Chapter 2

Forecasts

The definition of demand that may be reasonably expected to occur during the useful life of an airport's key components (e.g., runways, taxiways, terminal buildings, etc.) is an important factor in facility planning. In airport master planning, this involves projecting potential aviation activity in the near-term (1-5 years), intermediate (6-10), and long-term (11-20 years). Aviation demand forecasting for Baraboo-Wisconsin Dells Regional Airport (DLL) will primarily consider based aircraft, aircraft operations, and peak activity periods.

The Wisconsin Department of Transportation (WisDOT) Bureau of Aeronautics (BOA) reviews prepared aviation demand forecasts and design aircraft in conjunction with airport planning studies. Airport forecasts are compared to the *Terminal Area Forecast* (TAF) for the airport, as well as the *National Plan of Integrated Airports System* (NPIAS). The TAF and NPIAS are produced and updated regularly by the Federal Aviation Administration (FAA) and are used as a point of comparison for master plan forecasts. Even though the TAF is updated annually, in the past there was almost always a disparity between the TAF and master planning forecasts. This was primarily because the TAF forecasts are the result of a top-down model that does not consider local conditions, economic environments, or recent trends. While the TAF forecasts are to be a point of comparison for master plan forecasts, they serve other purposes, such as asset allocation by the FAA.

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

- Realistic
- Based on the most recent data available
- Reflective of the current and anticipated future conditions at the airport
- Supported by information in the study, and
- Able to provide adequate justification for airport planning and development

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

1) **Identify Aviation Activity Measures**: The level and type of aviation activity likely to impact facility needs. For general aviation airports, this typically includes total based aircraft and annual operations, as well as identifying critical design aircraft.
2) **Review Previous Airport Forecasts**: This may include the FAA TAF, state and/or regional system plans, and previous master plans, if applicable.
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 similar airports, survey techniques, cohort analysis, choice and distribution models, range projections, and professional judgement.
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**: Based aircraft and total operations are considered consistent with the TAF if they meet the following criteria:
    - Forecasts differ by less than 10 percent in the five-year forecast, and 15 percent in the 10-year forecast period, or
    - Forecasts do not affect the timing or scale of an airport project, or
    - Forecasts do not affect the role of the airport as defined in the current version of FAA Order 5090.5, *Formulation of the NPIAS and ACIP*.

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

The following forecast analysis for the airport was produced following these basic guidelines with the intent of identifying future based aircraft and annual operational demand levels, as well as identifying a critical design aircraft for use in developing facility design standards (Chapter Three). Existing forecasts are examined and compared against current and historical activity. Historical aviation activity is then examined along with other factors and trends that can affect demand. The intent is to provide an updated set of aviation demand projections for the airport that will permit airport management to make planning adjustments as necessary to maintain a viable, efficient, and cost-effective facility.

The forecast for this master plan will use a base year of 2022 with a planning horizon out to 2042.

NATIONAL AVIATION TRENDS

Each year, the FAA updates and publishes a national aviation forecast. Included in this publication are forecasts for the large air carriers, regional/commuter air carriers, general aviation, and FAA workload measures. The forecasts are prepared to meet the budget and planning needs of the FAA and to provide information that can be used by state and local authorities, the aviation industry, and the public. The current edition during the preparation of this master plan was *FAA Aerospace Forecast – Fiscal Years 2022-2042*. The FAA primarily uses the economic performance of the United States as an indicator of future aviation industry growth. Similar economic analyses are applied to the outlook for aviation growth in international markets. The following discussion is summarized from the *FAA Aerospace Forecast*.

Since its deregulation in 1978, the U.S. commercial air carrier industry has been characterized by boom-to-bust cycles. The volatility that was associated with these cycles was thought by many to be a structural feature of an industry that was capital intensive but cash poor. However, the Great Recession of 2007-2009 marked a fundamental change in the operations and finances of U.S. airlines. Since the end of the recession in 2009, U.S. airlines have revamped their business models to minimize losses by lowering operating costs, eliminating unprofitable routes, and grounding older, less fuel-efficient aircraft. To increase operating revenues, carriers initiated new services that customers were willing to purchase and started charging separately for services that were historically bundled in the price of a ticket. The industry experienced an unprecedented period of consolidation with three major mergers in five years. The results of these efforts were impressive: 2019 marked the eleventh consecutive year of profitability for the U.S. airline industry. Prior to the COVID-19 pandemic, there was confidence that the U.S. airlines had finally transformed from a capital intensive, highly cyclical industry to an industry that generates solid returns on capital and sustained profits.

The biggest factor affecting aviation trends currently is the ongoing effects of the COVID-19 pandemic. The effects of the pandemic on the aviation industry have been most devastating to the commercial airline operators, while segments of the general aviation industry, such as charters, air taxi, and fractional operators, appear to maintain pre-pandemic levels and, in many cases, show increases as people sought alternatives to flying commercially. At this point, uncertainty persists on what the long-term impacts of the pandemic will be on the aviation industry.

ECONOMIC ENVIRONMENT

Fundamentally, aviation demand is driven by economic activity. According to the FAA forecast, the COVID-19 pandemic caused a shrink in U.S. gross domestic product (GDP) in 2020 by 3.5 percent. This was accompanied by a 44.2 percent decrease in passenger enplanements, resulting in a combined operating loss of $32.1 billion for all passenger carriers. General aviation aircraft deliveries fell by 12.4 percent in 2020, general aviation activity fell by 8.0 percent, and the total number of operations at airports with control towers decreased by 16.7 percent compared to 2019.

Despite the largest decline in aviation activity since the jet era began in the late 1950s, the aviation industry has already shown signs of recovery from the COVID-19 pandemic. As of this writing, daily airline passenger enplanements (as measured by TSA screening counts) consistently measure more than double the amount from same-day 2020 numbers; however, passenger counts have yet to consistently return to 2019 levels. The FAA *Forecast* calls for U.S. domestic passenger counts to grow at an average annual rate of 4.9 percent. This includes double-digit growth in 2022 and 2023 as activity climbs out of the low base of 2020. Domestic passengers are forecast to return, on an annual basis, to 2019 levels in 2023.

General aviation (GA) was less affected by the pandemic, as those who could afford private aviation were attracted to the alternative over commercial travel. New student, private, and commercial pilots helped to increase the total number of pilots in 2021, and aircraft deliveries rose from their 2020 levels. The active general aviation fleet is expected to increase slightly (0.1 percent) between 2022 and 2042, while operations at towered airports are forecast to grow 1.5 percent a year over the forecast period.

Although the long-term outlook for both GA and commercial air travel activities is positive, it remains to be seen how the FAA will continue to evaluate and adjust these forecasts as the impacts of the ongoing COVID-19 pandemic, as well as the war in Ukraine, continue.

FAA GENERAL AVIATION FORECASTS

The FAA forecasts the fleet mix and hours flown for single and multi-engine piston aircraft, turboprops, business jets, piston and turbine helicopters, light sport, experimental, and other aircraft (gliders and balloons). The FAA forecasts “active aircraft,” rather than a total number of aircraft. An active aircraft is one that is flown at least one hour during the year. From 2010 through 2013, the FAA undertook an effort to have all aircraft owners re-register their aircraft. This effort resulted in a 10.5 percent decrease in the number of active general aviation aircraft, mostly in the piston category.

The long-term outlook for general aviation is promising, as growth at the high-end offsets continuing retirement of aging aircraft at the traditional low end of the segment. The active general aviation fleet is forecast to remain relatively stable between 2022 and 2042. The largest segment of the fleet – fixed-wing piston aircraft – is predicted to shrink over the forecast period due to unfavorable pilot demographics, increasing cost of ownership, the availability of lower-cost alternatives for recreational uses, and new aircraft deliveries not keeping pace with the retirement of aging aircraft. Conversely, turbine aircraft, including helicopters, is projected to grow the most due to steady growth in both U.S. GDP and corporate profits. The total number of GA hours flown is also forecasted to increase by 31.4 percent from 2020 to 2042.

Table 2A shows the primary general aviation demand indicators as forecast by the FAA. Each segment is discussed below.

TABLE 2A | FAA General Aviation Forecast

Demand Indicator	2022	2042	CAGR
General Aviation Fleet			
Total Fixed-Wing Piston	133,815	112,915	-0.85%
Total Fixed-Wing Turbine	26,480	38,455	1.88%
Total Helicopter	9,955	13,530	1.55%
Total Other (experimental, light sport, etc.)	34,340	44,005	1.25%
Total Active Aircraft	***204,590***	***208,905***	***0.10%***
General Aviation Operations			
Local General Aviation	13,731,399	15,767,539	0.69%
Itinerant General Aviation	14,569,014	16,259,605	0.55%
Air Taxi/Commuter	6,284,713	6,966,613	0.52%
Total General Aviation Operations	***34,585,126***	***38,993,757***	***0.60%***
CAGR: Compound Annual Growth Rate			

Source: FAA Aerospace Forecast, 2022-2042

General Aviation Fleet Mix

For 2022, the FAA estimates there are 133,815 piston-powered fixed-wing aircraft in the national fleet. This number is projected to decline by 0.85 percent annually, resulting in 112,915 by 2042. This includes a decline of 0.9 percent annually for single engine pistons and 0.3 percent for multi-engine pistons.

Total turbine aircraft are forecast to grow at a compound annual growth rate (CAGR) of 1.88 percent through 2042. The FAA estimates there are 26,480 fixed-wing turbine-powered aircraft currently in the national fleet. Turbine-powered aircraft include both jet aircraft and turboprops, which are aircraft with propellers that are driven by a turbine engine. Annual growth rates for turboprops and business jets are 0.6 percent and 2.6 percent, respectively, resulting in a total number of fixed-wing turbine aircraft of 38,455 by 2042.

The total number of helicopters, both piston- and turbine-powered, are projected to increase from an estimated 9,955 in 2022 to 13,530 by 2042 (1.55% CAGR). This includes annual growth rates of 0.6 percent and 1.9 percent for piston and turbine helicopters, respectively.

The FAA also forecasts changes in experimental, light sport, and other aircraft (including balloons and gliders). Combined, there are as estimated 34,340 of these aircraft in 2022, which is projected to grow to 44,005 by 2042 (1.25% CAGR).

In all, the total number of active aircraft in the national fleet in 2022 is 204,590. With an annual growth rate of 0.1 percent, the national fleet is expected to rise to 208,905 by 2042.

General Aviation Operations

The FAA also forecasts total operations based on activity at control towers across the U.S. Operations are categorized as air carrier, air taxi/commuter, general aviation, and military. Air carrier operations are those conducted by scheduled commercial air carriers, such as United or Southwest. While these operations are vital to forecasting activity at airports with such activity, since DLL does not currently have scheduled airline service, this part of the forecast is omitted. Military aircraft do use civilian airports across the country, but due to the inherent difficulty in predicting their operations, the FAA traditionally uses a zero-growth forecast for military operations.

General aviation (GA) is comprised of all non-commercial or military operations. Air taxi/commuter operations is another segment of commercial aviation that is conducted by aircraft with 59 seats or less that carry passengers or cargo for hire. Through 2042, total GA operations are projected to grow 0.6 percent annually. Local GA operations are expected to grow from 13.7 million in 2022 to 15.7 million in 2042 (0.69% CAGR), while itinerant GA operations are forecast to grow from 14.5 million in 2022 to 16.2 million in 2042 (0.55% CAGR). The air taxi/commuter category has a forecasted 0.52 percent annual growth rate, with operations forecasted from 6.2 million in 2022 to 6.9 million in 2042.

Exhibit 2A presents the historical and forecast U.S. active general aviation aircraft fleet and operations from the FAA *Aerospace Forecast*.

General Aviation Aircraft Shipments and Revenue

The 2007-2009 economic recession had a negative impact on general aviation aircraft production, and the industry has been slow to recover. Aircraft manufacturing declined for three straight years from 2008 through 2010. According to the General Aviation Manufacturing Association (GAMA), there is optimism that aircraft manufacturing will stabilize and return to growth, which has not been seen since 2011. **Table 2B** presents historical data related to general aviation aircraft shipments.

TABLE 2B | Annual General Aviation Aircraft Shipments – Manufactured Worldwide and Factory Net Billings

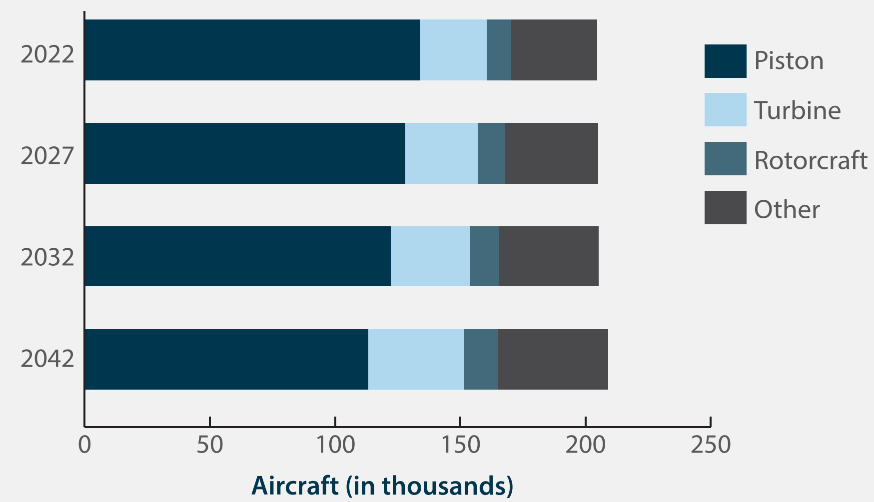
Year	Total	SEP	MEP	TP	Jet	Net Billings ($ million)
2010	2,024	781	108	368	767	19,715
2011	2,120	761	137	526	696	19,042
2012	2,164	817	91	584	672	18,895
2013	2,353	908	122	645	678	23,450
2014	2,454	986	143	603	722	24,499
2015	2,331	946	110	557	718	24,129
2016	2,267	890	129	582	666	21,059
2017	2,325	936	149	563	677	20,201
2018	2,441	952	185	601	703	20,564
2019	2,658	1,111	213	525	809	23,514
2020	2,408	1,164	157	443	644	20,047
2021	2,646	1,261	148	527	710	21,602

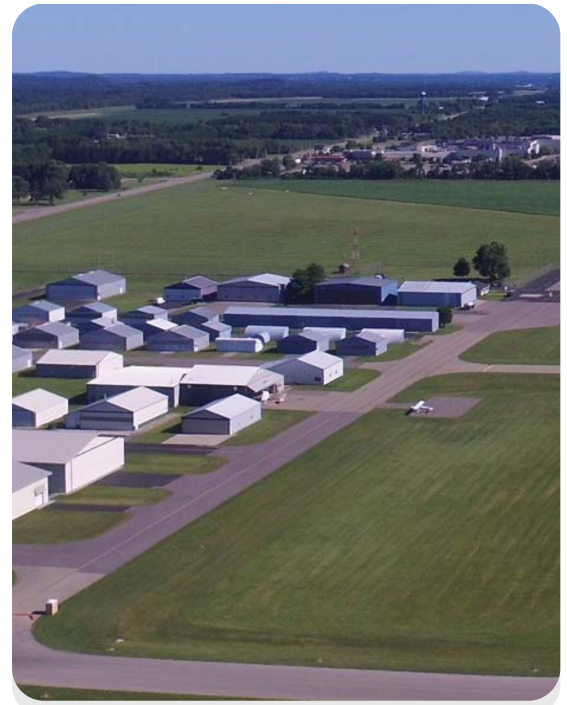
SEP: Single engine piston; MEP: Multi-engine piston; TP: Turboprop

Source: General Aviation Manufacturing Association (GAMA)

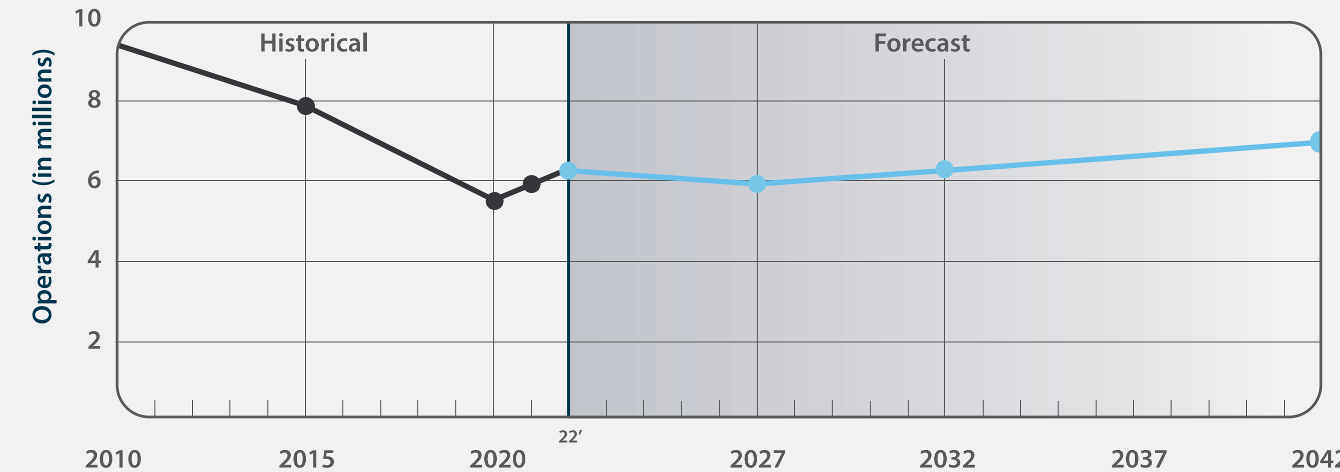
Airplane shipments in 2021, when compared to the previous year, increased in nearly every category; only multi-engine piston deliveries declined, albeit only by nine units. Net billings of airplane deliveries also increased to $21.6 billion over 2020 shipments.

U.S. Active General Aviation Aircraft

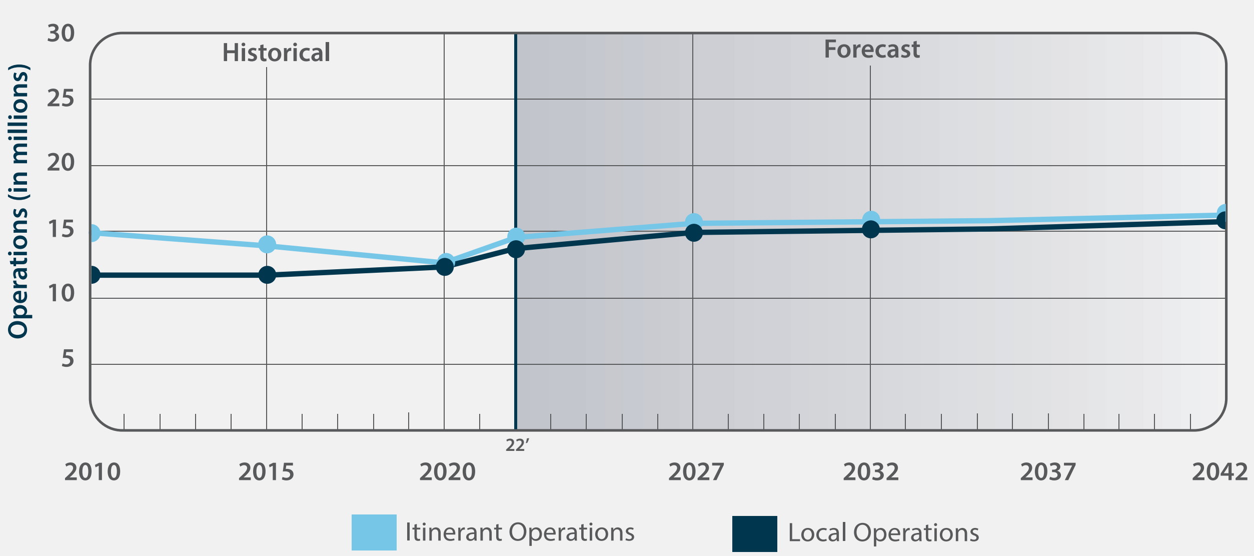




U.S. Air Taxi Operations



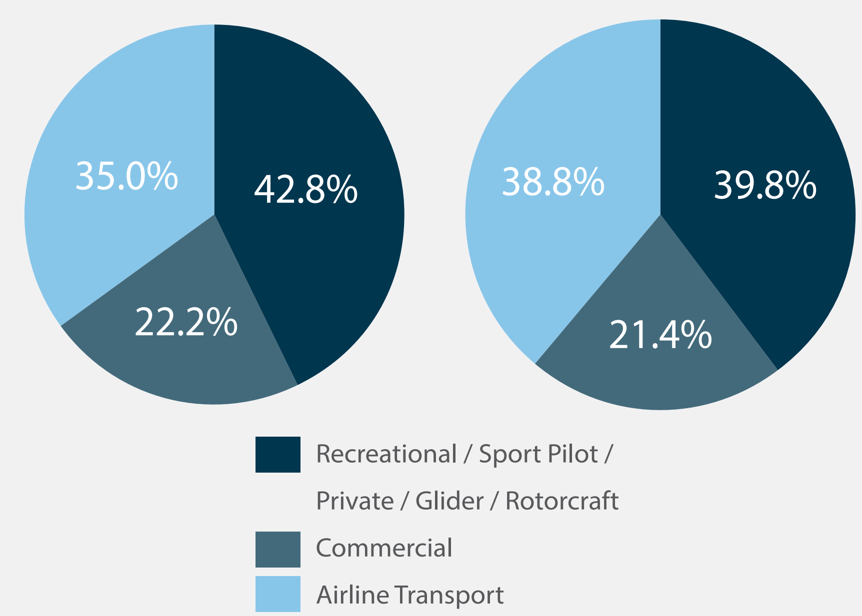
U.S. General Aviation Operations



Active Pilots By Certificate

2022
Total Active Pilots: **474,450***

2042
Total Active Pilots: **500,720**



**Excludes Student Pilot Certificates*

Source: FAA Aerospace Forecasts FY2022-2042

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Business Jets: General aviation manufacturers' deliveries of business jets increased from 644 to 710 units between 2020 and 2021. A continued expansion of market share resulted in North America taking delivery of 66 percent of the total business jet deliveries in 2021.

Turboprops: In 2021, a total of 527 turboprop airplanes were delivered to customers around the world, an increase from the 443 that were delivered the year before. Despite still being less than the 10-year delivery average, the turboprop market has still been significantly stronger compared to years prior to 2011. Nearly 53 percent of all turboprop deliveries in 2021 went to customers in North America.

Pistons: Single engine piston deliveries increased 8.3 percent from 1,164 in 2022 to 1,261 in 2021, while multi-engine piston deliveries declined slightly to 148 units in 2021, down from 157 aircraft in 2020. North American customers accounted for 68 percent of all 1,409 piston aircraft deliveries in 2021.

U.S. PILOT POPULATION

According to the FAA *Aerospace Forecast*, there were 469,062 active pilots certificated by the FAA at the end of 2020. Despite the COVID-19 pandemic, the total number of active pilots in the U.S. increased to an estimated 470,408 in 2021 and is forecast to grow 0.3 percent annually through 2042. The greatest amount of growth is expected in licensed sport pilots (up 2.7 percent annually), followed by helicopter pilots (1.3% CAGR) and airline transport pilots (ATP), which is forecast to increase by 0.8 percent each year through 2042. The total number of active private pilots is expected to decrease at an annual average rate of 0.5 percent, while commercial certificated pilots will grow slightly at 0.1 percent annually through 2042. Starting in 2016, the FAA has suspended forecasting student pilot certificates for the country due to having no expiration date nor a direct correlation between student pilots and private or higher certificates.

RISKS TO THE FORECAST

While the FAA is confident that its forecasts for aviation demand and activity can be reached, this is dependent on several factors, including the strength of both the national and global economy, security (including the threat of international terrorism), and oil prices. Higher oil prices could lead to further shifts in consumer spending away from aviation, dampening a recovery in air transport demand.

As stated previously, the rapid spread of COVID-19 that began within the United States in early 2020 continues to present a risk without clear historical precedent. It is not known at this point how the virus will continue to affect aviation; while the impacts felt in 2020 continued into the following years, activity levels in 2022 have shown a faster-than-expected return to air travel. However, the overall long-term impacts of the pandemic on the aviation industry will not be understood until the full spread or intensity of the human consequences, as well as the breadth and depth of economic fallout, is known.

AIRPORT SERVICE AREA

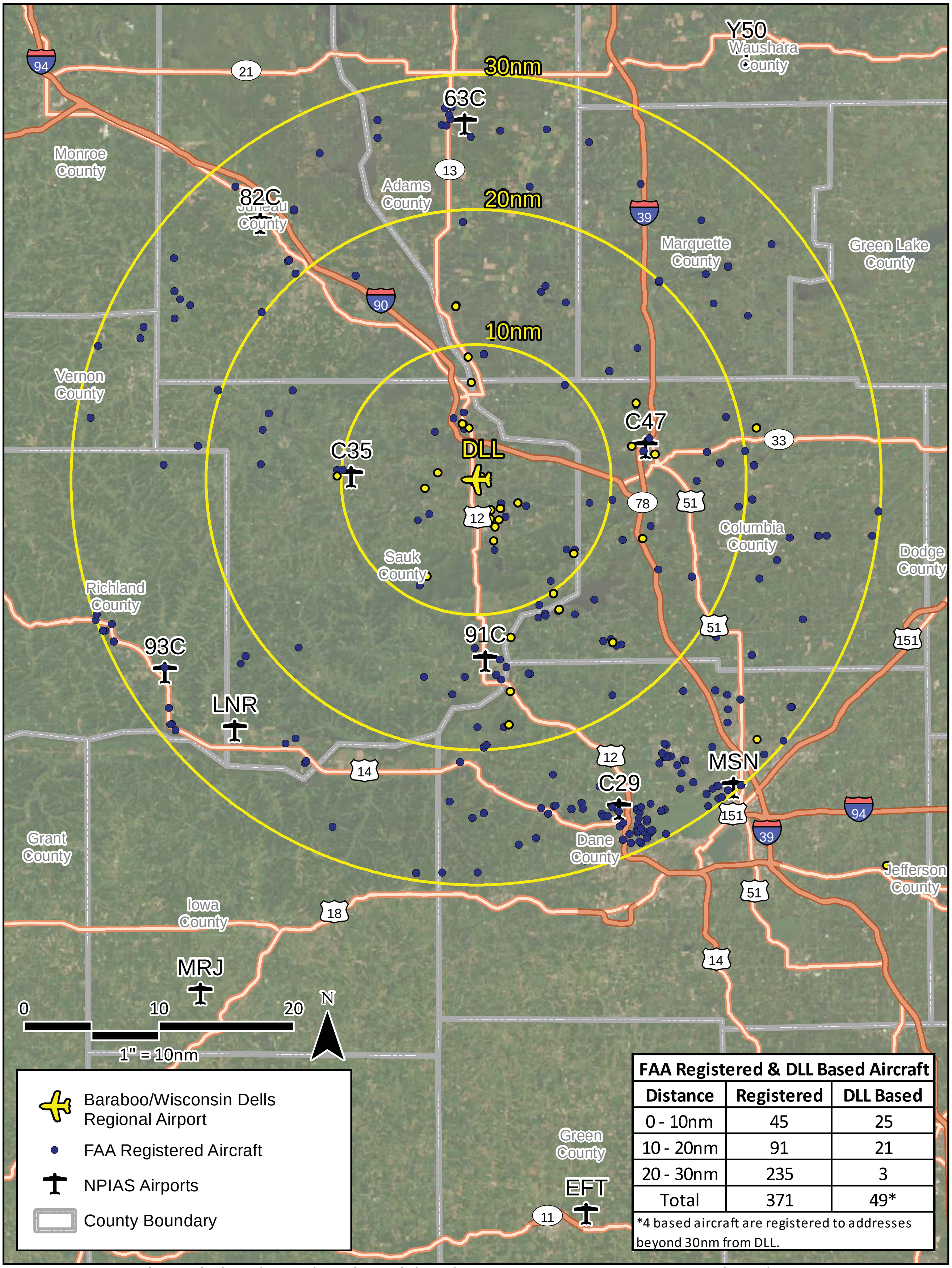
The initial step in determining the aviation demand for an airport is to define its generalized service area. The service area is defined primarily by evaluating the location of competing airports, their capabilities and services, and their relative attraction and convenience. In determining the aviation demand for an airport, it is necessary to identify the role of the airport, as well as the specific areas of aviation demand the airport is intended to serve. DLL is classified as a "regional general aviation" airport within the NPIAS. These types of airports support regional economies with interstate and some long-distance flying and have high levels of activity, including some jet and multi-engine propeller aircraft. These airports also provide support to local aviation activity, including flight training, emergency services, and chartered passenger service.

The service area for an airport is a geographic region from which the airport can be expected to attract the largest share of its activity. The definition of the service area can then be used to identify other factors, such as socioeconomic and demographic trends, which influence aviation demand at an airport. Aviation demand will also be impacted by the proximity and strength of aviation services offered at nearby competing airports, as well as the local and regional surface transportation network.

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

There are 10 public-use airports within 30 nautical miles (nm) of DLL. Nine of those airports are included within the NPIAS, with the only commercial service – and towered – airport being Dane County Regional (MSN) in Madison. The remaining airports all offer similar services to general aviation users as DLL, including instrument approach capabilities. Middleton Municipal-Morey Field (C29) and MSN both have based aircraft and annual operation estimates higher than DLL. Only three airfields have runway lengths close to the 5,010-foot-long surface provided at DLL (one of which is the commercial service airport, Dane County). Morey Field is the only airport besides Dane County that is classified as more than a "medium general aviation" airport by WisDOT; similarities and differences to DLL will be evaluated further in this study to better forecast and plan for facility upgrades to DLL. **Table 2C** provides a summary of the NPIAS airports within the 30-nm radius of DLL.

When evaluating a general aviation airport's service area, two primary demand segments must be considered: based aircraft and itinerant operations. An airport's ability to attract based aircraft is an important factor when defining the service area, with proximity being the highest ranked consideration for most aircraft owners. Aircraft owners typically choose to base at an airport that is close to their home or business. **Exhibit 2B** depicts a 10-, 20-, and 30-nautical mile radius from DLL, which extends beyond Sauk County and into the neighboring counties of Juneau, Adams, Marquette, Columbia, Dane, Iowa, and Richland. The radius also includes the municipalities of Lake Delton, Baraboo, Wisconsin Dells, Portage, and Reedsburg. Registered aircraft in the region and those aircraft that are based at DLL are shown in the exhibit, with the majority of the registered aircraft located near Madison. In total, there are 371 aircraft registered within the 30-nm radius of DLL which itself has an FAA-validated based aircraft count of 53. Most of the DLL based aircraft are attributed to addresses within 20 nautical miles of the airport.



FAA Registered & DLL Based Aircraft

Distance	Registered	DLL Based
0 - 10nm	45	25
10 - 20nm	91	21
20 - 30nm	235	3
Total	371	49*

*4 based aircraft are registered to addresses beyond 30nm from DLL.

Source: FAA Registered Aircraft Databse, basedaircraft.com, ESRI Basemap Imagery (2021)

Exhibit 2B
PRIMARY SERVICE AREA

TABLE 2C | NPIAS Airports Within 30 nm of DLL

Airport	NPIAS Classification[1]	State Classification[2]	Based Aircraft[3]	Annual Operations[3]	Longest Runway (ft.)[3]	Lowest Instrument Approach[4]
Baraboo-Wisconsin Dells (DLL)	**Regional GA**	**Medium GA**	**53**	**30,000**	**5,010**	**1-mile**
Reedsburg (C35)	Local GA	Medium GA	20	14,300	4,840	1-mile
Portage (C47)	Local GA	Medium GA	22	4,750	3,770	1-mile
Sauk-Prairie (91C)	Unclassified GA	Medium GA	30	8,350	2,936	1-mile
Mauston-New Lisbon (82C)	Local GA	Small GA	26	10,390	3,688	1-mile
Tri-County (LNR)	Local GA	Medium GA	29	16,000	5,000	1-mile
Adams County (63C)	Basic GA	Medium GA	12	7,070	3,398	1-mile
Morey Field (C29)	Regional GA	Large GA	95	40,510	4,001	1-mile
Richland (93C)	Basic GA	Small GA	11	9,200	3,200	1¼-mile
Dane County (MSN)	Small Hub	Commercial Service	106	85,201	9,006	½-mile

Sources: [1]FAA NPIAS; [2]Wisconsin State Airport System Plan 2030; [3]FAA Form 5010: Airport Master Record; [4]airnav.com

The second demand segment to consider is itinerant operations. These are operations that are performed by aircraft that arrive from outside the airport area and land at DLL or depart DLL for another airport. In most cases, pilots will use airports nearest their intended destinations, however, this is dependent on the airport's ability to accommodate the aircraft operator in terms of the facility and services available. As a result, airports with better facilities and services are more likely to attract a larger portion of the region's itinerant operations. One key factor in favor of itinerant operations at DLL is the "destination" location with world renowned water parks and an adjacent casino offering prime attractions, especially in the summer months.

When compared to other public-use airports in the region, DLL offers similar amenities such as maintenance, aviation fuel, and aircraft storage. Dane County Regional is the only airport in the area that has a longer runway surface than DLL, as well as the only instrument approach with less than a one-mile visibility minimum. DLL is located along U.S. Highway 12, providing access to the neighboring communities of Lake Delton, Wisconsin Dells, and Baraboo. The Wisconsin River presents a natural border between the eastern and western areas of the region, and many of the larger, rural communities are served by their own airports, such as Reedsburg Municipal and Portage Municipal. Hence, DLL's desirability to aircraft owners beyond Sauk County is diminished. Therefore, for the purposes of this study, **the primary service area of Baraboo-Wisconsin Dells Regional Airport is Sauk County with a focus on the "U.S. 12 Corridor:" the communities of Lake Delton, Baraboo, and Wisconsin Dells**.

FORECASTING APPROACH

The development of aviation forecasts proceeds through both analytical and judgmental processes. A series of mathematical relationships is tested to establish statistical logic and rationale for projected growth; however, the judgment of the forecast analyst, based on professional experience, knowledge of the aviation industry, and assessment of the local situation, is important in the final determination of the preferred forecast. The most reliable approach to estimating aviation demand is through the use of more than one analytical technique. Methodologies frequently considered include trendline/time-series projections, correlation/regression analysis, and market share analysis. The forecast analyst may elect to not use a certain technique depending on the reasonableness of the forecasts produced using other techniques.

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

Correlation analysis provides a measure of the direct relationship between two separate sets of historical data. Should there be a reasonable correlation between the data sets, further evaluation using regression analysis may be employed.

Regression analysis measures statistical relationships between dependent and independent variables, yielding a "correlation coefficient." The correlation coefficient (Pearson's "r") measures association between the changes in the dependent variable and the independent variable(s). As the coefficient determination – or "r^2 value" – approaches 1.0 the stronger the correlation between the variables. For example, an r^2 value of 0.95 indicates strong predictive reliability. A value less than 0.95 may be used but with the understanding that predictive reliability is lower.

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

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

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

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

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

The following forecast analyses examine each of these aviation demand categories expected at DLL over the next 20 years. Each segment will be examined individually, and then collectively, to provide an understanding of the overall aviation activity at the airport through 2042.

EXISTING FORECASTS

Consideration is given to any forecasts of aviation demand for the airport that have been completed in the recent past. For DLL, the previous forecasts reviewed are those in the FAA *Terminal Area Forecast* (TAF) and the 2030 *Wisconsin State Airport System Plan*. No forecast efforts associated with a long-term planning study have been done at DLL in over a decade.

FAA *TERMINAL AREA FORECAST* (TAF March 2022)

On an annual basis, the FAA publishes the TAF for each airport included in the NPIAS. The TAF is a generalized forecast of airport activity used by the FAA, primarily for internal planning purposes, and it is available to airports and consultants to use as a baseline projection and an important point of comparison when developing local forecasts. The most recent TAF was published in March 2022.

Table 2D presents the 2022 TAF for DLL. It is important to understand that the FAA does not do a detailed forecast for most general aviation airports and will frequently over- or underestimate the number and ratio of operations. Furthermore, the table shows the projection of both operations and based aircraft for the airport as determined by the FAA.

TABLE 2D | DLL Terminal Area Forecast

	2022	2027	2032	2042
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	0	0	0	0
Air Taxi	1,000	1,000	1,000	1,000
General Aviation	19,000	19,000	19,000	19,000
Military	2,500	2,500	2,500	2,500
Total Itinerant	*22,500*	*22,500*	*22,500*	*22,500*
Local				
General Aviation	7,500	7,500	7,500	7,500
Military	0	0	0	0
Total Local	*7,500*	*7,500*	*7,500*	*7,500*
Total Operations	**30,000**	**30,000**	**30,000**	**30,000**
BASED AIRCRAFT	**53**	**53**	**53**	**53**

Source: FAA DLL TAF

The TAF for DLL reflects the current FAA-validated based aircraft count of 53, as well as an estimated 30,000 total operations per year; however, the TAF presents a “no growth” projection through 2042. The no growth projection is typical for FAA TAF for airport’s that are not served by an airport traffic control tower (ATCT). While this resource is a good starting point in the forecast efforts, assuming the airport will experience zero change in activity or based aircraft over 20 years is unreasonable.

2030 WISCONSIN STATE AIRPORT SYSTEM PLAN

In 2010, WisDOT-BOA updated their state airport system plan, including an inventory of the 98 airports and all based aircraft within the state system. Forecasts were prepared for the various elements of aviation activity, including commercial air carrier operations and enplanements, air cargo, based aircraft, and general aviation operations. The forecast elements are presented by applicable component in **Table 2E**, according to the airport's BOA classification of "medium GA airport."

TABLE 2E | Wisconsin Statewide Aviation Forecasts

	2010	2015	2020	2030	CAGR
Based Aircraft					
All Medium GA Airports	1,599	1,606	1,614	1,689	0.27%
Baraboo-Wisconsin Dells	49	49	49	50	0.10%
GA and Air Taxi Operations					
All Medium GA Airports	819,200	820,550	822,750	863,110	0.26%
Baraboo-Wisconsin Dells	27,500	27,380	27,280	27,830	0.06%
Total Operations					
All Medium GA Airports	835,930	837,280	839,480	879,840	0.26%
Baraboo-Wisconsin Dells	30,520	30,400	30,300	30,850	0.05%

Source: Wisconsin State Airport System Plan 2030

The forecast presented uses an "operations per based aircraft" approach to project the operations at DLL. This type of analysis will be used in additional forecasts within this chapter. According to this forecasting effort, the airport was expected to grow at a slow pace through 2030. It should be noted, however, that the current number of based aircraft already exceeds the projected 2030 amount projected by the forecasters of the system plan.

GENERAL AVIATION FORECASTS

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

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

BASED AIRCRAFT FORECAST

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

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

Based Aircraft Inventory

Documentation of the historical number of based aircraft at the airport has been somewhat intermittent. For many years, the FAA did not require airports to report the number of based aircraft. It is only in recent years that the FAA has established a based aircraft inventory in which it is possible to cross-reference based aircraft claimed by one airport with other airports. The FAA is now using this based aircraft inventory as a baseline for determining what types of aircraft and how many are based at any individual airport. This database evolves daily as aircraft are added or removed, and it does not provide an annual history of based aircraft. It is the responsibility of the sponsor (owner) of each airport to input based aircraft information into the FAA database (www.basedaircraft.com).

Airport staff have undertaken a comprehensive physical count and submitted the data to the FAA for validation. The most recent – and validated – count at DLL identified 53 based aircraft. This number includes 45 single engine and two multi-engine piston aircraft, as well as six business jets. The jets are comprised of three Citation Excels, two Embraer Legacy 500s, and one Citation S/II.

Registered Aircraft Forecast

Aircraft ownership trends for the primary service area (Sauk County) are used to determine possible based aircraft trends for an airport. As such, a forecast of the total number of registered aircraft in Sauk County is developed for use as an input for the subsequent based aircraft forecasts conducted later.

In addition to the projections summarized below, several regressions were also prepared considering independent variables such as population, income, and employment. None of the resulting regressions produces an r^2 value of better than 0.70, which indicates poor correlation; therefore, the regressions are not included in the forecasts to follow.

Table 2F presents the history of registered aircraft in Sauk County from 2013 through 2022. These figures are derived from the FAA aircraft registration database that categorizes registered aircraft by county based on the zip code of registered aircraft. Although this information generally provides a correlation to based aircraft, it is not uncommon for some aircraft to be registered in the county but based at an airport outside of the county or vice versa. This is illustrated in the fact that the current DLL based aircraft jet count is six, while the total number of jets registered in Sauk County for 2022 is only three. Corporate aircraft, including turboprop and jet aircraft, are commonly registered in tax favorable locales and based elsewhere.

TABLE 2F | Registered Aircraft Fleet Mix in Sauk County

Year	SEP	MEP	TP	Jet	Helicopter	Other[1]	Total
2013	65	4	0	3	2	5	79
2014	58	2	0	3	1	5	69
2015	57	2	0	3	1	4	67
2016	56	1	0	3	1	4	65
2017	57	1	0	3	1	3	65
2018	57	1	0	3	0	2	63
2019	59	1	0	4	0	2	66
2020	58	1	0	3	1	2	65
2021	55	1	0	3	0	2	61
2022[2]	56	1	1	3	0	2	63
Compound Annual Growth Rate (CAGR) from 2013 to 2022							-2.48%

SEP: Single engine piston; MEP: Multi-engine piston; TP: Turboprop
[1]Other aircraft include balloons, gliders, ultralights, experimental aircraft
[2]2022 data is through 11/30/2022
Source: FAA Aircraft Registry Database

It is important to understand that the nine-year period was chosen due to the FAA's efforts to have aircraft owners re-register their aircraft, a process that was completed from 2010 to 2013. This resulted in an overall decrease in the number of active aircraft, of which the piston category was impacted the most. Over the nine-year period, both single engine and multi-engine piston registrations declined, as well as helicopters and other types of aircraft. Jet registrations remained fairly constant, and a turboprop aircraft was added to the fleet mix in 2022. Overall, registered aircraft in Sauk County decreased from 79 aircraft in 2013 (just after the re-registration period) to 63 in 2022, a compound annual growth rate (CAGR) of -2.48 percent.

Now that the number of registered aircraft has been identified, several projections of future registered aircraft are presented for the 20-year planning horizon.

Trendline/Historic Growth Rate Projections

Using the last nine years of registered aircraft data, a trendline projection was completed. This resulted in 49 aircraft by 2042 (-1.25% CAGR). A five-year trend was also prepared for the most recent period (2017-2022) which helped to remove some of the aftereffects of the FAA registration requirements. The five-year trendline projection results in 53 registered aircraft by 2042 (-0.86% CAGR).

In addition to a trendline, a simple growth rate projection was also prepared for registered aircraft in Sauk County. Over the last five years, the registered aircraft trend had a CAGR of -0.62 percent. By applying this rate to the current number of registered aircraft, a forecast emerges resulting in 56 aircraft by 2042. The compound annual growth rate over the past nine years has been -2.48 percent; applying this rate to the current number results in a forecast of 38 registered aircraft by 2042.

Share of U.S. Active General Aviation Aircraft

Sauk County's 63 registered aircraft in 2022 represents approximately 0.031 percent of the total U.S. active general aviation fleet. If the county maintained a constant market share of the national general aviation fleet moving forward, it would result in 64 registered aircraft by 2042 (0.08% CAGR). Another projection was prepared to account for the possibility of an increase in registered aircraft in the county. This forecast considers the historical activity of registered aircraft in the county, accounting for both the average and highest market shares within the last decade, and results in 84 registered aircraft by 2042 (1.45% CAGR). The market share of U.S. active general aviation aircraft projections is shown on **Table 2G**.

TABLE 2G | Registered Aircraft Forecasts – Market Share of U.S. Active GA Fleet

Year	Registered Aircraft	U.S. Active GA Aircraft	% of U.S. Active GA Aircraft
2013	79	199,927	0.040%
2014	69	204,408	0.034%
2015	67	210,031	0.032%
2016	65	211,794	0.031%
2017	65	211,757	0.031%
2018	63	211,749	0.030%
2019	66	210,981	0.031%
2020	65	204,140	0.032%
2021	61	204,405	0.030%
2022	63	204,590	0.031%
Constant Market Share (0.08% CAGR)			
2027	63	204,925	0.031%
2032	63	205,195	0.031%
2042	64	208,905	0.031%
Increasing Market Share (0.88% CAGR)			
2027	66	204,925	0.032%
2032	69	205,195	0.033%
2042	75	208,905	0.036%

Sources: FAA Aircraft Registry Database; FAA Aerospace Forecast, 2022-2042; Coffman Associates analysis

Share of Wisconsin Based Aircraft

For the purposes of this forecast, consideration was also given to the ratio of Sauk County registered aircraft compared to the total number of based aircraft in Wisconsin, as identified in the state TAF. This was done in order to align the forecast efforts more closely with the local conditions rather than a national trend. The 63 registered aircraft in Sauk County in 2022 represent approximately 1.674 percent of all based aircraft in Wisconsin. If the county maintains this market share, it will result in 70 aircraft by 2042 (0.53% CAGR). An additional growth forecast was prepared similar to the national market share growth forecast above, which resulted in a total county aircraft count of 76 in 2042 (0.94% CAGR). **Table 2H** shows the market share of Sauk County compared to all Wisconsin based aircraft.

TABLE 2H | Registered Aircraft Forecasts – Market Share of Wisconsin Based Aircraft

Year	Registered Aircraft	Wisconsin Based Aircraft	% of WI Based Aircraft
2013	79	3,976	1.987%
2014	69	3,994	1.728%
2015	67	3,867	1.733%
2016	65	4,106	1.583%
2017	65	4,078	1.594%
2018	63	4,191	1.503%
2019	66	4,111	1.605%
2020	65	3,719	1.748%
2021	61	3,741	1.631%
2022	63	3,763	1.674%
Constant Market Share (0.53% CAGR)			
2027	65	3,864	1.674%
2032	66	3,964	1.674%
2042	70	4,165	1.674%
Increasing Market Share (0.94% CAGR)			
2027	66	3,864	1.713%
2032	69	3,964	1.752%
2042	76	4,165	1.830%

Sources: FAA Wisconsin TAF; Coffman Associates analysis

Ratio of Registered Aircraft to Population

The number of registered aircraft in an area often fluctuates based on population trends. In 2022, Sauk County had 0.95 registered aircraft for every 1,000 residents. Recently, this ratio has fluctuated due to a growing population and a rise and fall in total registered aircraft. Two projections have been prepared based on ratios of registered aircraft to population. Maintaining the constant ratio (0.95) through 2042 results in 70 registered aircraft in Sauk County (0.53% CAGR). A growth ratio projection was also prepared, resulting in 84 registered aircraft by 2042 (1.45% CAGR).

Registered Aircraft Forecast Summary

Table 2J summarizes the ten registered aircraft forecasts for Sauk County. Despite recent declines in registered aircraft in the county, a concentrated effort on economic development within both the county and the greater Madison Region, paired with investments in hangar development at airports in the county, gives reason to believe that the number of aircraft registered in Sauk County will increase. For these reasons, as well as the forecasted growth of based aircraft in the state, the **increasing market share of Wisconsin based aircraft forecast** will be carried forward as the selected forecast. This forecast results in 66 registered aircraft in 2027; 69 in 2032; and 76 in 2042.

TABLE 2J | Registered Aircraft Forecast Summary

Projection	2027	2032	2042	CAGR
9-Year Trendline	59	55	49	-1.25%
5-Year Trendline	60	58	53	-0.86%
9-Year Growth Rate	56	49	38	-2.50%
5-Year Growth Rate	61	59	56	-0.59%
Constant % of U.S. Active Fleet	63	63	64	0.08%
Increasing % of U.S. Active Fleet	66	69	75	0.88%
Constant % of WI Based Aircraft	65	66	70	0.53%
Increasing % of WI Based Aircraft	**66**	**69**	**76**	**0.94%**
Constant Aircraft per Population	65	67	70	0.53%
Increasing Aircraft per Population	68	73	84	1.45%
Boldface indicates selected forecast				

Source: Coffman Associates analysis

Based Aircraft Forecast

Now that a forecast of the total number of registered aircraft in Sauk County has been chosen, a series of projections of based aircraft at DLL are prepared. The based aircraft forecasts are completed using market share analysis, growth trends, and local socioeconomic factors and anticipated growth rates and are discussed below.

Share of Sauk County Registered Aircraft

In 2022, the 53 aircraft based at DLL represented 84.1 percent of all aircraft registered in Sauk County. By maintaining this market share as a constant thought the planning horizon, a forecast is produced which results in 64 based aircraft by 2042 (0.95% CAGR).

An evaluation of various historical points indicates that DLL's market share of county registered aircraft can fluctuate, but generally is increasing. Furthermore, it can be noted that these points illustrate an inverse proportionate relationship between registered aircraft in Sauk County and DLL based aircraft: as the number of registered aircraft in Sauk County has fallen, the total number of those aircraft that choose to base at DLL has increased. Therefore, an increasing market share projection was also prepared with the assumption that, as the airport continues to develop and grow, so will the number of based aircraft registered within the county. This increasing market share projection results in 66 based aircraft by 2042 (1.10% CAGR). **Table 2K** presents the market share forecasts.

TABLE 2K | Based Aircraft Market Share of County Registered Aircraft Forecasts

Year	DLL Based Aircraft	Sauk County Registered Aircraft	DLL Market Share %
2013	45	79	57.0%
2016	47	65	72.3%
2019	45	66	68.2%
2022	53	63	84.1%
Constant Market Share (0.95% CAGR)			
2027	56	66	84.1%
2032	58	69	84.1%
2042	64	76	84.1%
Increasing Market Share (1.10% CAGR)			
2027	56	66	84.8%
2032	59	69	85.6%
2042	66	76	87.0%

Sources: FAA DLL TAF; FAA Aircraft Registry Database; Coffman Associates analysis

Historic Growth Rate Projection

According to the FAA TAF for DLL, the based aircraft count at the airport has increased from 45 in 2013 to 53 in 2022, an annual growth rate of 1.83 percent. Maintaining this growth rate over the course of the forecast period results in 76 based aircraft by 2042. This forecast is shown in **Table 2L** along with additional growth rate forecasts.

TABLE 2L | Based Aircraft Growth Rate Forecasts

Year	DLL Based Aircraft
2022	53
Historic Growth Rate (1.82% CAGR)	
2027	58
2032	64
2042	76
Population Growth Rate (0.54% CAGR)	
2027	54
2032	56
2042	59
Employment Growth Rate (0.71% CAGR)	
2027	55
2032	57
2042	61
Gross Regional Product Growth Rate (1.54% CAGR)	
2027	57
2032	62
2042	72
Note: Wisconsin TAF projection matches Population Growth Rate and is not shown.	

Sources: basedaircraft.com; Sauk County CEDDS; Coffman Associates analysis

Socioeconomic Growth Rate Projection

Based aircraft growth is often related to the population and economic activity of the service area. Therefore, based aircraft projections were prepared using the forecasted growth rates of population, employment, and gross regional product (GRP) for Sauk County. Through 2042, population in the county is expected to grow at an annual rate of 0.53 percent, while employment is projected to grow at 0.68 percent, and GRP is forecasted to grow at 1.53 percent. Applying each of these rates to the current based aircraft count results in a projected based aircraft count for 2042 of 59, 61, and 72, respectively. **Table 2L** shows the results of both the socioeconomic and historic growth rate forecasts for DLL. It should be noted that the FAA TAF for Wisconsin follows the same growth rate as the population forecast; thus, the state TAF projection is not included in the table.

Based Aircraft Forecast Summary

Selecting a based aircraft forecast is ultimately based on the judgement of the forecast analyst. A selected forecast should be reasonable and based on a sound methodology. The methodology presented in this analysis first examined the history of aircraft ownership in Sauk County, the airport's primary service area. Using the selected forecast of registered aircraft in the county, a market share analysis was conducted based on maintaining a constant market share, as well as an increasing market share based on recent historical points. Additional projections that considered the airport's recent based aircraft growth rate and growth rates based on key socioeconomic indicators (population, employment, and GRP) were presented. Each of these six projections is summarized in **Table 2M**.

TABLE 2M | Based Aircraft Forecast Summary

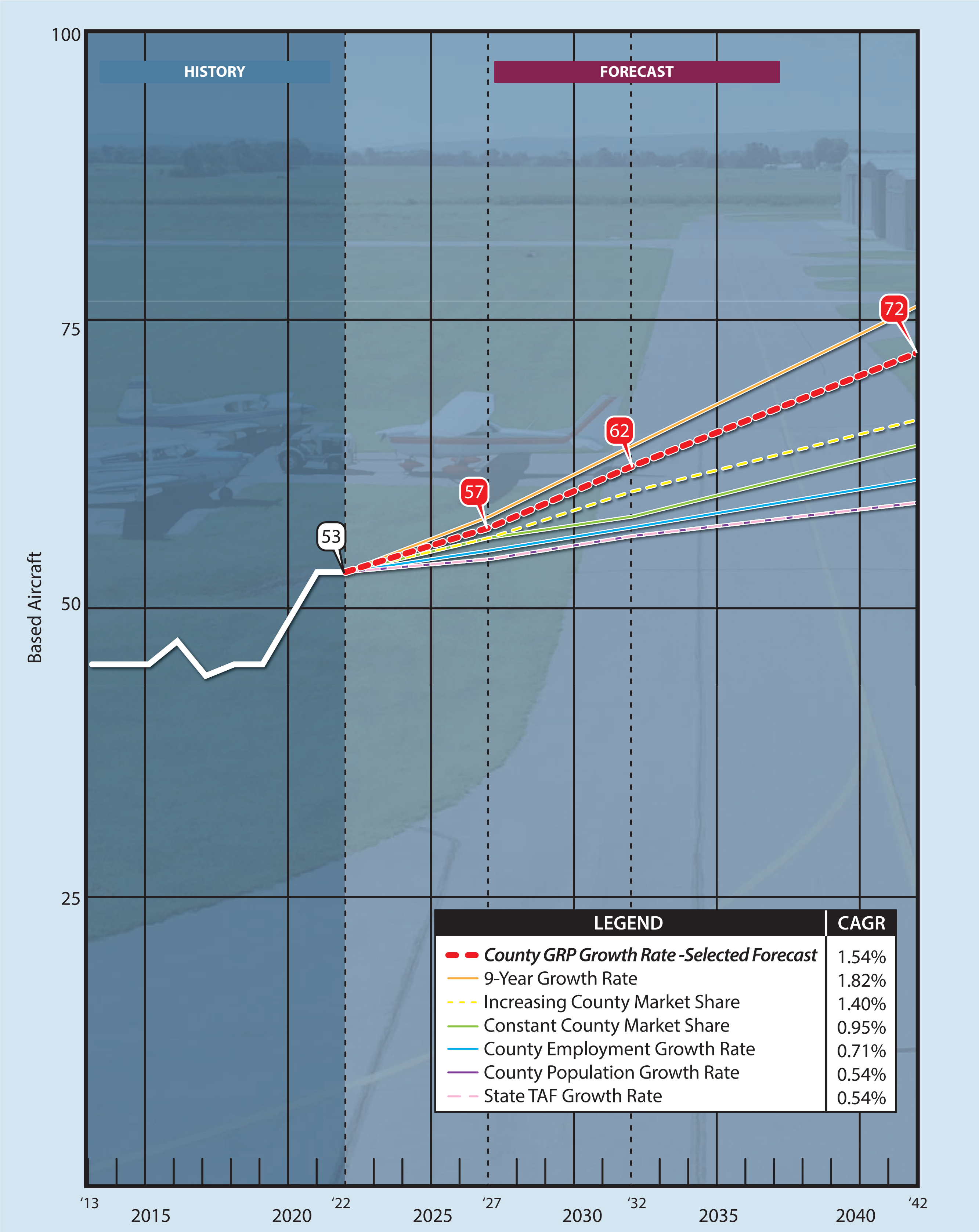
Projection	2027	2032	2042	CAGR
Constant % of County Registrations	56	58	64	0.95%
Increasing % of County Registrations	56	59	66	1.10%
9-Year Growth Rate	58	64	76	1.82%
County Population Growth Rate	54	56	59	0.54%
County Employment Growth Rate	55	57	61	0.71%
County GRP Growth Rate	**57**	**62**	**72**	**1.54%**
Boldface indicates selected forecast				

Source: Coffman Associates analysis

Another important consideration when evaluating the future based aircraft forecasts is whether an airport has a hangar waiting list, which is an indicator of what the current demand level may be for newly based aircraft. DLL maintains such a waiting list, which currently has seven interested parties, as well as three corporate clients looking to build their own hangars. This information indicates a demand for hangar space and reinforces the likelihood of higher based aircraft county through the planning period, including the likelihood of additional based jet aircraft with the corporations.

As previously mentioned, based aircraft levels are typically tied to economic conditions and available hangar space. DLL could see based aircraft growth with the development of new hangar facilities, such as the new buildings recently completed at the south end of the airfield. Economic conditions for both Sauk County and the greater Madison Region are also projected to increase, indicating favorable conditions for increased aviation activity. Considering these factors, as well as historic levels of based aircraft compared to county registrations, the **County GRP Growth Rate forecast** has been selected as the preferred forecast. The selected forecast is reasonably optimistic and assumes DLL will continue to grow and gain market share of registered aircraft within the county, and that the continued economic growth of the local area will drive demand for more based aircraft.

Exhibit 2C graphically presents the six based aircraft forecasts that comprise the planning envelope, the selected forecast, as well as the FAA TAF for DLL for reference.



CAGR: Compound Annual Growth Rate

Source: Coffman Associates analysis

BASED AIRCRAFT FLEET MIX FORECAST

It is important to understand the current and projected based aircraft fleet mix at an airport to ensure the planning of proper facilities. The addition of one or several larger turboprops or business jet aircraft to the airport can have a significant impact on the separation requirements and the various obstacle-clearing surfaces. For example, the addition of a large business jet, such as a Gulfstream V, would require more stringent design standards at the airport. This possibility is discussed further in Chapter Three.

The current validated based aircraft fleet mix consists of 45 single engine and two multi-engine piston aircraft, as well as six jets. As mentioned above, the FAA projects a gradual decline in multi-engine piston aircraft as turboprops and jet aircraft become more prevalent. The forecasted based aircraft fleet mix at DLL reflects this increase in turbine-powered aircraft, as well as additional training aircraft and piston-powered private airplanes. The based aircraft fleet mix for DLL through 2042 is presented in **Table 2N**.

TABLE 2N | Based Aircraft Fleet Mix

Aircraft Type	2022	2027	2032	2042
Single Engine Piston	45	48	50	54
Multi-Engine Piston	2	1	0	0
Turboprop	0	1	2	5
Jet	6	7	9	11
Helicopter	0	0	1	2
Total Based Aircraft	**53**	**57**	**62**	**72**

Sources: FAA Based Aircraft Registry; Coffman Associates analysis

OPERATIONS FORECAST

The next step in the forecast process is to identify a reasonable projection of aviation activity at the airport. DLL does not have commercial air service, and military operations are unpredictable in nature and are traditionally held constant. Therefore, the primary focus of the operations forecast is general aviation and air taxi activity. General aviation operations are classified as either local or itinerant. A local operation is a takeoff or landing performed by an aircraft that operates within the immediate airspace of the airport or which executes simulated approaches or touch-and-go operations at the airport. Local operations are generally conducted by training aircraft. Itinerant operations are those performed by aircraft with a specific origin or destination away from the airport. Generally, itinerant operations increase with business and commercial use, since business aircraft are not typically used for large scale training activities.

At airports with an ATCT, aircraft operations are tallied and recorded in an FAA database which is available for retrieval by airports, consultants, and other parties. For airports without a control tower – such as DLL – the FAA TAF is usually the starting point for forecasting operations. For many airports in the NPIAS, the TAF is the result of a top-down approach to forecasting and does not consider local conditions or calculations specific to the airport. Most often, the TAF operational figure for a non-towered airport is an estimate made during the 5010 inspections by a local resource. TAF operational projections for non-towered airports are standard no-growth. For instance, the TAF maintains a constant 30,000 total operations between 2022 and 2042; therefore, alternative methods to estimating operations are employed.

The FAA recommends applying an approved forecast model specifically developed for small, non-towered GA airports. The forecast model is contained in a report entitled *Model for Estimating General Aviation Operations at Non-Towered Airports Using Towered and Non-Towered Airport Data* (GRA, Inc., 2001). Independent variables used in the model include airport characteristics and local population. The model was derived using a combined data set for small towered and non-towered GA airports and incorporates a dummy variable to distinguish between the two airports. Specifically, the model – dubbed "Equation 15" – uses the following variables:

- Number of based aircraft at the airport
- Percent of aircraft based at the airport among GA airports within 100 miles
- Number of Part 141 flight training schools at the airport
- Population within 100 miles of the airport
- Ratio of population within 25 and 100 miles of the airport

Equation 15 factors each of these variables so that both local and national factors are considered when estimating operations. The model forecasts an estimated 18,756 total annual operations in 2022. For purposes of simplification in future forecast calculations, this number is rounded to **18,800** total operations. **Table 2P** presents the calculations of operations for the airport in the base year of 2022.

TABLE 2P | Model for Estimating Operations at Non-Towered Airports – DLL

Function	Formula Term	Value
	775	775
+	241 × BA	12,773
-	0.14 × BA^2	393
+	31,478 × %100mi	640
+	5,577 × VITFSnum	0
+	0.001 × Pop100	4,599
-	3,736 × WACAORAK	0
+	12,121 × Pop25/100	362
=	**TOTAL**	18,756
		18,800

BA: Validated based aircraft (53)
BA^2: Based aircraft squared (2,809)
%100mi: Percent of aircraft based at DLL among all based aircraft at GA airports within 100 miles (0.02031)
VITFSnum: Number of Part 141 flight schools on-airport (0)
Pop100: Population within 100 miles of DLL (4,599,273)
WACAORAK: 1 if airport is in WA, CA, OR, or AK; 0 if otherwise (0)
Pop25/100: Ratio of population within 25 miles of DLL to Pop100 (0.02989)

Sources: Model for Estimating General Aviation Operations at Non-Towered Airports, Equation #15 (2001); Coffman Associates analysis

This equation only identifies an approximation of the total GA operations at DLL. In order to distinguish between itinerant and local operations, a ratio of these total operations is typically established. One method is to use the predetermined ratio in the current TAF. The March 2022 TAF for DLL presents a ratio of 73:27; that is, 27 percent of all operations at the airport will be local, with the remaining 73 percent of operations being itinerant. Four percent of those itinerant operations were estimated as air taxi operations, which are inherently itinerant in nature.

A more reliable measure of air taxi operations can be obtained from flight records of instrument flight rule (IFR) operations. *AirportIQ*, a source for aviation reports, includes departure and arrival information of aircraft operating under filed IFR flight plans and specifically for those operating under CFR Part 135 tallied as "air taxi". These flights plans are generally filed by companies operating commercial air taxi/commuter operations, such as charter operators. Data provided from AirportIQ establishes a total of 226 air taxi operations for 2022. Information provided by airport management further reinforced this estimate, as well as a more airport-specific itinerant-to-local operations ratio of 60:40. This ratio will be applied to the remaining 18,574 operations to get a baseline.

Therefore, the 2022 baseline of operations at DLL includes 226 air taxi operations, 11,144 itinerant operations, and 7,430 local operations. While the FAA TAF estimates 2,500 annual military operations, airport management has indicated that 1,000 operations is more accurate. Factoring these military operations, the total estimated operations for DLL in 2022 is **19,800**. The forecasts for each operational category are described in detail below. Similar to the forecasting efforts of based aircraft above, forecasts of operations will consider market shares, as well as growth rates at the national and state levels.

Air Taxi Operations Forecast

Air taxi operations are those that provide "on-demand" or "for hire" transportation of people or property via aircraft with fewer than 60 passenger seats. Air taxi includes a broad range of operations, including smaller commercial service aircraft, charter and fractional ownership operators, air cargo aircraft, and air ambulance services.

Nationally, the FAA expects air taxi operations to return to slow growth after a decrease in 2020. This includes commuter aircraft, which are those scheduled air service providers who use aircraft with less than 60 seats, such as the Bombardier CRJ-200. Because DLL does not receive commercial air service, only those operations conducted by charter (CFR Part 135)/fractional aircraft and similar for-hire operations will be forecast.

Market Share Forecasts

The 226 air taxi operations estimated for DLL account for approximately 0.0036 percent of all U.S. air taxi operations in 2022. By carrying this percentage forward and using the FAA *Aerospace Forecast* projections of national air taxi operations, a forecast emerges generating a CAGR of 0.52 percent and a total of 251 operations by 2042. An increasing market share of national air taxi operations, reflective of historical air taxi activity at DLL, was also prepared and produced a total of 700 operations by 2042 (5.82 % CAGR).

Growth Rate Forecasts

Two additional estimates for air taxi operations were prepared, using the forecasted growth rates for air taxi operations published in the FAA *Aerospace Forecast* and the Wisconsin TAF. The *Aerospace Forecast* anticipates air taxi operations to increase at an annual rate of 0.52 percent, while the state TAF projects a slight decline in air taxi operations (-0.10% CAGR). Applying these growth rates to the current air taxi operations count results in a projection of 251 and 222 total air taxi operations by 2042, respectively.

Table 2Q presents the four prepared air taxi forecasts for DLL, as well as historical air taxi operations.

TABLE 2Q | Air Taxi Forecasts – DLL

Year	DLL Air Taxi Operations	U.S. Air Taxi Operations	DLL Market Share %
2009	610	9,521,000	0.0064%
2010	594	9,410,000	0.0063%
2011	614	9,279,000	0.0066%
2012	760	8,994,000	0.0085%
2013	838	8,803,000	0.0095%
2014	706	8,440,000	0.0084%
2015	654	7,895,000	0.0083%
2016	570	7,580,000	0.0075%
2017	652	7,180,000	0.0091%
2018	438	7,126,000	0.0061%
2019	526	7,234,000	0.0073%
2020	232	5,472,000	0.0042%
2021	220	5,882,000	0.0037%
2022	226	6,285,000	0.0036%
Constant Market Share (0.52% CAGR)			
2027	214	5,963,000	0.0036%
2032	226	6,286,000	0.0036%
2042	251	6,967,000	0.0036%
Increasing Market Share (5.82% CAGR) – Selected Forecast			
2027	311	5,963,000	0.0037%
2032	429	6,286,000	0.0038%
2042	700	6,967,000	0.0040%
FAA *Aerospace Forecast* Growth Rate (0.53% CAGR)			
2027	232	5,963,000	0.0039%
2032	238	6,286,000	0.0038%
2042	251	6,967,000	0.0036%
State TAF Growth Rate (-0.09% CAGR)			
2027	225	5,963,000	0.0038%
2032	224	6,286,000	0.0036%
2042	222	6,967,000	0.0032%

Sources: FAA DLL TAF; FAA Wisconsin TAF; FAA Aerospace Forecast, 2022-2042; AirportIQ; Coffman Associates analysis

Based on the continued increased use of corporate and business aviation, the diminishing negative impacts of the COVID-19 pandemic, and the location of the airport relative to the Wisconsin Dells/Lake Delton Resort Area, it can be reasonably expected that DLL will see an increase in air taxi operations through the planning horizon. Furthermore, pre-pandemic activity in air taxi operations was much higher than in recent history and can be expected to return to such levels. For these reasons, the **increasing market share of U.S. air taxi operations** forecast has been selected as the preferred forecast.

Itinerant Operations Forecast

Using the operations estimate for 2022 derived from Equation 15 previously, four projections of itinerant general aviation operations have been developed. The forecasts presented consider the recent impact of the COVID-19 pandemic, including the faster-than-expected return of private air travel. This was brought on by the ability of those who had the means to avoid commercial air travel to do so. Within the state, as well as the nation, people with access to private aircraft opted to travel via general aviation over the airlines, which resulted in a rebound of itinerant operations since 2020. Market share projections, as well as growth rate forecasts, were prepared for itinerant operations at DLL.

Market Share Forecasts

The estimated 11,144 itinerant operations at DLL represents approximately 0.0765 percent of all itinerant operations in the U.S. for 2022. Applying the same market share to the national itinerant operations forecast provided by the FAA *Aerospace Forecast*, a forecast of 12,438 operations in 2042 is produced (0.55% CAGR). A growing market share forecast was also prepared, resulting in an annual growth rate of 1.37 percent and 14,634 itinerant operations by 2042.

Growth Rate Forecasts

By applying the expected growth rate for itinerant operations published in both the FAA's *Aerospace Forecast* and the TAF for the State of Wisconsin, two additional forecasts are produced. The CAGR of 0.55 percent from the *Aerospace Forecast* results in 12,438 itinerant operations in 2042, while the more conservative Wisconsin TAF 0.26 percent CAGR produced a forecast of 11,746 operations in 2042.

Table 2R presents the four itinerant operations forecasts for DLL.

TABLE 2R | Itinerant GA Operations Forecasts – DLL

Year	DLL Itinerant GA Operations	U.S. Itinerant GA Operations	DLL Market Share %
2022	11,144	14,569,000	0.0765%
Constant Market Share (0.55% CAGR)			
2027	11,961	15,636,000	0.0765%
2032	12,116	15,839,000	0.0765%
2042	12,438	16,260,000	0.0765%
Increasing Market Share (1.37% CAGR) – Selected Forecast			
2027	12,489	15,636,000	0.0799%
2032	13,185	15,839,000	0.0832%
2042	14,634	16,260,000	0.0900%
FAA *Aerospace Forecast* Growth Rate (0.55% CAGR)			
2027	11,455	15,636,000	0.0733%
2032	11,773	15,839,000	0.0743%
2042	12,438	16,260,000	0.0765%
State TAF Growth Rate (0.26% CAGR)			
2027	11,292	15,636,000	0.0722%
2032	11,441	15,839,000	0.0722%
2042	11,746	16,260,000	0.0722%

Sources: FAA DLL TAF; FAA Wisconsin TAF; FAA Aerospace Forecast, 2022-2042; Coffman Associates analysis

With a near return to pre-pandemic levels of itinerant general aviation operations nationwide, as well as the recent investments at the airport (repaved and widened runway, new hangar facilities), paired with the fact that the Wisconsin Dells/Lake Delton Resort Area is visited by over four million visitors annually, it is reasonable to expect DLL to increase its itinerant aviation activity through the planning period. For these reasons, the **increasing market share of U.S. itinerant operations forecast** has been identified as the selected forecast.

Local Operations Forecast

Operations conducted by training aircraft, or by pilots taking local flights and returning to DLL, are considered "local" in that they takeoff and land at the same airport. Remarkably, while the majority of the aviation industry suffered during the COVID-19 pandemic, flight schools and flying clubs across the country saw an increase in activity. This is reflected in the FAA *Aerospace Forecast* data which shows local GA operations as the only category of aviation that has 2021 numbers higher than its 2019 level. Forecasts were prepared in the same manner as the itinerant and air taxi operations for DLL and are described below.

Market Share Forecasts

The estimated 7,430 local operations derived from Equation 15 previously constitutes approximately 0.0541 percent of all local general aviation operations in the nation. By keeping this share constant through the planning period, a projection of 8,532 operations by 2042 is produced (0.69% CAGR). A second, increasing market share projection was also prepared and resulted in 9,461 local operations by 2042 (1.22% CAGR).

Growth Rate Forecasts

The FAA *Aerospace Forecast* and the TAF for Wisconsin both expect local general aviation operations to return to pre-pandemic levels and continue to increase through the planning period. Using the 0.69 percent annual growth rate from the *Aerospace Forecast* produces a local GA operations projection of 8,532 in 2042. The state TAF reflects a more gradual growth rate of 0.23 percent, which when used produces a forecasted 7,776 local operations by 2042.

Table 2S presents the forecasts of local GA operations for DLL through 2042.

The **constant market share forecast** has been retained as the selected forecast for local GA operations at DLL. This is due to the return of private, recreational flying, as well as a steady stream of student pilots from nearby airports that regularly use the instrument approaches and non-towered airspace of DLL for practice. If a flight school were to be located at the airport, an argument for the increasing market share forecast could be made.

TABLE 2S | Local GA Operations Forecasts – DLL

Year	DLL Local GA Operations	U.S. Local GA Operations	DLL Market Share %
2022	7,430	13,731,000	0.0541%
Constant Market Share (0.69% CAGR) – Selected Forecast			
2027	8,090	14,951,000	0.0541%
2032	8,232	15,214,000	0.0541%
2042	8,532	15,768,000	0.0541%
Increasing Market Share (1.22% CAGR)			
2027	8,310	14,951,000	0.0556%
2032	8,680	15,214,000	0.0571%
2042	9,461	15,768,000	0.0600%
FAA *Aerospace Forecast* Growth Rate (0.69% CAGR)			
2027	7,691	14,951,000	0.0514%
2032	7,962	15,214,000	0.0523%
2042	8,532	15,768,000	0.0541%
State TAF Growth Rate (0.23% CAGR)			
2027	7,515	14,951,000	0.0503%
2032	7,601	15,214,000	0.0500%
2042	7,776	15,768,000	0.0493%

Sources: FAA DLL TAF; FAA Wisconsin TAF; FAA Aerospace Forecast, 2022-2042; Coffman Associates analysis

Military Operations Forecast

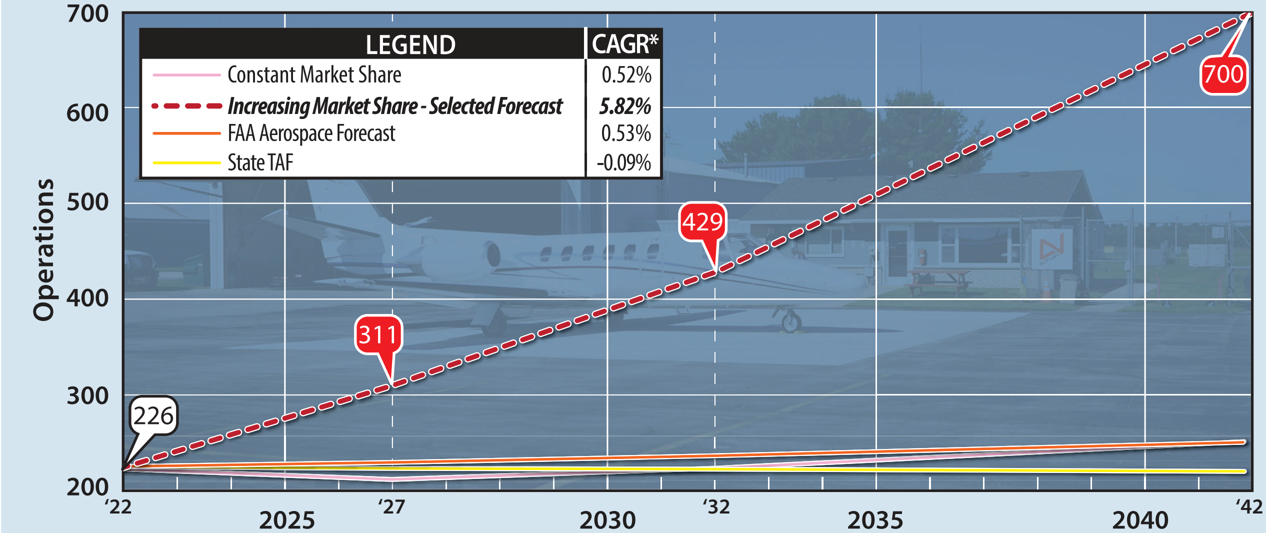
Military aircraft can and do use civilian airports across the country. With an Air National Guard base at Volk Field, located approximately 32 nautical miles to the northwest, DLL does have activity by military aircraft. Forecasts of military aircraft activity are inherently difficult due to the national security nature of their operations and the fact that missions can change without notice. Thus, it is typical for the FAA to use a flat line forecast for military operations. For DLL, the FAA has established 2,500 itinerant operations per year for military activity. **However, feedback from airport management indicates this number to be high and that 1,000 annual operations is more accurate**. This estimate will carry forward through the planning period of this master plan forecast. Military operations are not considered "local" at airports other than military or joint-use airfields. Therefore, no local military operations will be projected at DLL.

OPERATIONS FORECAST SUMMARY

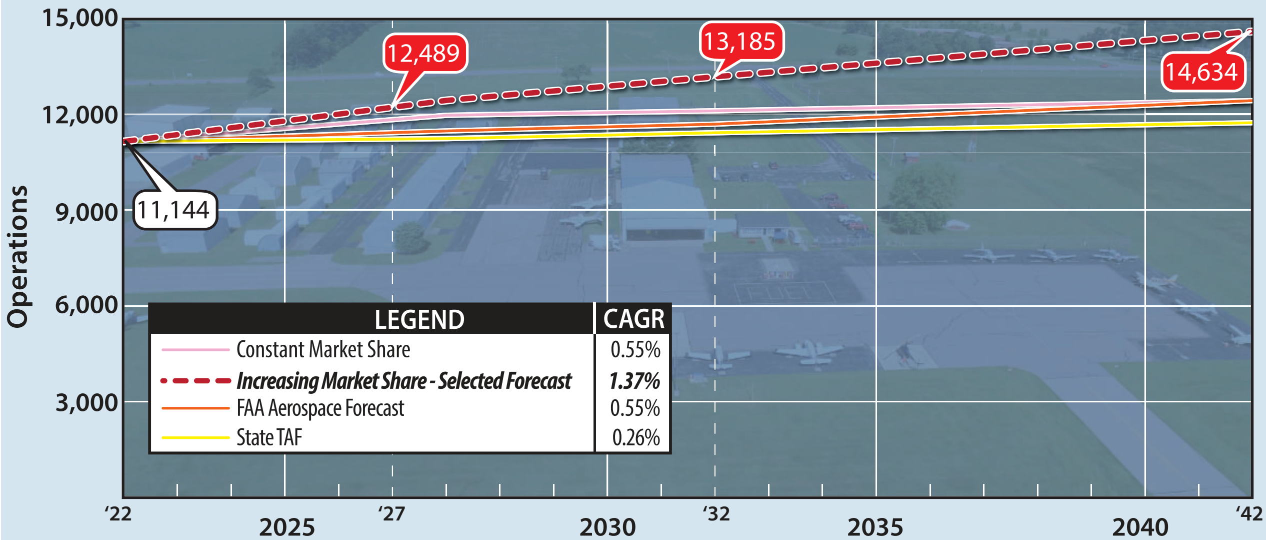
Table 2T presents the total number and breakdown of the selected forecasts. The airport experiences a mix of operation types, including general aviation, air taxi, and military. **Exhibit 2D** shows the forecast envelopes for the general aviation and air taxi operations.

The selected forecast elements represent the current and expected condition of both the local and national aviation activity. This includes a continual increased use of general aviation in the private and commercial, "on-demand" sectors to travel between airports in the region and the country, as well as a steady stream of activity by training aircraft in the area. While the addition of a flight school or a charter company may present numbers higher than forecast, the more conservative approach is reasonable and prudent when considering the local, regional, and national state of the aviation industry.

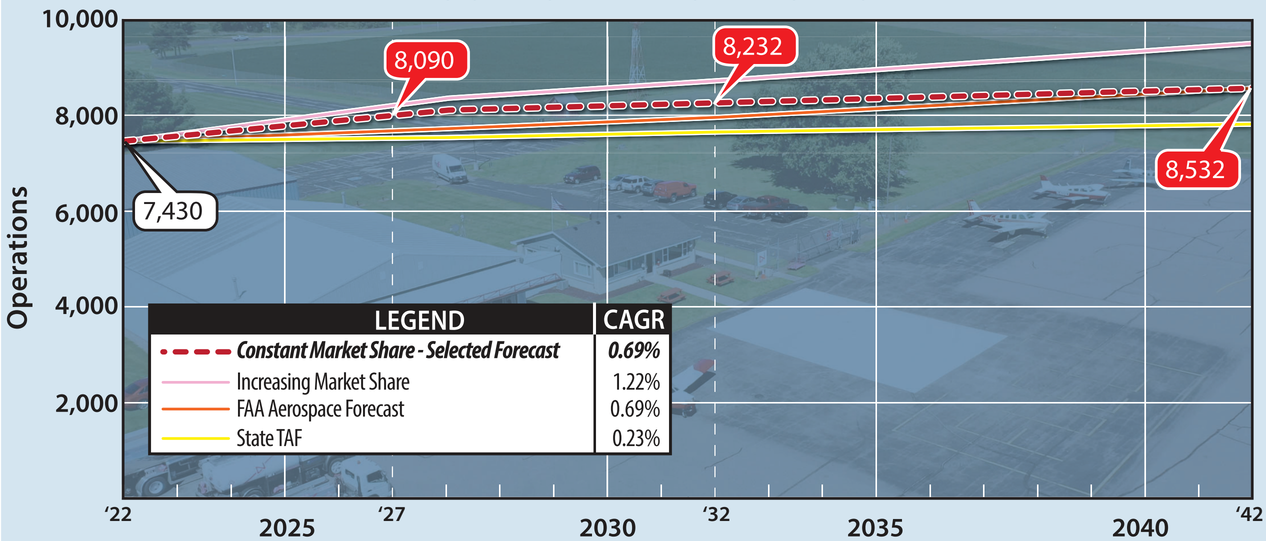
AIR TAXI OPERATIONS FORECAST



ITINERANT OPERATIONS FORECAST



LOCAL OPERATIONS FORECAST



CAGR: Compound Annual Growth Rate

Exhibit 2D
OPERATIONS FORECASTS

TABLE 2T | Total Annual Operations Forecast – DLL

	Base Year 2022	PLANNING HORIZON 2027	2032	2042	CAGR
Itinerant					
Air Carrier	0	0	0	0	0.00%
Air Taxi	226	311	429	700	5.82%
General Aviation	11,144	12,489	13,185	14,634	1.37%
Military	1,000	1,000	1,000	1,000	0.00%
Total Itinerant	12,370	13,800	14,614	16,334	1.40%
Local					
General Aviation	7,430	8,090	8,232	8,532	0.69%
Military	0	0	0	0	0.00%
Total Local	7,430	8,090	8,232	8,532	0.69%
Total Operations	**19,800**	**21,890**	**22,846**	**24,866**	**1.15%**

Source: Coffman Associates analysis

PEAKING CHARACTERISTICS

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

- **Peak Month** – The calendar month when peak aircraft operations occur
- **Design Day** – The average day in the peak month
- **Busy Day** – The busy day of a typical week in the peak month
- **Design Hour** – The peak hour within the design day

For airports with operating control towers, aircraft operational counts are collected, and the peaking time periods are derived from historical trends. In the case of non-towered airports, such as DLL, peaking characteristics are calculated based on known trends at towered general aviation airports by using a simple mathematical estimate. Therefore, for this master plan, the peak month will be defined as the month which consists of 10 percent of the total annual operations forecast. The design day is derived by dividing the peak month by the average number of days in a month (365/12). The busy day is forecast as the weekday with 25 percent more operations than the design day. The design hour consists of 15 percent of the operations forecast for a design day. **Table 2U** summarizes the calculated peaking characteristics for DLL.

TABLE 2U | Peaking Characteristics

Peak Period	Base Year 2022	PLANNING HORIZON 2027	2032	2042
Annual Operations	19,800	21,890	22,846	24,866
Peak Month	1,980	2,189	2,285	2,487
Design Day	65	72	75	82
Busy Day	81	90	94	103
Design Hour	12	14	14	15

Source: Coffman Associates analysis

FORECAST SUMMARY

This chapter has outlined the various activity levels that might be reasonably anticipated over the planning period. The base year for these forecasts is 2022, with a 20-year planning horizon to 2042. The primary aviation demand indicators are based aircraft and operations. There are currently 53 based aircraft at the airport, which is forecast to increase to 72 by 2042, an annual growth rate of 1.54 percent. Total operations at DLL are projected to increase from 19,800 in 2022 to 24,866 in 2042 (1.15% CAGR). **Exhibit 2E** presents a summary of the aviation activity projections prepared in this chapter, including the based aircraft and operational forecasts.

Projections of aviation demand will be influenced by unforeseen factors and events in the future. Hence, it is not reasonable to assume that future demand will follow the exact projection lines, but over time, forecasts of aviation demand tend to fall within the planning envelopes established in this chapter. The forecasts developed for this master planning effort are considered reasonable for planning purposes. The need for additional facilities will be based on these forecasts; however, if demand does not occur as projected, then implementation of facility construction can be slower. Likewise, if demand materializes beyond what is forecast, the airport may accelerate construction of new facilities.

FORECAST COMPARISON TO THE TAF

Typically, the FAA will review forecasts against an airport's *Terminal Area Forecast* to determine reasonableness. The State of Wisconsin is part of the FAA's State Block Grant program, where the state aeronautical agency (WisDOT-BOA) acts as an agent for the FAA. Therefore, this forecast will be sent to and reviewed by BOA. The forecasts are considered reasonable when compared to the TAF if they meet the following criteria:

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

If the forecasts exceed these parameters, additional review and justification may be required. **Table 2V** presents the direct comparison of this master plan forecast with the TAF published in March 2022.

TABLE 2V | Forecast/TAF Comparison

	Base Year 2022	FORECAST 2027	2032	2042
Operations				
Master Plan Forecast	19,800	21,890	22,846	24,866
DLL 2022 TAF	30,000	30,000	30,000	30,000
% Difference	41.0%	31.3%	27.1%	18.7%
Based Aircraft				
Master Plan Forecast	53	57	62	72
DLL 2022 TAF	53	53	53	53
% Difference	0.0%	7.3%	15.7%	30.4%

Sources: FAA DLL TAF; Coffman Associates analysis

	BASE YEAR	2027	2032	2042
ANNUAL OPERATIONS				
Itinerant				
Air Carrier	0	0	0	0
Air Taxi	226	311	429	700
General Aviation	11,144	12,489	13,185	14,634
Military	1,000	1,000	1,000	1,000
Total Itinerant Operations	***12,370***	***13,800***	***14,614***	***16,334***
Local				
General Aviation	7,430	8,090	8,232	8,532
Military	0	0	0	0
Total Local Operations	***7,430***	***8,090***	***8,232***	***8,532***
Total Annual Operations	***19,800***	***21,890***	***22,846***	***24,866***
PEAKING				
Annual Operations	19,800	21,890	22,846	24,866
Peak Month	1,980	2,189	2,285	2,487
Design Day	65	72	75	82
Busy Day	81	90	94	103
Design Hour	12	14	14	15
BASED AIRCRAFT				
Single Engine	45	48	50	54
Multi-Engine	2	1	0	0
Turboprop	0	1	2	5
Jet	6	7	9	11
Helicopter	0	0	1	2
Total Based Aircraft	***53***	***57***	***62***	***72***

Exhibit 2E
FORECAST SUMMARY

As of this writing (December 2022) there were 53 based aircraft validated by the FAA at DLL, which matches the TAF, but the 19,800 estimated operations for 2022 in this master plan do not match the 30,000 operations published in the TAF. The based aircraft forecast meets the reasonableness criteria for both the 5- and 10-year periods, despite the FAA forecasting no growth or decline in the based aircraft count. It can be surmised that, had the TAF presented even a marginal growth in based aircraft, the selected based aircraft forecast in this master plan would align more closely with the FAA estimates.

The operations forecast does not meet the percent difference criteria for reasonableness. This difference is due to the no-growth approach the FAA takes with developing the TAF for smaller, non-towered airports in the NPIAS. This master plan used the FAA-approved model for estimating operations at non-towered airports as published by GRA, Inc. (2001). Additional support for the accuracy of the master plan calculations can be found in airport management feedback and approval, as well as information gathered from AirportIQ and the FAA's Traffic Flow Management System Counts (TFMSC). Therefore, the operations forecast presented in this master plan was presented to BOA for review. Once the forecast is approved, the FAA may choose to update the airport's TAF with the new projections.

The next step in the forecast process is to identify the critical design aircraft and to define the elements of airport design that rely on the critical design aircraft.

AIRCRAFT AND RUNWAY CLASSIFICATION

The FAA has established multiple aircraft classification systems that group aircraft based on their design (physical dimensions) and performance (approach speed in landing configuration) characteristics. These classification systems are used to design certain airport elements, such as runways, taxiways, aprons, safety areas, and separation standards, all based on the aircraft expected to use the airport facilities more frequently.

AIRCRAFT CLASSIFICATION

The use of appropriate FAA design standards is generally based on the characteristics of aircraft that commonly use, or are expected to use, the airport. The "critical design aircraft" is used to define the design parameters for an airport. The design aircraft may be a single aircraft type or a composite aircraft group representing a collection of aircraft with similar characteristics. The design aircraft is classified by three parameters: Aircraft Approach Category (AAC), Airplane Design Group (ADG), and Taxiway Design Group (TDG). FAA Advisory Circular (AC) 150/5300-13B, *Airport Design*, describes the following airplane classification systems, the parameters of which are presented on **Exhibit 2F**.

Aircraft Approach Category (AAC): A grouping of aircraft based on a reference landing speed (V_{ref}), if specified. If V_{ref} is not specified, 1.3 times the stall speed (V_{so}) at the maximum certified landing weight is used. These numbers are those values as established for an aircraft by the certification authority of the country of registry. The AAC refers to the approach speed of an aircraft in the landing configuration. The higher the approach speed, the more restrictive the design standard. The AAC is depicted by a letter (A though E) and applies to runway and runway-related features, such as runway width, runway safety area (RSA), runway object free area (ROFA), runway protection zone (RPZ), and separation standards.

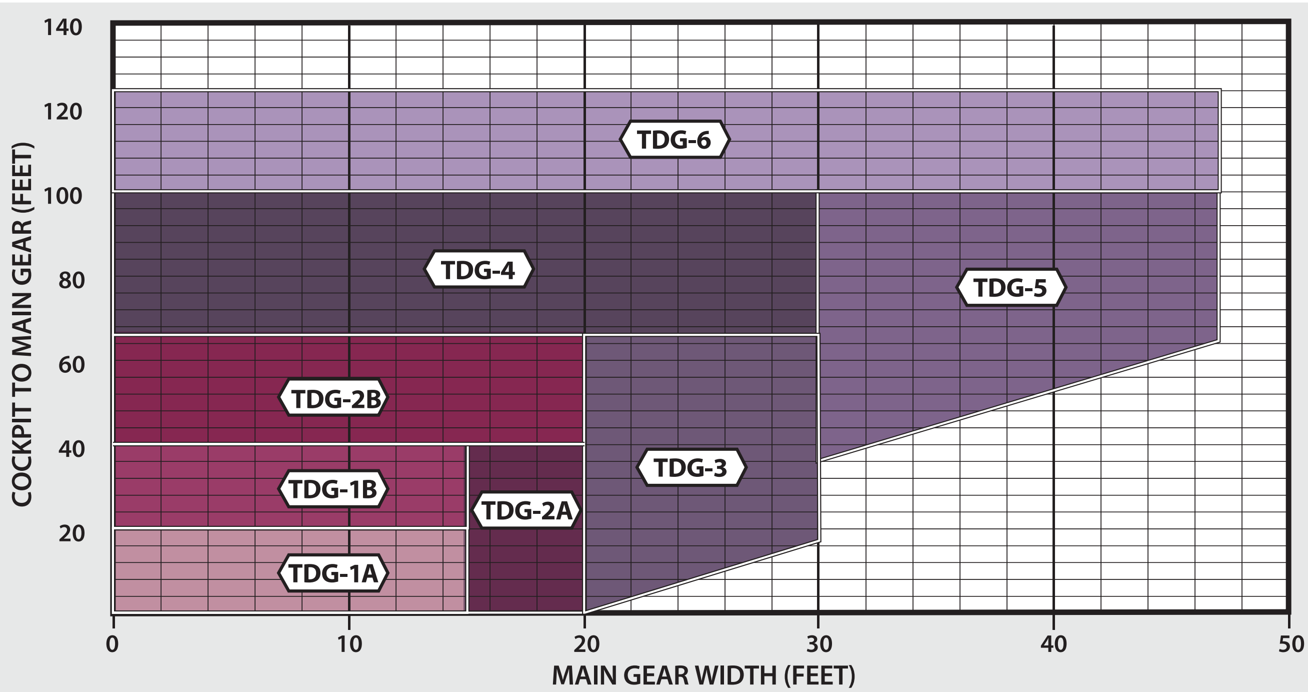
AIRCRAFT APPROACH CATEGORY (AAC)	
Category	**Approach Speed**
A	less than 91 knots
B	91 knots or more but less than 121 knots
C	121 knots or more but less than 141 knots
D	141 knots or more but less than 166 knots
E	166 knots or more

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

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

***RVR**: Runway Visual Range

TAXIWAY DESIGN GROUP (TDG)



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

Airplane Design Group (ADG): The ADG, depicted by a Roman numeral I through VI, is a classification of aircraft relating to the wingspan or tail height of the aircraft. If the wingspan and tail height fall under different design groups, the higher dimension and category (more restrictive) is used. The ADG is used to establish design standards for taxiway safety area (TSA), taxiway object free area (TOFA), taxilane object free area, wingtip clearance, and other separation standards.

Taxiway Design Group (TDG): A classification of aircraft based on dimensions of the airplane undercarriage: the outer-to-outer main gear width (MGW) and cockpit-to-main gear (CMG) distance. Several taxiway design elements are determined by the TDG, including the taxiway width, taxiway edge safety margin, taxiway shoulder width, taxiway fillet design and dimension, and separation standards. It is appropriate for different taxiways at the same airport to be planned and built to different taxiway design standards based on the aircraft expected to use the taxiway. The TDG has an alphanumeric designation (such as 2A) based on the combined dimensions of the MGW and CMG and is derived from a chart found in *Airport Design*.

Exhibit 2G presents the aircraft classification of common aircraft in operation today.

RUNWAY AND AIRPORT CLASSIFICATION

The runway and airport classifications, along with the aircraft classifications defined above, are used to determine the appropriate FAA design standards that the airfield facilities are to be designed and built.

Runway Design Code (RDC): A code signifying the design standards to which a runway is built. The RDC is based on planning development and has no operational component. The AAC, ADG, and runway visual range (RVR) are combined to form the RDC for a certain runway. The RDC provides the information necessary to determine critical design standards. The first two components, the AAC and ADG, are depicted as a letter and Roman numeral as previously defined. The third component refers to the visibility minimums, expressed by RVR values in feet of 1,200 (⅛-mile); 1,600 (¼-mile); 2,400 (½-mile); 4,000 (¾-mile); and 5,000 (1-mile). The RVR values approximate standard visibility minimums of established instrument approach procedures to the runway. Visual-only approaches are designated by "VIS" instead of a numerical value.

Approach Reference Code (APRC): A code signifying the current operational capabilities of a runway and associate parallel taxiway regarding landing operations. The same three components of the RDC make up the APRC: the AAC, ADG, and RVR. The APRC describes the current operational capabilities of a runway under meteorological conditions where no special operating procedures are necessary, as opposed to the RDC, which is based on planning development with no operational component. The APRC for a runway is established based on the lowest runway-to-taxiway centerline separation present at the airport.

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

A-I

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

B-I

Aircraft	TDG
Beech Baron 58	**1A**
Beech King Air 90	1A
Cessna 421	1A
Cessna Citation CJ1	1A
Cessna Citation 1	2A
Embraer Phenom 100	1B

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

Aircraft	TDG
Beech Super King Air 200	**2A**
Cessna 441 Conquest	1A
Cessna Citation CJ2	2A
Pilatus PC-12	1A

B-II *over 12,500 lbs.*

Aircraft	TDG
Beech Super King Air 350	2A
Cessna Citation CJ3,V	2A
Cessna Citation Bravo	1A
Cessna Citation CJ4	**1B**
Cessna Citation Latitude/Longitude	1B
Embraer Phenom 300	1B
Falcon 10, 20, 50	1B
Falcon 900, 2000	2A
Hawker 800/850, 4000	1B
Pilatus PC-24	1B

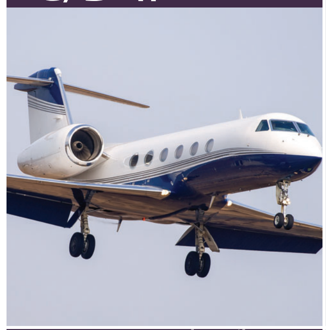
A/B-III

Aircraft	TDG
Bombardier Dash 8	3
Bombardier Global 5000, 6000, 7000, 8000	**2B**
Falcon 6X, 7X, 8X	2B

C/D-I

Aircraft	TDG
Lear 25, 31, 45, 55, **60**	**1B**
Learjet 35, 36 (D-I)	1B

C/D-II



Aircraft	TDG
Challenger 600/604	1B
Cessna Citation VII, X+	1B
Embraer Legacy 450/500	1B
Gulfstream 350, 450 (D-II)	2A
Gulfstream G200/G280	1B
Lear 70, 75	1B
Bombardier CRJ-200, -700	1B/2B
Embraer ERJ-135, -140, -145	2B

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

Aircraft	TDG
Gulfstream V	2A
Gulfstream 550,**650 (D-III)**	**2B**
Bombardier CRJ-900, -1000	2B
Embraer E-170, -175, -190	3

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

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

C/D-IV

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

D-V

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

TDG: Taxiway Design Group

Note: Aircraft pictured is identified in **bold** type.

Exhibit 2G
AIRCRAFT REFERENCE CODES

Airport Reference Code (ARC): An airport designation that signifies the airport's highest runway design code without the visibility component (RVR). The ARC is used for planning and design purposes only and does not limit the aircraft capable of operating safely at the airport. Airports with one runway will have an ARC that is the same as their runway design code. **The airport's current Airport Layout Plan (ALP), which was last updated in 2013, identifies the ARC as B-II**.

CRITICAL DESIGN AIRCRAFT

The selection of airport design criteria is based on the aircraft currently using, or expected to use, the airport. The "critical design aircraft" is used to establish the design parameters of the airport. These criteria are typically based on the most demanding aircraft using the airfield facilities on a relatively frequent basis. The critical design aircraft can be a single aircraft or a composite of multiple aircraft that represent a collection of aircraft characteristics. With the selection of multiple aircraft, the most demanding of the aircraft characteristics are used to establish the design criteria of the airport based on the AAC, ADG, and TDG. If the airport contains multiple runways, a critical design aircraft will be identified for each runway.

The primary consideration for a critical design aircraft is to ensure safe operation of the aircraft using the airport. If an aircraft larger than the critical design aircraft were to operate at the airport, it may result in reduced safety margins or unsafe operations. However, airports typically do not establish design criteria based solely on the largest aircraft using the airfield facilities if it operates on an infrequent basis. Certainly, the FAA will not financially support facilities to meet the needs of infrequent aircraft operators.

The critical design aircraft can be defined as **an aircraft conducting <u>at least 500 annual operations</u> at an airport**, excluding touch-and-go operations, or the most regularly scheduled aircraft in commercial service. When planning for future airport facilities, it is extremely important to consider the demands of aircraft operating at the airport in the future. As a result of the separation standards based on the critical aircraft, caution must be exercised to ensure that short-term development does not preclude the long-term needs of the airport. Thus, it is important to strike a balance between the facility needs of aircraft currently operating at the airport and the facility needs of aircraft projected to operate at the airport in the future. Although precautions must be taken to ensure long-term airport development, airports with critical aircraft that do not use the airport facilities on a regular basis are unable to operate economically due to the added development and maintenance expenses.

AIRPORT DESIGN AIRCRAFT

It is important to have an accurate understanding of what type of aircraft operate at the airport, both now and in the future. The type of aircraft using the airport facilities can have a significant impact on several design criteria. Therefore, a review of aircraft activity by type and category can be beneficial in determining future airport design standards that must be met to accommodate certain aircraft.

The Traffic Flow Management System Counts (TFMSC) is a database maintained by the FAA that captures operations by aircraft type at airports. Information is added to the system when pilots file flight plans and/or when flights are detected by radars in the National Airspace System. Due to factors such as VFR operations, limited radar coverage, and incomplete flight plans, the TFMSC data does not account for all aircraft operations at an airport. However, FAA indicates that the TFMSC database does capture more than 95 percent of turboprop and jet operations as operators of these types of aircraft almost always file a flight plan. These aircraft are more restrictive in their applicable airport design standards, and their count by the TFMSC does provide an accurate reflection of their activity at the airport.

Exhibit 2H presents the TFMSC annual aircraft operations at DLL for the 10-year period from 2013 to 2022, as well as the activity for the most recent 12 months through May 31, 2023. **Table 2W** provides a summary of the total operations by AAC and ADG.

TABLE 2W | TFMSC Operations Summary For DLL

	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023[1]
Aircraft Approach Category (AAC)											
A	86	86	92	104	170	80	88	50	90	128	120
B	432	478	522	528	520	408	702	422	742	740	682
C	56	70	52	70	74	26	168	180	290	314	300
D	6	6	6	4	10	6	2	4	4	2	2
Total	**580**	**640**	**672**	**706**	**774**	**520**	**960**	**656**	**1,126**	**1,184**	**1,104**
Airplane Design Group (ADG)											
I	108	126	134	162	172	104	142	66	146	106	114
II	468	510	534	540	602	416	816	590	980	1,076	988
III	0	2	2	4	0	0	0	0	0	0	0
IV	4	2	2	0	0	0	2	0	0	2	2
Total	**580**	**640**	**672**	**706**	**774**	**520**	**960**	**656**	**1,126**	**1,184**	**1,104**

[1]2023 lists the most recent 12 months of activity: 6/1/22 – 5/31/23

Source: FAA Traffic Flow Management System Counts (TFMSC)

As can be seen from the table, aircraft in the "B" approach category have exceeded 500 operations per year several times. With a 10-year average of 550 annual operations, AAC B is the primary aircraft type operating regularly at DLL. The primary aircraft that were recorded in this AAC are the Cessna Citation Excel (three are based at the airport), Citation II/Bravo (also based at the airport), and the Beechcraft King Air 200/300/350.

The airport does experience operations by aircraft in the "C" approach category, but historically has not exceeded the operations threshold for critical aircraft determination. In the last few years, however, the airport has experienced an increase of activity by aircraft in the C category, specifically the Beechcraft Hawker 800/850 and the Embraer Legacy 500. Two Legacy aircraft are currently based at the airport. For planning purposes, this trend is expected to continue and may ultimately represent the critical design aircraft.

Activity by aircraft in ADG II averaged 654 operations over the past 10 years. Aircraft representative of the ADG II group include the based aircraft Citation Excel and Embraer Legacy, as well as the Citation Latitude, Hawker 800/850, and larger variants of the Beechcraft King Air. Through 2042, the airport is

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	Beech Turbine Duke	0	0	0	0	0	2	0	0	0	0
	Cessna 206/207/210	0	0	0	2	0	0	2	0	4	0
	Cirrus Vision Jet	0	0	0	0	0	2	12	0	6	14
	Eclipse 400/500	2	6	4	6	8	6	2	2	6	0
	Epic Dynasty	0	0	6	2	8	0	2	0	2	0
	Kodiak Quest	0	0	0	0	0	2	2	0	0	2
	Lancair Evolution/Legacy	0	0	0	0	0	0	0	0	2	2
	Piper Malibu/Meridian	6	14	6	10	18	8	10	10	4	8
	Socata TBM 7/850/900	8	8	10	12	16	16	10	14	20	18
	Total	16	28	26	32	50	36	40	26	44	44
A-II	Cessna Caravan	2	4	8	8	52	4	2	2	14	0
	De Havilland Twin Otter	2	0	0	0	0	0	0	0	0	0
	Pilatus PC-12	66	54	58	64	68	40	46	22	32	84
	Total	70	58	66	72	120	44	48	24	46	84
B-I	Beechjet 400	6	2	14	16	10	2	6	4	4	4
	Cessna 425 Corsair	0	0	4	0	8	0	0	0	4	2
	Citation CJ1	20	14	20	26	24	8	22	12	24	14
	Citation I/SP	2	6	4	4	2	2	0	0	2	0
	Citation M2	0	0	0	0	0	0	10	0	4	0
	Citation Mustang	0	8	12	0	6	10	12	2	6	6
	Falcon 10	2	0	0	0	0	0	0	2	6	0
	Hawker 1000	0	0	0	0	0	4	0	0	0	0
	Honda Jet	0	0	0	0	0	0	4	0	0	2
	King Air 90/100	12	8	12	10	14	4	28	10	26	10
	Mitsubishi MU-2	0	2	0	0	4	0	0	0	2	2
	Phenom 100	0	2	2	2	2	2	0	0	0	2
	Piaggio Avanti	0	0	0	2	0	4	0	0	0	0
	Piper Cheyenne	2	8	6	12	6	8	4	0	4	2
	Premier 1	14	14	14	16	12	0	2	0	14	2
	Rockwell Sabre 40/60	2	0	0	0	0	0	0	0	0	0
	T-6 Texan	0	0	0	4	0	2	0	0	0	0
	Total	60	64	88	92	88	46	88	30	90	46
B-II	Aero Commander 690	42	60	52	32	22	24	0	0	2	0
	Beech 1900	2	2	4	22	12	0	0	2	2	0
	Cessna Conquest	6	12	22	12	10	12	16	2	4	28
	Citation CJ2/CJ3/CJ4	10	12	18	12	14	8	14	6	24	14
	Citation II/SP/Latitude	58	40	34	72	44	56	212	106	184	166
	Citation V/Sovereign	18	16	14	22	28	30	20	6	14	16
	Citation X	0	2	0	0	0	2	0	0	2	4
	Citation XLS	152	168	208	182	182	154	252	226	234	234
	Embraer EMB-110/120	0	0	0	0	2	2	0	0	8	2
	Falcon 20/50	10	6	0	4	4	6	0	0	56	80
	Falcon 2000	6	10	8	6	14	8	14	8	20	12
	Falcon 900	0	6	0	6	6	2	2	0	2	8
	King Air 200/300/350	64	72	72	34	70	42	72	20	80	100
	King Air F90	2	0	0	2	0	0	0	0	0	6
	Phenom 300	2	8	2	22	24	14	10	16	10	16

ARC	Aircraft	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
B-II cont.	Pilatus PC-24	0	0	0	0	0	0	0	0	4	4
	Swearingen merlin	0	0	0	4	0	2	2	0	6	4
	Total	372	414	434	432	432	362	614	392	652	694
B-III	Bombardier Global 5000	0	0	0	2	0	0	0	0	0	0
	CASA 235	0	0	0	2	0	0	0	0	0	0
	Total	0	0	0	4	0	0	0	0	0	0
C-I	BAe Systems Hawk	0	0	0	0	0	2	0	0	0	0
	Learjet 20 Series	0	0	0	2	2	0	0	0	0	0
	Learjet 31	2	4	0	0	0	0	0	0	2	0
	Learjet 40 Series	18	18	10	24	20	10	12	2	0	12
	Learjet 50 Series	6	4	6	4	0	0	0	0	0	0
	Learjet 60 Series	0	4	4	4	8	4	2	4	4	2
	Westwind II	2	0	0	0	0	0	0	0	2	0
	Total	28	30	20	34	30	16	14	6	8	14
C-II	Bombardier CRJ 100/200/700	0	4	0	0	0	0	0	0	0	0
	Challenger 300	0	0	2	2	14	6	22	14	40	18
	Challenger 600/604	0	0	2	0	0	0	2	4	2	0
	Citation III/VI	12	14	8	10	8	2	4	2	6	4
	Embraer 500/450 Legacy	0	0	0	0	2	2	2	50	156	242
	Embraer ERJ-135/140/145	0	0	0	0	0	0	2	0	0	0
	Gulfstream 100/150	0	4	2	4	2	0	2	0	6	0
	Gulfstream 280	0	0	0	0	0	0	0	0	8	2
	Hawker 800 (Formerly Bae-125-800)	12	14	12	18	18	0	98	100	58	24
	Learjet 70 Series	0	0	2	2	0	0	20	4	6	8
	Total	24	36	28	36	44	10	152	174	282	298
C-III	Boeing 737 (200 thru 700 series)	0	0	2	0	0	0	0	0	0	0
	Bombardier CRJ 900/1000	0	2	0	0	0	0	0	0	0	0
	Total	0	2	2	0	0	0	0	0	0	0
C-IV	Boeing 707	0	0	2	0	0	0	0	0	0	0
	Boeing 757-200	2	2	0	0	0	0	0	0	0	0
	Boeing C-17	0	0	0	0	0	0	0	0	0	2
	C-130 Hercules	2	0	0	0	0	0	2	0	0	0
	Total	4	2	2	0	0	0	2	0	0	2
D-I	F-15 Eagle	0	0	0	0	0	0	0	0	2	0
	F-22 Raptor	0	0	0	0	0	0	0	0	0	2
	Learjet 35/36	4	4	0	4	4	6	0	4	2	0
	Total	4	4	0	4	4	6	0	4	4	2
D-II	Gulfstream 200	2	0	4	0	0	0	0	0	0	0
	Gulfstream 450	0	2	2	0	6	0	2	0	0	0
	Total	2	2	6	0	6	0	2	0	0	0

Source: TFMSC January 2013 through December 2022 (data normalized annually)

Exhibit 2H
HISTORICAL JET AND TURBOPROP OPERATIONS

AIRPORT REFERENCE CODE (ARC) SUMMARY

ARC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A-I	16	28	26	32	50	36	40	26	44	44
A-II	70	58	66	72	120	44	48	24	46	84
B-I	60	64	88	92	88	46	88	30	90	46
B-II	372	414	434	432	432	362	614	392	652	694
B-III	0	0	0	4	0	0	0	0	0	0
C-I	28	30	20	34	30	16	14	6	8	14
C-II	24	36	28	36	44	10	152	174	282	298
C-III	0	2	2	0	0	0	0	0	0	0
C-IV	4	2	2	0	0	0	2	0	0	2
D-I	4	4	0	4	4	6	0	4	4	2
D-II	2	2	6	0	6	0	2	0	0	0
TOTAL	580	640	672	706	774	520	960	656	1,126	1,184

APPROACH CATEGORY

AC	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
A	86	86	92	104	170	80	88	50	90	128
B	432	478	522	528	520	408	702	422	742	740
C	56	70	52	70	74	26	168	180	290	314
D	6	6	6	4	10	6	2	4	4	2
TOTAL	580	640	672	706	774	520	960	656	1,126	1,184

DESIGN GROUP

DG	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022
I	108	126	134	162	172	104	142	66	146	106
II	468	510	534	540	602	416	816	590	980	1076
III	0	2	2	4	0	0	0	0	0	0
IV	4	2	2	0	0	0	2	0	0	2
TOTAL	580	640	672	706	774	520	960	656	1,126	1,184

Exhibit 2H continued
HISTORICAL JET AND TURBOPROP OPERATIONS

not expected to experience more than 500 operations by aircraft in ADG III or above; operations are expected to predominantly remain in the ADG II category. Therefore, ADG II will remain the critical design group for planning purposes.

Airport Design Aircraft Summary

The current aircraft approach category (AAC) is "B," and the current airplane design group (ADG) is "II." The most active "B-II" airplane at DLL has been the Citation Excel/XLS, followed by the Citation II. The airport currently has one Citation II and three Citation Excel based aircraft. The Citation Excel falls within TDG "1B." **Therefore, the current airport design aircraft is classified as B-II-1B**.

For planning purposes, **the future airport design aircraft is considered to be C-II-2A** and is represented by the Embraer Legacy 500 (ARC C-II) and Beechcraft King Air 350 (TDG 2A). Activity by this class of aircraft has been increasing in recent years, and with two Legacy aircraft currently based at the airport, it is logical to presume that trend will continue through 2042. Furthermore, the continued growth of the Wisconsin Dells/Lake Delton Resort Area will attract operators of larger and faster business jet. It is therefore appropriate to plan the airport now for the potential transition to a C-II-2A.

RUNWAY DESIGN CODE

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

Current RDC

Runway 1-19 is the primary, paved runway at DLL and should be designed to accommodate the overall airport design aircraft, which has been identified as B-II-1B. The runway is 5,010 feet long, 100 feet wide, and has non-precision GPS instrument approaches. The lowest visibility minimum available at the airport is 1-mile. Therefore, the current RDC for Runway 1-19 is **B-II-5000**.

Runway 14-32 is the airport's turf runway and is 2,746 feet long and 100 feet wide. Turf runways do not typically have instrument approaches and are used primarily by single engine piston aircraft weighing less than 12,500 pounds. Therefore, the current RDC for Runway 14-32 is **A-I(small)-VIS**.

Future RDC

Since the future critical aircraft is planned to be C-II-2A, the first two components of the RDC will change to "C-II." The third component considers the RVR, or the instrument visibility minimums. While further analysis will be necessary, it is economically advantageous for the airport to seek and acquire the lowest visibility minimums possible. Currently, general aviation airports such as DLL can obtain visibility minimums down to ¾-mile using GPS technology without any additional ground-based equipment (provided various airport protection surfaces are clear of obstructions). The NextGen program from the FAA is actively analyzing the possibility of stand-alone GPS instrument approaches with visibility minimums down to ½-mile. Furthermore, the airport currently has an instrument landing system (ILS) localizer which provides a localizer approach (LOC). This approach may also be evaluated for a lower visibility minimum. This study will consider the feasibility of ½-mile visibility minimums to one or both runway ends. **Therefore, the future (ultimate) RDC for Runway 1-19 will be planned to C-II-2400**. If the analysis to be completed later in this master plan shows that ½-mile approaches are not feasible, then the future (ultimate) RDC will be revised.

The 2013 ALP reflects a plan to pave Runway 14-32 and establish non-precision instrument approaches with visibility minimums of 1-mile. A partial parallel taxiway, located 250 feet from the runway, is also planned. The feasibility and impacts of this option are explored further in the following two chapters. If the crosswind runway is to be paved, **the future (ultimate) RDC for Runway 14-32 may be planned to B-II-5000**; otherwise, the ultimate RDC for the turf runway shall remain A-I(small)-VIS.

APPROACH AND DEPARTURE REFERENCE CODES

The approach and departure reference codes (APRC and DPRC) describe the current operational capabilities of each runway and their adjacent parallel taxiway when no special operating procedures are necessary. Essentially, the APRC and DPRC describe the current conditions at an airport in runway classification terms when considering the parallel taxiways.

The parallel taxiway for Runway 1-19 is located 400 feet from the runway, measured from centerline to centerline. Both runway ends have non-precision instrument approaches, with 1-mile visibility minimums each. Therefore, the APRC for Runway 1-19 is D/IV/4000 and D/V/4000; the DPRC is D/IV and D/V. With the future condition considering instrument visibilities down to ½-mile, the approach and departure codes will change. The ultimate Runway 1-19 APRC would change to D/IV/2400 and D/V/2400; the DPRC remains the same.

The turf runway does not have an associated parallel taxiway, therefore no APRC or DPRC are assigned. However, the long-term potential plan for paving Runway 14-32 includes an associated partial parallel taxiway with a centerline-to-centerline distance of 250 feet. With a 1-mile non-precision instrument approach on either end of the runway, the ultimate APRC for Runway 14-32 would become B/II/4000 and the DPRC would be B/II. If Runway 14-32 remains unpaved, no APRC or DPRC would be assigned in the ultimate condition.

CRITICAL DESIGN AIRCRAFT SUMMARY

The critical design aircraft is currently defined by those aircraft in ARC B-II and is projected to transition to a C-II category through the planning period. The current critical design aircraft is defined by the Cessna

Citation Excel/XLS, and the Embraer Legacy 500 is an example of the ultimate critical design aircraft. Both types of aircraft are currently based at the airport. **Table 2Y** summarizes the current and future runway classifications at DLL.

TABLE 2Y | Airport and Runway Classifications at DLL

	Existing	Ultimate
Airport Classification		
Airport Reference Code (ARC)	B-II	C-II
Airport Design Aircraft	B-II-1B	C-II-2A
Critical Aircraft Example	Cessna Citation Excel/XLS	Embraer Legacy 500
Runway 1-19		
Runway Design Code (RDC)	B-II-5000	C-II-2400
Approach Reference Code (APRC)	D/IV/4000 and D/V/4000	D/IV/2400 and D/V/2400
Departure Reference Code (DPRC)	D/IV and D/V	Same
Runway 14-32 (Paved)		
Runway Design Code (RDC)	A-I(small)-VIS	B-II(small)-5000
Approach Reference Code (APRC)	N/A	B/II/4000
Departure Reference Code (DPCR)	N/A	B/II
Runway 14-32 (Turf)		
Runway Design Code (RDC)	A-I(small)-VIS	Same
Approach Reference Code (APRC)	N/A	Same
Departure Reference Code (DPRC)	N/A	Same

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

SUMMARY

This chapter has outlined the various activity levels that might be reasonably anticipated over the next 20 years of this master plan, as well as the critical design aircraft for the airport. Based aircraft are forecast to grow from 53 currently to 72 by 2042. Total aircraft operations are projected to grow from 19,800 in 2022 to 24,866 by 2042. The forecasted growth is driven by the FAA's positive outlook for general aviation activity, including corporate and business jet activity, as well as positive outlooks for socioeconomic growth (population, employment, and income/GRP) in Sauk County. Furthermore, the continued growth and investment in the Wisconsin Dells/Lake Delton Resort Area, as well as the greater Madison Region, provides additional support for these growth forecasts.

The critical design aircraft for the airport was determined by examining the FAA's TFMSC database of flight plans and aircraft activity at the airport. The current critical design aircraft is described as B-II-1B and is best represented by the Cessna Citation Excel/XLS business jet. The future design aircraft is projected to transition to a larger business jet with a faster approach speed; the ultimate critical design aircraft is best represented by the Embraer Legacy 500 and is described as C-II-2A.

As stated previously, the FAA forecast of aviation demand has not taken into full account the ongoing impact and recovery from the COVID-19 pandemic and the associated economic downturn. Despite earlier predictions, some activity has recovered faster than expected; however, the full effect of the pandemic on the aviation industry has yet to be fully determined. Prior to implementation of suggested projects identified later in this master plan, the forecast element may need to be re-validated. Based on the types of aircraft using DLL, the proposed existing and ultimate design aircraft are considered valid and reasonable for planning purposes.

The next step in the planning process is to assess the capabilities of the existing facilities to determine what upgrades may be necessary to meet future demands. The range of forecasts developed here will be taken forward in the next chapter as the planning horizon levels that will serve as milestones or activity benchmarks in evaluating facility requirements.