

Birchwood Airport Layout Plan Update Aviation Activity Forecast

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List of Abbreviations

AAC.....	Aircraft Approach Category
AASP.....	Alaska Aviation System Plan
AC.....	FAA Advisory Circular
ADG.....	Aircraft Design Group
ADLWD.....	Alaska Department of Labor and Workforce Development
BTS.....	U.S. Department of Transportation - Bureau of Transportation Statistics
CAP.....	Civil Air Patrol
COVID-19.....	Coronavirus Disease 2019
DOT	U.S. Department of Transportation
DOT&PF.....	Alaska Department of Transportation & Public Facilities
DRC.....	Departure Reference Code
FAA.....	Federal Aviation Administration
GA.....	General Aviation
MOA.....	Municipality of Anchorage
MSB.....	Matanuska-Susitna Borough
MTOW.....	Maximum Take-Off Weight
TAF.....	FAA Terminal Area Forecast

1. SUMMARY

This report documents the development of the aviation activity forecast for Birchwood Airport. The report describes the purpose of a forecast and the methods used to gather and analyze the data considered. The results of previous forecasts will be summarized and compared to the findings of this forecast. The results of this forecast will be considered in the development of the Birchwood Airport Master Plan Update.

The purpose of an aviation activity forecast is to:

- 1) Establish the current operational demands of the airport.
- 2) Evaluate historic airport uses and trends that affect aviation activity at the airport.
- 3) Forecast future operational demands based on the current demand and historic trends.

This analysis will also result in the determination of the critical aircraft, which the Federal Aviation Administration (FAA) defines as the most demanding aircraft or group of aircraft with 500 or more annual operations at the airport.

HDL Engineering Consultants, LLC developed this forecast using aviation activity data recorded between July and October 2020, interviews with airport users and Alaska Department of Transportation & Public Facilities (DOT&PF) personnel, and statistics available through the FAA and the Bureau of Transportation Statistics (BTS). This study also included a review of the forecasts developed as part of DOT&PF's 2005 Draft Birchwood Airport Master Plan, the 2011 Alaska Aviation System Plan (AASP) Forecast, and the most recent Terminal Area Forecast (TAF) prepared by the FAA as part of the National Plan of Integrated Airport Systems (NPIAS) report to Congress in 2019.

Using the trends from recorded aviation activity data, an estimated 13,545 operations and 53,700 training operations occurred at the Birchwood Airport in 2020. Based on the data counts, the most demanding aircraft currently operating at the airport with more than 500 operations per year is the A-I (Small) aircraft, such as the Cessna 172 and Cessna 182.

Based on the forecast base scenario, operations are expected to increase to 15,391 operations and 61,068 training operations annually by 2040. A-I (Small) aircraft are anticipated to remain the critical aircraft throughout the forecast period.

There are currently 308 aircraft based at the airport. The number of based aircraft is forecasted to grow to 398 by 2040, provided additional tie-down and lease space is made available to meet the current unmet demand and the forecasted moderate growth rate.

Zero enplanements were recorded in 2020, and six enplanements were recorded in 2019. Recorded enplanements are not anticipated to increase from the number recorded in 2019.

The current and ultimate critical aircraft was identified as A-I (Small), which is defined as small aircraft with a wingspan less than 49 feet, approach speeds less than 91 knots, and a maximum takeoff weight less than 12,500 lbs. Therefore, the Airport Layout Plan should be developed to support the needs of A-I (Small) aircraft.

2. BACKGROUND

The Birchwood Airport (FAA identifier: BCV) is owned and operated by the DOT&PF. The airport is a general aviation (GA) airport located in southcentral Alaska, approximately 20 miles northeast of Anchorage, in the unincorporated community of Chugiak. The airport serves a regional role for Anchorage, Eagle River, Chugiak, Palmer, and Wasilla GA communities. The airport is non-towered, and there is no FAA Flight Service Station. Commercial operations on the field include flight instruction, aircraft maintenance, manufacturing, and fuel sales. Operations also include ultra-light aircraft, glider aircraft, and Civil Air Patrol (CAP) search and rescue activities.

The Birchwood Airport consists of two parallel runways. The paved Runway 2L/20R is 4,010 feet long by 100 feet wide, and the gravel/paved Runway 2R/20L is 1,800 feet long by 50 feet wide.

Terminology

In aviation activity forecasting, the most critical metric used is aircraft operations. The total number of operations is studied based on the type of operation and the type of aircraft employed. Therefore, it is necessary to use the term consistently during the development of the forecast. The following terminology is used to define the different types of airport operations discussed in this report:

- Operations: The FAA guidance regarding what constitutes an operation is defined differently in the FAA advisory circulars (AC), as follows:
 - AC 150/5070-6B, *Airport Master Plans*, provides guidance for airport master planning, including demand-capacity analysis, and defines an aircraft operation as the landing, take-off, or touch-and-go procedure (FAA, 2015).
 - AC 150/5000-17, *Critical Aircraft and Regular Use Determination*, states that only local and itinerant take-offs and landings qualify as operations for the determination of critical aircraft and regular use. The critical aircraft is the most demanding aircraft that regularly use the airport. The threshold to determine regular use is 500 annual operations. For determination of design requirements on the airfield, touch-and-go operations and operations by federal government agencies are expressly excluded from operational counts (FAA, 2017).

In this forecast, the term aircraft operation matches the FAA definition in AC 150/5000-17 and refers only to the take-off or landing of a local or itinerant aircraft.

- Training Operations: Training operations, also called touch-and-go operations, are not included in the operations count, per AC 150/5000-17. The training operations are identified separately in the baseline forecast and are considered when evaluating airfield demand.
- Itinerant Operations: These are operations to or from an airport using aircraft based at a different airport. For these visitors, transient parking is provided to allow pilots to park their aircraft at the airport for a short duration.
- Local Operations. These are operations to or from an airport using aircraft based at that airport. For this report, pilots with an address in the Municipality of Anchorage (MOA)

or the nearby Palmer and Wasilla communities are assumed to be based at the Birchwood Airport. This method generates a slightly higher proportion of Local Operations compared to a cross-reference between operational identifiers and based aircraft registrations. Based aircraft records only include active registrations in which airport sponsors have reported Birchwood as their home base which would exclude some local operations.

- Air Carrier Operations. Air carrier operations are scheduled passenger or cargo operations provided by a certificated air carrier. Air carriers are required to report all their operations to the U.S. Department of Transportation's (DOT) BTS – Office of Airline Statistics monthly (U.S. DOT, 2007).
- Air Taxi Operations. Air taxi operations are on-demand charter operations provided by a certified air carrier. Air taxi operators voluntarily report operational information through the Airport Activity Survey annually (FAA, 2021a).

Forecast Methodology

This forecast was prepared in accordance with *Forecasting Aviation Activity by Airport* (FAA, 2001) and the AC 150/5070-6B, *Airport Master Plans* (FAA, 2015). It considers short-term (1 to 5 years) operational planning, medium-term (6 to 10 years) capital improvements planning, and long-term (11 to 20 years) general planning. As described in detail in Section 7 of this report, the forecasting methodology uses the projected population growth for the study area.

The forecast also considers the following types of activity:

- The number of local aircraft operations
 - GA
 - Military
- The number of itinerant aircraft operations
 - Air carrier
 - Air taxi
 - GA
 - Military
- Passenger enplanements
- Number of aircraft based at the airport
- Mix of aircraft types based at the airport

As a result, the forecast identifies the critical aircraft, which establishes the parameters determining design standards for future airport improvements.

COVID-19

This forecast was prepared during the Coronavirus Disease 2019 (COVID-19) pandemic. The anticipated effect of COVID-19 on the forecast is discussed in detail in Section 5 of this report.

3. SOCIOECONOMIC PROFILE

The FAA requires that planners who are preparing or updating aviation forecasts consider factors affecting aviation activity such as socioeconomic data, demographics, and geographic attributes (FAA, 2015). An understanding of the socioeconomics of the airport and the region is required to understand how the population or economic growth impacts airport activity.

The Birchwood Airport is located in Chugiak, a suburb within the MOA in southcentral Alaska. Users of the Birchwood Airport are primarily residents of the MOA and Matanuska-Susitna Borough (MSB).

The AASP identifies the Birchwood Airport as a Local NPIAS High Activity airport – also called a GA airport (DOWL, 2015). The businesses at the airport support the aviation community by providing basic goods and services such as airplane parts manufacturing, maintenance, repairs, fuel sales, and pilot training (Northern Economics, 2020). Services offered at the airport both attract aviation activity and rely on aviation activity to remain in business. As such, the general purpose of the airport is to provide space and opportunity for recreational aviation. The socioeconomic profile was performed as part of the Airport Master Plan update and is relevant to this forecast because recreational aviation has historically been tied directly to the economic and demographic trends in the study area.

Population

The historic and forecasted population trends for the MOA and MSB are discussed in Sections 5 and 7 of this report. As discussed in those sections, the rate of population growth in the MOA and MSB is anticipated to have a direct relationship to the level of aviation activity at the airport.

Economic Activity

The local Chugiak economy is tied closely to the economic conditions and opportunities within the MOA and MSB, especially the communities of Anchorage, Palmer, and Wasilla. The Chugiak area is a residential area with little commercial or industrial activity.

Chugiak is part of the Anchorage School District, and K-12 schools are located within the community. Chugiak also has multiple churches, a post office, a grocery store, and a shooting range contributing to the local economy.

In the January 2021 edition of the *Alaska Economic Trends Magazine*, the Alaska Department of Labor and Workforce Development (ADLWD) reports that an estimated 27,200 jobs have been lost throughout Alaska due to the COVID-19 pandemic. Approximately 14,000 of these jobs were lost in the Anchorage area. The ADLWD estimates that Anchorage will experience 3.1 percent economic growth in 2021 as the state recovers from the downturn caused by the pandemic (ADLWD 2021). This short-term growth is expected to bring economic activity back to pre-pandemic levels and is not expected to result in additional aviation activity at the airport.

No new economic drivers have been identified for the Chugiak area, and the economic growth is anticipated to align with population growth for the study period.

4. OTHER AIRPORT ACTIVITY FORECASTS

When preparing an aviation activity forecast, the FAA requires that TAF, previous forecasts, and state or local aviation system plan forecasts be considered (FAA, 2015). For the Birchwood Airport, relevant data from the 2005 Draft Birchwood Airport Master (2005 Master Plan), the 2011 AASP forecast, and the FAA's TAF forecast was considered and compared to the 2020 baseline data developed in this report. A discussion and comparison to each forecast are included below.

2005 Draft Birchwood Airport Master Plan (DOT&PF, 2005)

The forecast included in the 2005 Draft Master Plan covered a planning period from 2000 to 2020 and is shown in Table 4.1. This forecast was based on field observations collected by the FAA Air Traffic Division in 2000 and HDR in 2001.

In 2000, the FAA responded to a request for an air traffic control tower at Birchwood Airport by performing an air traffic count survey. The survey took place over ten days spread out between May 23 and September 1. The survey recorded 1,662 operations spread over 75 hours during the ten days. The FAA did not differentiate between take-offs, landings, and training operations.

In 2001, HDR Inc. performed an air traffic count survey over eight days between July 5 and September 4. This survey separated training operations from take-offs and landings. In all, 557 operations were observed over 41 hours during the course of eight days. Of the operations observed by HDR, 224 (40%) were training operations. The operations and training operations were used to develop an hourly average volume of operations and training operations. A yearly average was calculated by multiplying the hourly average by the number of annual daylight hours between civil twilight. Therefore, the 2005 Draft Master Plan included both operations and training operations (touch-and-go operations) to develop the yearly baseline aviation activity estimate. The 2005 Draft Master Plan also assumed that one-third of the baseline traffic was local and two-thirds were itinerant. Military operations were determined based on the Airport Master Record showing "<1%" military operations.

The 2005 Draft Master Plan concluded that there is insufficient accurate historical aviation activity data for Birchwood Airport to perform a regression analysis. Therefore, future aviation activity was forecasted based on growth scenarios correlated directly to population trends in the region. The moderate growth forecast scenario used closely corresponded with the annual average population growth for the region of 1.2% per year in the 15 years before the 2001 base year. A summary of the 2005 Draft Master Plan is included in Table 4.1 below.

The 2005 Draft Master Plan found no air carriers were operating or anticipated to start operating at the airport and did not forecast any enplanements. Actual operation counts from the BTS were not available for Birchwood Airport, which confirmed that no reporting air carriers were providing scheduled service at the airport during that time.

The existing and ultimate critical aircraft for each runway was identified for the planning period. For Runway 02L/20R (then called 01L/29R), the current and ultimate critical aircraft was determined to be a B-II to accommodate a fleet mix of small aircraft, including Piper Navajo (B-I), Piper Aztec (B-I), and Beechcraft M18 (A-II). For Runway 02R/20L, the critical aircraft was identified as A-I based on a fleet mix of tundra tire or ski-equipped aircraft such as Piper PA-12 and Piper PA-18.

Table 4.1: 2005 Birchwood Airport Master Plan Forecast

Aircraft Operations Forecast				
	Base Year Estimate	<i>Projected</i>		
<u>Category</u>	<u>2000</u>	<u>2005</u>	<u>2010</u>	<u>2020</u>
Air Carrier	0	0	0	0
Air Taxi	2,200	2,346	2,494	2,785
GA	83,808	89,378	94,949	106,888
Military	100	107	113	127
Total operations	86,108	91,831	97,554	109,000
Based Aircraft	435	491	509	560

In summary, the 2005 Draft Master Plan used data sets for observed airport activity to establish the base year level of operations. One of the data sets used (data collected in 2000) included touch-and-go operations, which resulted in a higher level of operations assumed in the base year. Current FAA guidance does not allow training operations to be used in critical aircraft determination. Therefore, the 2005 base year and forecasted operations cannot be used as an accurate comparison to the 2020 aviation counts gathered for this forecast.

Alaska Aviation System Plan Forecast (2011)

The AASP is a planning document that establishes the vision for Alaska’s aviation network by addressing aviation infrastructure and policy needs. The AASP identifies airport improvements needed and establishes funding priorities. The AASP includes documents of the condition of the aviation system with photos, maps, and data and is continuously updated as planning, design, and construction projects are completed.

The AASP includes a statewide aviation activity forecast published in 2011, which consists of a high-level forecast for the Birchwood Airport. The AASP forecast is based on the historic FAA data for hours flown and based aircraft in Alaska compared to the rest of the United States. The AASP forecast then uses the correlation between hours flown and based aircraft to estimate operations for Alaska as a whole. Next, specific data for the Birchwood Airport is derived from the number of based aircraft at the airport. The based aircraft data used in this analysis is provided from the FAA Airport Master Record data (5010).

The 2011 final AASP forecast reported that there is no reliable year-by-year record of based aircraft by borough or census area. Therefore, the number of based aircraft in each borough was assumed to increase with the population forecast for that borough/census area.

The 2011 AASP forecast includes forecasts for 2008-2030 for enplanements, operations, and based aircraft. The AASP identified the Cessna 185 as the most common aircraft in Alaska based

on registration records; it was therefore assumed to be the critical aircraft at airports that do not have commercial service.

Birchwood Airport lacks commercial service, so the Cessna 185 (A-I (small)) was identified as the study period’s existing and ultimate critical aircraft. The AASP forecasted activity specific to Birchwood Airport is summarized in Table 4.2 below.

Table 4.2: 2011 AASP Forecast for Birchwood Airport

Aircraft Operations Forecast				
	Base Year Estimate	<i>Projected</i>		
<u>Category</u>	<u>2008</u>	<u>2015</u>	<u>2020</u>	<u>2030</u>
Air Carrier	0	0	0	0
Air Taxi	0	0	0	0
GA	36,525	36,043	38,330	46,047
Military	0	0	0	0
Total operations	36,525	36,043	38,330	46,047
Based Aircraft	307	316	330	367

Birchwood Airport was not one of the airports studied in detail when the AASP forecast was prepared for the State of Alaska, and no local counts were performed at Birchwood Airport for the AASP. The method used to establish base level estimates in the AASP relied on statistical information for the State of Alaska and applied that information to the Birchwood Airport based on the number of based aircraft reported the 5010 Master Record. The information used for this forecast is based on recently observed operation levels at the Birchwood Airport and provides more accurate and detailed information than what is available in the AASP.

FAA Terminal Area Forecast (2019)

The FAA maintains TAF for non-hub airports using modeling based on the number of based aircraft present at the airport. The TAF is the official FAA forecast of aviation activity for active U.S. airports in the NPAIS, including Birchwood Airport. The TAF is updated frequently based on historic traffic information. Birchwood Airport is a non-towered airport, so no direct traffic records are available from Air Traffic Control. With the lack of specific reported information, the TAF for non-primary airports, such as Birchwood, is developed by applying a zero percent growth rate for the duration of the study period from the baseline operation data obtained from the 5010 Master Record. The May 20, 2021, 5010 Master Record estimates 70,188 operations annually for Birchwood (FAA, 2021b).

The quality of the TAF forecast depends on the quality of the estimated aviation activity data entered into the Master Record. Without knowing the source of the operational data entered into

the Master Record in 2011 and knowing that the TAF does not consider local economic trends, the TAF is not a sufficient forecasting tool for the Birchwood Airport.

5. CURRENT AND HISTORICAL AVIATION ACTIVITY DATA

Birchwood Airport does not have an air traffic control tower, so airport activity information must be derived from other sources. For this forecast, scheduled operations, air taxi operations, automatic air traffic counts, local and itinerant operations, and population trends were analyzed to establish a baseline of aviation activity at the airport.

Air Carrier Operations

Scheduled airport activity data is collected in the BTS's "T-100 Domestic air carriers" database. All certificated air carriers that offer scheduled service submit a report to BTS each month. FAA includes this information in the Air Carrier Activity Information System (ACAIS). On-demand-only operators are not required to submit monthly reports and cannot be expected to be fully represented in the database. Birchwood Airport is not included in the "T-100 Domestic air carriers" database, indicating no scheduled passenger and cargo services operate at the airport. This lack of scheduled passenger and cargo operations at the airport was confirmed through interviews with the Airport Manager and airport users.

Air Taxi Operations

The FAA collects data for air taxi operations through the FAA "Airport Activity Survey of Air Taxi/Commercial Operators" (FAA, 2019b). This survey is completed annually voluntarily, and the results are contained in the ACAIS. Birchwood air taxi enplanements recorded in the ACAIS show that there were between 140 to 450 air taxi enplanements annually from 2003 to 2012. These enplanements were likely related to guided hunting and fishing trips operated by airport user Dennis Harm. Mr. Harm stated that he stopped flying for guide operations around 2012, and no enplanements were reported at Birchwood between 2013 and 2018. A total of 6 enplanements were reported in 2019, and zero enplanements were reported in 2020 (FAA, 2020a).

The tenant 70 North provides Air Taxi operations for Anchorage and locations throughout the North Slope Borough at the Birchwood Airport. In an interview, 70 North indicated that their operations at Birchwood Airport are limited to the maintenance and repair of their aircraft fleet.

Therefore, the minimum number of six taxi enplanements from 2019 is considered representative of recent air taxi activity and is included in the baseline forecast (FAA, 2020a).

Automatic Air Traffic Counts

On July 21, 2020, the DOT&PF installed an automatic air traffic counter at the combined airport maintenance building and fire station, which is located on airport property. Data was collected on the counter using a General Audio Recording Device (G.A.R.D.) – an activity counting tool produced by Invisible Intelligence, LLC. The automated counter collected and recorded radio transmissions and operations through radar surveillance based on active aircraft transponders.

The G.A.R.D. software can generate reports for hourly, monthly, and yearly airport traffic for a designated reporting period. The software cross-references transponders with the FAA's Automatic Dependent Surveillance-Broadcast (ADS-B) registry to identify the particular make and model of the aircraft recorded. Aircraft without ADS-B transponders are assigned unique "S" codes when entering the radar surveillance area. No make or model information is available for aircraft recorded with "S" codes, and the aircraft information is represented as "unknown" on

the traffic counter reports. Based on interviews with airport users, aircraft without transponders are typically small aircraft, and all “unknown” are represented as A-I (small) aircraft for the purposes of this forecast.

The DOT&PF recorded aviation activity data on the airport for two recording periods. The first recording period lasted 27 days between July 21 and August 16, 2020. The second recording period lasted 31 days between September 2 and October 2, 2020.

Like all automatic counters, the G.A.R.D. automated counting system logs triggering events. In the case of the G.A.R.D. system, radio transmission events are logged when the transmission occurs within a pre-set range from the airport. Each event is logged together with the location and ADS-B transponder code or S-Code. This method allows for the identification of aircraft make and model of all transponder-equipped aircraft. There are limitations with the counting system, as it relies on computer function and storage. When installed without Wi-Fi or internet connection, remote connection to confirm continued operation is not possible. The data stored does not distinguish between take-offs and landings, nor can it differentiate between local and itinerant operations. Since every transmission is logged, often with only seconds between log entries, the data must be analyzed and sorted to remove duplicate entries for every operation. Training operations are identified by measuring the time between operations for each distinct aircraft. When the same aircraft has multiple operations only separated by under 10 minutes, it is assumed that the pilot is practicing touch-and-go operations.

Roughly 80% of the recorded aviation activity was related to training (touch-and-go operations). Table 5.2 outlines the recorded training operations. While this information was not included in the operations count to determine the critical aircraft per AC 150/5000-17, it was considered when evaluating airfield demand.

The G.A.R.D automated counter recorded 1,330 operations over 27 days at the Birchwood Airport from July 21 to August 16, 2020. The G.A.R.D recorded 618 operations during a separate reporting period spanning 31 days from September 2 to October 2. The activity count periods and results are summarized in Table 5.1.

Table 5.1: Activity Counts

G.A.R.D. Counts		
	G.A.R.D. Count 1	G.A.R.D. Count 2
Dates	7/21/20 – 8/16/20	9/2/20 – 10/2/20
Number of Days	27	19
Recorded Operations	1,330	618
Average Ops/Day	49.5	32.5

Table 5.2: Touch-and-Go Training Activity Counts

G.A.R.D. Counts		
	G.A.R.D. Count 1	G.A.R.D. Count 2
Dates	7/21/20 – 8/16/20	9/2/20 – 10/2/20
Number of Days	27	19
Recorded Operations	5,875	2,341
Average Ops/Day	218	140

An annual projection of yearly operations was developed by assuming that the two distinct reporting periods represent typical aviation activity levels in the summer months and winter months, respectively. Summer operations were assumed to occur during the 99 days between Memorial Day and Labor Day. Winter operations were assumed to occur during the 266 days between Labor Day and Memorial Day. Assuming 49.5 operations per day during the summer and 32.5 operations per day during the winter results in an annual average of 13,545 operations a year (Table 5.3).

Table 5.3: Estimated 2020 Operations

Summer vs. Winter Activity			
	Summer Activity	Winter Activity	Yearly Activity
Assumed Duration	5/25/20 – 9/07/20	9/07/20 – 5/31/21	
Average Ops/Day	49.5	32.5	
Average Training Ops/Day	218	120	
Number of Days Assumed	99	266	
Extrapolated Subtotal Operations Per Period	4,900	8,645	
Extrapolated Subtotal Training Operations Per Period	21,582	31,920	
Estimated Annual Ops			13,545
Estimated Annual Training Ops			53,700

On August 21, 2020, a visual 5-hour count of aviation activity was also completed at the Birchwood Airport. All operations were logged with an exact timestamp and were separated by landing or take-off events and by which Runway was used. Operations were not separated between local, itinerant, or training operations. A total of 182 operations were observed during the 5-hour period. This count is slightly higher than but comparable to the combined total operations and training operations on other recorded days. The intention of the visual count was to use the result as a control of the automatic counter. Unfortunately, the automatic counter was not operational on that day, and the data cannot be compared alongside the automatic counts. Since the visual counts are so limited in duration, they are not suitable as more than a comparison to the counts collected by the G.A.R.D. system.

The estimated annual operations derived from the traffic count information do not align with the previous forecasts included in the 2005 Draft Master Plan, the 2011 AASP, or the current TAF. The 2005 Draft Master Plan forecasted 109,000 operations in 2020 (see Table 4.1 above). The AASP forecasted 38,330 annual operations in 2020, and the TAF reports 35,044 operations in 2020 (unchanged from 2011). Multiple reasons are possible for the disparity in operations between these four forecasts. The data sets for this forecast and the 2005 forecast are limited to observed or recorded operations at the time and for the duration of the data collection interval. Also, the 2005 Draft Master Plan Forecast includes training operations. The AASP and TAF forecasts both rely on the reported based aircraft to develop aircraft operations. Therefore, these prior forecasts were not deemed to be compatible sources of historic aviation activity at Birchwood Airport.

The COVID-19 pandemic could have also impacted operations at the Birchwood Airport. However, it is difficult to estimate and quantify the impact without historical observation data from the previous years. Logically, economic hardships and quarantine requirements associated with the pandemic reduced the number of operations and commercial passenger enplanements, as reported throughout the aviation industry in Alaska (BTS, 2021a). However, both of the

recording intervals at the Birchwood Airport were completed outside of the MOA “Hunker Down” emergency orders in response to COVID-19, so the impact of MOA emergency orders was not captured in the dataset. Local users reported that airport activity during the recording time was similar to previous years. C2 Aviation LLC, the sole fixed-base operator and fuel provider at the Birchwood Airport, reported that the volume of aviation fuel sales was similar in 2020 to pre-pandemic levels. Therefore, the impact of COVID-19 on GA operations was assumed to be minimal, and no adjustment was made in the forecast.

Local vs. Itinerant Operations

The G.A.R.D collected data were sorted based on the location of the owner’s residence to determine the ratio of local verse itinerant operations at the Birchwood Airport. This information is reflected in Table 5.4 below.

Table 5.4: Operations by Aircraft Owner’s Address

G.A.R.D. Counts		
	G.A.R.D. Count 1	G.A.R.D. Count 2
Dates	7/21/20 – 8/16/20	9/2/20 – 10/2/20
Number of Operations	1,330	618
MOA and MSB address	490	284
CAP	313	39
Other State	256	62
Unknown	271	233
Percent local Operations	60.4%	52.3%

The amount of local and itinerant information presented above considers that the CAP uses local aircraft. These aircraft are not registered locally but are used by the local chapter and based at Birchwood Airport while on rotation to the local chapter.

Based on the information shown in Table 5.3 above, local GA operations are assumed to be between 50% and 60% of Birchwood Airport’s estimated operations.

Historical Population

Since records of annual landings and operations maintained at Birchwood Airport are not available, this forecast relies on operation counts and their correlation to projected population trends to forecast changes in aircraft activity. A review of leasing data shows that lease tenants at Birchwood Airport live in the MOA and, to a lesser extent, the nearby communities in the MSB. The forecast methodology and the relationship between forecasted population growth and aviation activity are discussed in detail in Section 7 of this report.

Table 5.5 shows ADLWD historic population data from 2010 to 2020.

Table 5.5: Historical Population Trends 2010 - 2020

2010 - 2020 Population Trends												
	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	Average Annual % Change
MOA	291,826	295,713	298,306	301,223	300,252	298,933	299,330	298,176	294,973	292,487	288,970	-0.098
MSB	88,995	91,712	93,664	95,948	96,268	100,144	102,839	104,607	105,685	106,782	107,305	1.89
MOA + MSB	380,821	387,425	391,970	397,171	398,520	399,077	402,169	402,783	400,658	399,269	396,275	0.397

Source: ADLWD Population Estimates Cities and Census Designated Places, 2010 to 2020

Local economic conditions for the 20-year planning horizon are forecasted to remain much as they are today. ADLWD projected an annual population growth of the MOA and MSB of 0.6% between 2010 and 2045 (Northern Economics, 2021). Based on the DOT&PF approved methodology discussed in Section 7 of this report, these projected growth rates will forecast future operations at the Birchwood Airport.

6. AIRCRAFT FLEET

The aircraft fleet in this forecast was developed from the mix of aircraft reported by the G.A.R.D automated counter during the two periods of observation in the summer and fall of 2020 and confirmed with a series of interviews with airport users, tenants, and business owners. Training operations have not been included in the fleet mix data. The G.A.R.D fleet mix data is shown in Table 6.1 below.

Table 6.1: Aircraft Mix at Birchwood Airport 2020

G.A.R.D. Counts		
	G.A.R.D. Count 1	G.A.R.D. Count 2
Dates	7/21/20 – 8/16/20	9/2/20 – 10/2/20
Number of Operations	1,330	618
A-I	1,309	603
A-II	0	6
B-I	3	4
C-I	1	0
C-II	4	0
Helicopter	13	5
Military/Federal (A-I)	14	2

As discussed in Chapter 5 above, operations recorded by aircraft without transponders are assumed to be performed with small aircraft and have been included as A-I operations. There are no based air carriers providing passenger or cargo services from Birchwood Airport, and no tenants expressed a desire to begin providing air carrier operations.

Military

In interviews, airport users indicated that there are currently no military operations at Birchwood Airport, which is also supported by the ownership information for the aircraft recorded by the G.A.R.D. There are no military operations in the recorded aviation activity data.

Federal

There were 16 operations in this dataset by aircraft owned by the U.S. Department of Interior, Office of Aviation Services. Two aircraft were used in these operations, a Cub Crafters CC18-180 and a Cessna U206. FAA policy prohibits the inclusion of operations with military or federally-owned aircraft in critical aircraft determination. (FAA, 2019b section 3-11). These operations are considered federal/military operations in this forecast and are not included in the operational statistics under the respective category.

State of Alaska

The dataset also includes one helicopter operation with a Eurocopter AS 350 owned by the State of Alaska. As state agencies are not excluded from funding eligibility, this operation is included in the operational statistics above.

Helicopter

Based on interviews, helicopter traffic at Birchwood Airport mainly consists of operations with helicopters based at other airports. The data from G.A.R.D. identified 18 operations during the recorded periods. The amount of helicopter operations does not rise to the level of critical aircraft.

Balloons

The data from G.A.R.D. identified one operation by a balloon. Based on interviews, this operation appears to be an anomaly, and there is no balloon activity reported by airport users or DOT&PF M&O staff. Balloon operations are not included in the aviation activity forecast.

Based Aircraft

The airport Master Record shows that there are currently 308 aircraft based at the airport (FAA, 2021b).

There are 118 leasable tie-downs on the GA aprons at the airport. DOT&PF's Statewide Aviation Leasing Office records indicate that all of the existing GA tie-downs are regularly leased during the summer months. DOT&PF Leasing also stated that there is existing demand for an additional approximately 20 additional tie-down spaces.

The 2005 Draft Master Plan reported a total of 45 lease lots on the Birchwood Airport. The aerial imagery used in the Master Plan shows a total of 38 hangar buildings (DOT&PF, 2005). Lease records from June 2020 show that there are currently 67 lease lots (DOT&PF, 2020a) with approximately 70 buildings, including T-hangars and single hangars.

A count of aircraft visible in 2020 aerial photography shows 237 occupied tie-downs on the GA aprons and private lease lots. The visual count does not account for aircraft located inside hangars. A count of hangar doors on the airport buildings indicates as many as 136 hangar units. There could be as many as 373 based aircraft at the Birchwood Airport, assuming one aircraft per hangar door. However, to get an accurate count would require access to all hangars and interviews with all tenants, which is beyond the scope of this study. Therefore, the current 5010 Master Record is considered to be the best source of data available for aircraft based at the Birchwood Airport, and 308 based aircraft was used as the baseline for the forecast.

7. BIRCHWOOD AIR TRAFFIC FORECAST

The goal of an aviation activity forecast is to use observed trends at the airport to project the estimated baseline year operations forward to the end of the study period. The forecasted aviation activity is also used to determine the ultimate critical aircraft. In cases where the critical aircraft is expected to change, it is also important to estimate the timing of the change as this may trigger the need to modify airport facilities, such as runways, taxiways, and aprons.

This aviation forecast will be used to 1) compare demand as it changes over time with the capacity of airport facilities and 2) identify the time or activity levels when new or expanded facilities are needed.

As discussed above, the baseline for the forecast was developed through evaluation of air carrier reporting, recorded instrument flight plans, operational counts, and interviews with air carriers and airport users. The methods used for this forecast are further discussed in the forecast methodology section below.

Forecast Methodology

There are several methodologies and techniques for forecasting aviation activity at an airport. These methodologies are described in an FAA document titled Forecasting Aviation Activity by Airport (2001). The chosen methodology for this forecast is trend analysis and extrapolation.

The forecast methodology approved by the DOT&PF and the FAA in November 2020 consisted of comparing actual operation counts collected by the DOT&PF with the forecasted aviation activity reported in the 2005 Draft Airport Master Plan and the 2011 AASP to see if a correlation or regression analysis could be established. However, after comparing the 2005 Draft Master Plan, the 2011 AASP Forecast for Birchwood, and the aviation activity recorded by the DOT&PF in 2020, it was determined that there is no direct correlation between the two previous forecasts and the currently recorded data. The difference between the three data sets is shown in table 7.1 below.

Table 7.1 Birchwood Airport Master Plan Base Year Activity

Airport Activity in 2005, 2011, 2020			
	2005 AMP	2011 AASP	2020 G.A.R.D
<u>Base year</u>	<u>2001</u>	<u>2008</u>	<u>2020</u>
Enplanements	0	0	6
Air Taxi	2,200	0	0
GA	83,808	36,525	13,545
Military	100	0	0
Total operations	86,108	36,525	13,545
Based Aircraft	433	307	308

The lack of correlation between the data from the previous forecasts and the 2020 data is likely due to the varying methodologies used to establish the baseline forecasts. There is no clear correlation between the data points, and a regression analysis is therefore unlikely to produce reliable data that can be used to forecast aviation activity at Birchwood Airport for the study period. This conclusion matches the conclusions from the 2005 Draft Master Plan and the 2011 AASP forecasts, which also found that there is not a sufficient amount of historic aviation operation data available at Birchwood Airport to generate a regression analysis for a reliable forecast.

Likewise, using trends with based aircraft to establish a regression analysis at the Birchwood Airport will also not produce an accurate trend line for future forecasting. The airport has been reported at maximum capacity for tie-down lease space since the conclusion of the 2005 Draft Master Plan, and the number of based aircraft has been limited by the tie-down and lease space available.

Therefore, the forecasting methodology based on historic population trends used in both the 2005 Draft Master Plan and the AASP remains the best indicator for future aircraft activity at the Birchwood Airport at this time.

As discussed in the “Local vs. Itinerant Operations” section above, the majority of airport users at Birchwood Airport reside in the MOA or the Matanuska Susitna Borough (MSB), as confirmed by a review of airport leases and G.A.R.D. recorded activity data. Therefore, ADLWD records of historic population and forecasted population, economic, and local aviation trends for the MOA and the MSB were used to project the 2020 baseline operations at Birchwood Airport.

Population and Economic Trends

According to the ADLWD, the population in the MOA – which includes Chugiak – and the population in the MSB are expected to continue increasing over the next decade as the number of births and in-migration exceeds the number of deaths and out-migration. Although population trends are positive, they will likely be tempered in the short term by a tightening of limited employment opportunities because of the effects of COVID-19. The outlook for the local economy should improve as vaccines are available, and the long-term effects of COVID-19 are considered negligible for this forecast's purposes.

Local economic conditions for the 20-year planning horizon are forecasted to remain much as they are today. According to airport users, the fleet serving the airport is unlikely to change. The ADLWD population forecast predicts population in the region will continue to increase at a rate of 0.6% between 2019 and 2045. Table 7.2 provides the ADLWD population forecasts for MOA and MSB (Northern Economics 2021).

Table 7.2: ADLWD Population Forecast for MOA and MSB

Population Forecasts						
	2020-2025	2025-2030	2030-2035	2035-2040	2040-2045	2020-2045
MOA	0.5%	0.3%	0.2%	0.1%	0.1%	0.2%
MSB	1.9%	1.6%	1.5%	1.3%	1.1%	1.5%
Study Area	0.9%	0.7%	0.6%	0.5%	0.4%	0.6%

Aviation Trends

Costs and regulations have been increasing in the aviation industry. Nationally, fewer people are becoming certified pilots, and the average age of pilots is rising (the current average age is about 50 years). An annual FAA survey of GA and air taxi pilots shows that the number of active aircraft and average use of each aircraft has declined slightly over the past 10 years. (FAA 2019).

Air traffic in general across the nation has been decreasing. Ratios of pilots and based aircraft to the population have decreased consistently for many years and will likely continue to decline. The average annual growth rate for all areas between 2008 and 2019 has been approximately -1% per year.

However, based on interviews with the DOT&PF's Leasing staff, it appears that the Birchwood Airport has not followed the declining national trend in aviation activity. There is a continued demand for both hangar and tie-down leases at the airport. Leasing reported that while there is seasonal variability in tie-down leases, all GA tie-downs are occupied each summer, and there is currently an unmet seasonal need of about 20 tie-down spaces. Leasing does not maintain a waitlist for tie-downs in general, but waitlists are maintained for pilots who desire to move to a different tie-down.

Leasing receives one or more calls each month inquiring about leasable land for hangars. But with no land available, no waitlist is maintained. Also, the Facility Standards Report prepared as part of this Master Plan Update determined that there is a forecasted need for 25 additional lease lots in the next 10 years to satisfy unmet demand.

Based Aircraft

The forecast for based aircraft assumes that the unmet need for tie-downs and lease lots will be satisfied over the next ten years. This forecast considers an overall trend for based aircraft that matches the population trends shown in table 7.2 above for the 20-year planning horizon. However, assuming additional apron areas are developed in the near term to satisfy the unmet demand, an additional 20 aircraft are added to the year five based aircraft forecast, above the overall growth trend projected. Likewise, assuming additional lease areas will be available in approximately ten years and that the majority of lease lots will be developed for single hangar use, an additional 25 aircraft are added to the year ten based aircraft forecast, above the growth projected, to satisfy unmet lease lot demand.

Trend Line Development

The FAA recognizes that socioeconomic factors impact aviation activity trends while increasing population and a growing economy enables aviation growth.

Low, moderate, and high growth rates for air traffic at the Birchwood Airport follow the trend lines developed by Northern Economics. (Northern Economics, 2021) The low rate represents 32.4% of the baseline projection. The baseline projection aligns with the average combined growth rate for both the MOA and MSB. The high growth rate is scaled to 133.5% of the baseline projection.

There are no air carriers currently offering scheduled passenger operations from Birchwood Airport. Interviews conducted with Airport tenants indicated only occasional air taxi operations. Since the variations are irregular from year to year, no change from the 2019 recorded enplanements is forecasted.

Table 7.3 presents the low, moderate, and high growth rates developed for the Birchwood Airport air traffic forecasts for the study period (Northern Economics, 2021).

Table 7.3: Annual Growth Rates for Birchwood Airport 2020 - 2040

Annual Growth Rate (Percent)			
<u>Years</u>	<u>Low</u>	<u>Base</u>	<u>High</u>
2020-2025	0.28%	0.86%	1.14%
2025-2030	0.22%	0.67%	0.89%
2030-2035	0.18%	0.57%	0.76%
2035-2040	0.16%	0.48%	6.40%
2040-2045	0.13%	0.39%	0.53%

Table 7.4 provides a forecast for Birchwood Airport. Note that the counts presented in the table do not include training operations. Enplanements in the forecast are based on the air taxi report for 2019.

Table 7.4: Air Traffic Forecast Birchwood Airport 2020 - 2040

Air Traffic by Type					
	<u>2020</u>	<u>2025</u>	<u>2030</u>	<u>2035</u>	<u>2040</u>
Enplanements					
Low Forecast	6	6	6	6	6
Moderate Forecast	6	6	6	6	6
High Forecast	6	6	6	6	6
Based Aircraft					
Low Forecast	308	<i>332</i>	<i>361</i>	<i>364</i>	<i>367</i>
Moderate Forecast	308	<i>341</i>	<i>378</i>	<i>389</i>	<i>398</i>
High Forecast	308	<i>346</i>	<i>387</i>	<i>402</i>	<i>415</i>
Local GA Operations					
Low Forecast	8,056	<i>8,165</i>	<i>8,249</i>	<i>8,323</i>	<i>8,386</i>
Moderate Forecast	8,056	<i>8,408</i>	<i>8,693</i>	<i>8,944</i>	<i>9,161</i>
High Forecast	8,056	<i>8,526</i>	<i>8,912</i>	<i>9,256</i>	<i>9,556</i>
Itinerant GA Operations					
Low Forecast	5,489	<i>5,563</i>	<i>5,621</i>	<i>5,670</i>	<i>5,713</i>
Moderate Forecast	5,489	<i>5,728</i>	<i>5,925</i>	<i>6,088</i>	<i>6,230</i>
High Forecast	5,489	<i>5,806</i>	<i>6,067</i>	<i>6,300</i>	<i>6,507</i>
Helicopter Operations					
Low Forecast	118	<i>120</i>	<i>121</i>	<i>122</i>	<i>123</i>
Moderate Forecast	118	<i>123</i>	<i>127</i>	<i>131</i>	<i>134</i>
High Forecast	118	<i>125</i>	<i>131</i>	<i>136</i>	<i>140</i>
Operations - Total					
Low Forecast	13,545	<i>13,728</i>	<i>13,870</i>	<i>13,993</i>	<i>14,099</i>
Moderate Forecast	13,545	<i>14,136</i>	<i>14,618</i>	<i>15,032</i>	<i>15,391</i>
High Forecast	13,545	<i>14,332</i>	<i>14,979</i>	<i>15,556</i>	<i>16,063</i>

Note: Italicized text is used to indicate forecasted aviation activity.

Operations will reach 15,391 operations annually by 2040, based on projections from a base forecast scenario. Enplanements are not anticipated to change at Birchwood Airport.

Critical Aircraft

Table 6.1 above shows that aircraft with a maximum take-off weight (MTOW) of less than 12,500 pounds, an Aircraft Approach Category (AAC) of A, and an Aircraft Design Group (ADG) of I – that is A-I (small) – make up the 97-98% of operations at Birchwood Airport and are the only classification of aircraft with more than 500 operations annually. Appendix A contains the detailed G.A.R.D. counts. The critical aircraft is the same for Runway 02L/20R and Runway 02R/20L. Two aircraft models – Cessna 172 and Cessna 182 – were projected to have more than 500 annual operations each based on interpolated recorded aviation data. Both of these aircraft are A-I aircraft with MTOW of less than 12,500 pounds (Small). Therefore, based on the recorded operations and forecasted activity, A-I (Small) aircraft constitute both the existing and ultimate critical aircraft at Birchwood Airport.

Existing Critical Aircraft: A-I (Small)

Ultimate Critical Aircraft: A-I (Small)

The Approach and Departure Reference Code (DRC) for a runway are a measure of the largest aircraft that can operate on the runway while maintaining safety for aircraft simultaneously taxiing on a parallel taxiway (FAA, 2014). Based on visibility minima and separation between runway centerline and the parallel taxiways, the existing and ultimate Approach Reference Code (APRC) is B/I/5,000, and the DRC is B/I.

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Appendix A: Birchwood Airport Fleet Mix

Birchwood Airport Fleet Mix

<u>Manufacturer</u>	<u>Model</u>	<u>AAC</u>	<u>ADG</u>	<u>Jul-Aug Ops</u>	<u>Sep-Oct Ops</u>	<u>Summer Ops</u>	<u>Winter Ops</u>	<u>Total</u>
Aeronca	7BCM	A	I	0	1	0	14	14
Aviat Aircraft Inc	A-1B	A	I	8	7	29	98	127
Beech	76	A	I	9		33	0	33
Beech	BT36	A	I	3		11	0	11
Bellanca	7GCBC	A	I	4		15	0	15
Buckeye	Dream Machine II	A	I		1	0	14	14
Cessna	140	A	I	0	9	0	126	126
Cessna	150	A	I	22	14	81	196	277
Cessna	152	A	I	4	6	15	84	99
Cessna	170	A	I	26	7	95	98	193
Cessna	172	A	I	305	131	1118	1834	2952
Cessna	180	A	I	44	26	161	364	525
Cessna	182	A	I	339	47	1243	658	1901
Cessna	185	A	I	47	36	172	504	676
Cessna	206	A	I	1	0	4	0	4
Cessna	U206	A	I	12	7	44	98	142
Cessna Ector	305A	A	I	45	23	165	322	487
Cessna Textron	240	A	I	9	0	33	0	33
Cirrus	SR-22	A	I	9		33	0	33

Birchwood Airport Fleet Mix

<u>Manufacturer</u>	<u>Model</u>	<u>AAC</u>	<u>ADG</u>	<u>Jul-Aug Ops</u>	<u>Sep-Oct Ops</u>	<u>Summer Ops</u>	<u>Winter Ops</u>	<u>Total</u>
Columbia Aircraft Mfg	LC41-550FG	A	I	1		4	0	4
Davison Mackey LLC	SQ-2	A	I	5		18	0	18
DeHavilland	DHC-2 MK.1	A	I	4	2	15	28	43
Flightworks	Capella TD	A	I	1		4	0	4
FoxAir	Kitfox light sport	A	I	4	4	15	56	71
Freeman Matthew	Glastar	A	I	15	4	55	56	111
Gippsland	GA-8	A	I	2		7	0	7
Grumman	G-44A	A	I	1	1	4	14	18
Hallock Randy	CH 750	A	I	24	10	88	140	228
Mallia Jeff	Cozy JM MK III	A	I	0	2	0	28	28
Mark Goldberg	Bearhawk Patrol	A	I	1		4	0	4
Maule	M-4-220C	A	I	12	11	44	154	198
Maule	M-5-235C	A	I	7	0	26	0	26
Maule	M-6-235	A	I	4	4	15	56	71
Maule	M-7-235A	A	I	0	2	0	28	28
Navion	Navion H	A	I	0	1	0	14	14
Piper	PA 46-350P	A	I	1		4	0	4
Piper	PA-12	A	I	8	1	29	14	43
Piper	PA-18-105 Special	A	I	0	2	0	28	28

Birchwood Airport Fleet Mix

<u>Manufacturer</u>	<u>Model</u>	<u>AAC</u>	<u>ADG</u>	<u>Jul-Aug Ops</u>	<u>Sep-Oct Ops</u>	<u>Summer Ops</u>	<u>Winter Ops</u>	<u>Total</u>
Piper	PA-18-135	A	I	0	2	0	28	28
Piper	PA-18-150	A	I	21	17	77	238	315
Piper	PA-28-151	A	I	1		4	0	4
Piper	PA-28-235	A	I	2		7	0	7
Piper	PA-28R-200	A	I	11	4	40	56	96
Piper	PA-28RT-201T	A	I	6		22	0	22
Piper	PA-32-300	A	I	2		7	0	7
Piper	PA-34-200T	A	I	17		62	0	62
Protzman James	PA-18	A	I	1		4	0	4
Richmond Jim	Carbon Cub EX	A	I	2		7	0	7
Schuh Rodney J	BD-18-217	A	I	1		4	0	4
Stinson	108-3	A	I	2		7	0	7
Terry Holliday	THPA-13	A	I	4		15	0	15
Wicks	RV-8	A	I	0	1	0	14	14
Cessna Textron	208B	A	II	0	1	0	14	14
DeHavilland/ Viking	DHC-6-400	A	II		3	0	42	42
Pilatus	PC-12	A	II	0	2	0	28	28
Cessna	340A	B	I	1	4	4	56	60

Birchwood Airport Fleet Mix								
<u>Manufacturer</u>	<u>Model</u>	<u>AAC</u>	<u>ADG</u>	<u>Jul-Aug Ops</u>	<u>Sep-Oct Ops</u>	<u>Summer Ops</u>	<u>Winter Ops</u>	<u>Total</u>
Piper	PA-31-350	B	I	2		7	0	7
Learjet	45	C	I	1		4	0	4
Embraer	EMB-135ER	C	II	4		15	0	15
Bell Helicopter Textron Canada	407	Heli		1		4	0	4
Eurocopter	AS 350 B3	Heli		2		7	0	7
Hughes	369D	Heli		4		15	0	15
Messerschmitt- Bolkow-Blohm	BK 117 B-2	Heli		1		4	0	4
Robinson	R44	Heli		5	5	18	70	88
No Make Data		A	I	262	220	961	3080	4041
Mathematical Correction¹						21	-7	14
Total Operations				1,330	618	4,900	8,645	13,545
Federal (US Department of Interior)								
Cub Crafters Inc.	CC18-180	A	I	10		37	0	37
Cessna	U206	A	I	4	2	15	28	43

¹The mathematical correction is introduced to account for the accumulated discrepancy introduced by rounding the extrapolated number of operations for each manufacturer and model, as compared to applying the same extrapolation factors to the total operations per period.