter		200	280	440	460	500
Total GA Operations		13,140	14,640	15,240	15,840	16,440
Subtotals by AAC (FW + Heli)	A	11,814	13,170	13,570	14,070	14,330
	B	1,304	1,440	1,610	1,710	2,020
	C	22	28	50	50	70
	D	0	2	10	10	20
Subtotals by ADG (FW only)	I	10,328	11,712	12,000	12,378	12,610
	II	2,612	2,648	2,800	3,002	3,330

Critical Aircraft Conclusions

Based on the updated aviation activity forecast, the current and future critical aircraft for HRI is a multi-engine turboprop aircraft included in Airplane Design Group II (ADG II). The largest sources of ADG II operations at HRI are locally-based aerial applicators and scheduled air cargo service:

- ADG II Aerial Applicators (Single Engine Turboprops & Piston): 1,600 operations (2017)
- ADG II Air Cargo Aircraft (Multi-Engine Turboprops): 850 operations (2017)

The air traffic breakout by aircraft approach category and design group provided in **Table 3-17** identifies the total volume of current and forecast ADG II activity, which also includes locally-based and transient business class turbine aircraft.

A review of instrument flight plan data identified 146 business jet operation at HRI in 2017. The majority of this activity is generated by Approach Category A and B aircraft, although the airport also accommodates limited amounts of Approach Category C and D aircraft activity (ADG I and II). Available runway length and instrument approach capabilities are identified as two potential factors currently limiting larger business jet activity at HRI.

Table 3-18 summarizes the current and future critical aircraft and airport reference code (ARC) for HRI. An analysis of aircraft use and applicable design standards will be performed in the facility requirements analysis to address specific facility needs.

TABLE 3-18: HRI – SUMMARY OF CRITICAL AIRCRAFT & ARC

HRI Current and Future "Airport" ARC: B-II
Based on the updated master plan forecasts, the current and future critical aircraft for HRI is a large multi-engine turboprop included in **Airport Reference Code (ARC) B-II**: **Existing/Future Critical Aircraft:** **Swearingen Metro III** (representative AC type, large multi-engine turboprop) • Aircraft Approach Category B • Airplane Design Group II • MGTW 16,500 Pounds The aviation activity forecasts anticipate an increase in ARC B-II (and more demanding C&D aircraft) business jet operations at HRI during the twenty-year planning period. For planning purposes, the runway length requirements for the critical aircraft should be defined and a development reserve should be considered based on requirements future business jet aircraft.

Operational Peaks

Activity peaking is evaluated to identify potential capacity related issues that may need to be addressed through facility improvements or operational changes.

The **Peak Month** represents the month of the year with the greatest number of aircraft operations (takeoffs and landings). The peak month at HRI occurs during the summer and is estimated to account for approximately 11 percent of annual aircraft operations.

Peak Day operations are defined by the average day in the peak month (**Design Day**) and the busy day in the typical week during peak month (busy day). The **Design Day** is calculated by dividing peak month operations by 30. For planning purposes, the **Busy Day** is often estimated to be 25 percent higher than the average day in the peak month (Design Day x 1.25), unless the airport routinely experiences significant seasonal or daily surges in traffic.

The peak activity period in the Design Day is the **Design Hour**. For planning purposes, the **Design Hour** operations are estimated to account for 20 percent of Design Day operations (Design Day x 0.20).

The operational peaks for each forecast year are summarized in **Table 3-19**. This level of peaking is consistent with the mix of airport traffic and is expected to remain relatively unchanged during the planning period. No significant runway or taxiway capacity issues have been identified based on current or forecast activity levels.

TABLE 3-19: PEAK GENERAL AVIATION OPERATIONS FORECAST

Activity	2017	2022	2027	2032	2037
Annual Operations (GA)	13,140	14,640	15,240	15,840	16,440
Peak Month Operations (11%)	1,445	1,610	1,676	1,742	1,830
Design Day Operations (average day in peak month)	48	54	56	58	61
Busy Day Operations (assumed 125% of design day)	60	67	70	73	75
Design Hour Operations (assumed 20% of design day)	10	11	12	12	12

Military Activity

Airport management reports that HRI periodically accommodates military helicopter and fixed-wing activity. Based on local observations, 100 annual military operations will be assumed during the planning period. The FAA Terminal Area Forecast (TAF) currently estimates military activity at HRI at 50 annual operations, although the activity was previously projected at 100 annual operations.

Air Taxi Activity

Air taxi activity includes for-hire charter flights and some scheduled commercial air carriers operating under FAR Part 135. Air taxi activity at HRI currently includes approximately 1,040 scheduled air cargo operations from Ameriflight, a UPS contract carrier operating under Part 135. Additional charter flight activity at HRI would also be conducted under Part 135.

The FAA Terminal Area Forecast (TAF) estimates air taxi activity at HRI at 500 annual operations. However, the 500-annual air taxi estimate has been maintained unchanged in the TAF since 2000. With the recent addition of the scheduled cargo service, it appears that annual taxi activity is approximately 1,500 operations. This level of activity is assumed to remain steady during the planning period.

Forecast Summary

The summary of based aircraft and annual aircraft operations forecasts is provided in **Table 3-20**. The forecast for based aircraft and aircraft operations projects modest sustained growth in activity at HRI through the twenty-year planning period that is consistent with the FAA's long-term expectations for general aviation.

TABLE 3-20: FORECAST SUMMARY

Activity	2017	2022	2027	2032	2037
Itinerant Operations					
General Aviation	3,034	3,624	3,834	3,979	4,189
Air Taxi	1,500	1,500	1,500	1,500	1,500
Military	100	100	100	100	100
Total Itinerant Operations	**4,634**	**5,224**	**5,434**	**5,579**	**5,789**
Local Operations (all GA)	8,606	9,516	9,906	10,361	10,751
Total Local & Itinerant Operations	**13,240**	**14,740**	**15,340**	**15,940**	**16,540**
Based Aircraft	**39**	**44**	**46**	**48**	**50**
Operations Per Based Aircraft (GA)	337	335	333	331	332

As with any long-term facility demand forecast, it is recommended that development reserves be protected to accommodate demand that may exceed current projections. For planning purposes, a reserve capable of accommodating a doubling of the twenty-year preferred forecast demand should be adequate to accommodate unforeseen facility needs during the current planning period. However, should demand significantly deviate from the airport's recent historical trend, updated forecasts should be prepared to ensure that adequate facility planning is maintained.

Fifty-Year Forecast

Per the airport master plan project scope of work, fifty-year demand forecasts were prepared by extrapolating the average annual growth rates (AAGR) for the recommended 20-year based aircraft and aircraft operations forecasts. The purpose of the 50-year projection is to provide an estimate of demand that can be used to approximate long-term aviation use land requirements for the airport. **Table 3-21** summarizes the 50-year forecast including the intermediate 30- and 40-year based aircraft and aircraft operations.

TABLE 3-21: 50-YEAR FORECAST

Activity	2017	2037	2047	2057	2067
Annual Operations	13,240	16,440	18,548	20,753	23,221
Based Aircraft	39	50	57	64	73

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