2. Aviation Demand Forecasts

2.1. INTRODUCTION TO FORECASTS

Aviation demand forecasts for Chehalis-Centralia Airport (CLS) are presented in this chapter to examine the activity levels necessary to develop plans appropriate to the airport over a twenty-year planning period (2023-2043). Airport developments such as the construction of new hangars are triggering events that must be considered when planning over the forecast period. Forecasts developed for the Master Plan Update (MPU) will serve as the basis for future analysis and recommendations for the development of the airport. Thorough data collection with appropriate information, the application of analytical judgment, and the use of approved forecasting methodologies are the core foundation of the forecasting process.

The following forecast study was conducted late in the recovery response to the COVID-19 pandemic. The FAA notes that the pandemic had a lessened effect on GA operations relative to that of the commercial aviation industry. Data indicates that operations at CLS increased during the initial stages of the pandemic in 2020 and then declined in the following years to pre-pandemic levels. GA activity overall is expected to increase nationwide for the foreseeable future post-pandemic. Due to the uncertainty and volatility on the aviation industry as a whole during the pandemic, project justification will be required by the FAA on a per-project basis and FAA approval alone of the forecast does not provide justification to begin airport development. Justification for future projects will be made based on activity levels at the time the project is requested for development, rather than the approval of these forecasts. Accordingly, this forecast will act as a benchmark, and further documentation of actual activity levels reaching the planning activity levels will be needed prior to FAA participation in funding for eligible projects.

The Federal Aviation Administration (FAA) offers guidance for aviation forecasting which includes both specifically required forecast items as well as appropriate forecast methodologies for projecting future activity. The development of forecasts for General Aviation (GA) airports without Air Traffic Control (ATC) towers, such as CLS, is a challenging task due to limited published operational data relative to towered airports. As a result, forecasts must draw from other indicators of aviation activity consistent with FAA Advisory Circular 150/5070-5B and the 2001 FAA guidance paper “Forecasting Aviation Activity by Airport”. Sources used to generate an understanding of trends in aviation activity include stakeholder input, generalized regional and national aviation forecasts, and non-aviation forecasts such as demographics and economics in the immediate region surrounding CLS that might correlate to historical growth in aviation activity. The forecast study included in this CLS MPU synthesizes a multitude of data and forecasts linked with aviation activity at the local, regional, and national levels. Professional experience and knowledgeable judgment by the forecaster additionally confirm the relevance of forecast data sources in the absence of direct airport operational statistics.

The FAA approves of a handful of specific methodologies that are appropriate for aviation forecasting. The CLS MPU forecast utilizes trends, regression, and market share analysis. Analysis relative to specific local, regional, and national aviation data and forecasts along with historical forecasts assists in the

study process. The forecast generated by the CLS MPU study process sets a foundational forecast of based aircraft and total operations.

The forecast additionally aids in identifying the airport's critical aircraft. The classification of an airport's critical aircraft helps planners and the FAA to assign appropriate design criteria for future airport development.

2.2. NATIONAL TRENDS AND FORECASTS

Beyond just the context of CLS, aviation, and specifically GA, is a market that is changing at the macro-level across the nation. For that reason, the use of forecasting products from the FAA can provide useful insight as to how trends affecting GA nationwide might apply to aviation activity at CLS.

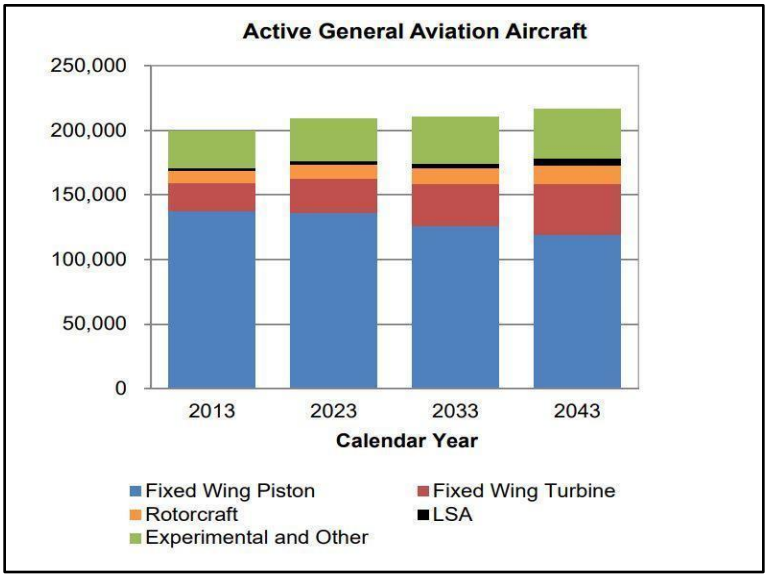
Among the more reliable forecasts for federally-sourced aviation demand are the FAA Aerospace Forecast (2023-2043) and the 2022 FAA Terminal Area Forecast (TAF) for CLS which is derived from the National Plan of Integrated Airport Systems.

2.2.1. FAA Aerospace Forecasts

The fixed wing piston engine fleet is specifically mentioned in the forecast summary as an area of recession, noting that fleet age and retirement is beginning to outpace the rate of new aircraft deliveries in the segment. The FAA also suggests that ballooning operating and ownership costs within the piston-engine fixed wing aircraft segment are contributing to the decline. Some of this market segment is forecasted to shift towards aircraft ownership and operation in the experimental and light sport aircraft segment due to lower costs associated with those fleets. The FAA sees continued growth in the performance of the U.S. economy continuing to fuel growth within the GA turbine fixed wing aircraft and rotorcraft industries.

Although change is expected in the coming years regarding fleet mix, propulsion, and the economics of GA, the FAA report on the nation's GA fleet is astoundingly stable, with a compound annual growth rate (CAGR) of 0.2% over the 20-year forecast period. The number of piston-engine aircraft (single- and multi-engine) over the forecast period is expected to decline at a rate of -0.7% annually while rotorcraft (+1.5%), experimental aircraft (+0.8%), light sport aircraft (+3.1%), and turbine (turboprop and jet) aircraft (+2.0%) are all expected to grow through 2043. The national GA fleet broken down by share of aircraft type is illustrated in **Figure 2-1** below.

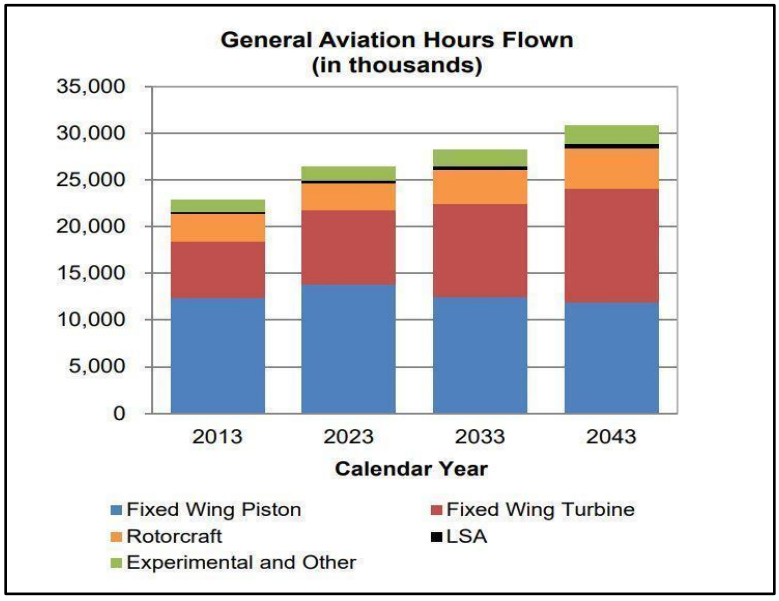
Figure 2-1: FAA Forecast of GA Fleet



Source: FAA Aerospace Forecast FY2023-2043, 2023.

The FAA forecasts that the number of GA hours flown will increase 0.8% per year over the 20-year forecast period. The rate of growth is expected to be bolstered by an increased rate of utilization of fixed wing turbine (turboprop and jet) aircraft, which is projected to expand at a CAGR of 2.2%. **Figure 2-2** illustrates the growth of GA hours flown segmented by aircraft type over the forecast period.

F**igure 2-2: FAA Forecast for GA Hours Flown**



Source: FAA Aerospace Forecast FY2023-2043, 2023.

2.2.2. National Terminal Area Forecast Summary

Official FAA forecasts for CLS as well as other airports provide an overall forecast for planning purposes with the TAF that is published annually. Data found in an FAA TAF includes historical data from the previous 20 years to the baseline and a 20-year forecast from the baseline year. It is important to remember that historical data from 2020-2022 may include data indicative of reduced aviation activity due to the COVID-19 pandemic. The TAF determines the forecasted aviation activity in the form of operations, based aircraft, and enplanements and is developed in conjunction with the National Plan of Integrated Airport Systems (NPIAS). The FAA's TAF and associate annual summaries provide forecasts not just at the local airport level, but also at the regional and national level in regard to airport systems.

In general, smaller GA airports have less TAF data available. The full FAA TAF for CLS, Washington State, the Northwest Mountain Region, and the nation are available in **Appendix 2-X.**

The latest National TAF published by the FAA in February 2023 includes key trends for GA local and itinerant operations, which will have the greatest impact on an airport such as CLS more than other categories forecasted. Local operations are expected to see a CAGR of 0.63% in the near term (through 2027, 5 years), 0.50% in the medium term (through 2032, 10 years), and a more conservative 0.45% in the longer term (through 2042, 20 years). Itinerant operations are also expected to see growth over the forecast period, with a CAGR of 1.37% in the next five years, 1.13% in the next 10 years, and 1.02% in the 20-year forecast. The based aircraft count is additionally expected to see growth at an annualized rate of 0.77%. **Table 2-1** provides a summary of selected national statistics from the FAA TAF across selected five-year periods.

Table 2-1: FAA National TAF Activity Forecasted for Selected Years 1990-2042

Year	Air Carrier/Air Taxi & Commuter Itinerant Operations	GA Itinerant Operations	GA Location Operations	Based Aircraft
1990	23,168,008	37,712,500	39,310,039	161,068
1995	26,950,188	38,534,068	38,158,077	156,760
2000	29,451,437	43,659,392	42,896,230	178,680
2005	29,158,822	40,058,306	40,538,229	195,789
2010	25,080,054	34,246,178	36,510,747	164,302
2015	24,562,800	32,285,972	35,653,309	163,149
2020	19,943,215	30,438,088	35,816,652	155,584
2022	24,338,189	32,411,995	37,570,977	159,551
2027*	28,451,844	34,147,057	39,686,273	166,315
2032*	30,904,711	34,730,431	40,431,839	173,129
2037*	33,398,137	35,357,106	41,232,804	180,262
2042*	36,109,230	36,032,343	42,096,133	187,828

Source: FAA TAF, 2023.
**Forecast years*

2.3. CURRENT AIRPORT DATA

There are many sources of information regarding airport operations and based aircraft, however, at smaller GA airports such as CLS it is important to note that data is often incomplete or unreliable. In many cases, the consolidation of data from multiple sources is necessary to fully understand activity at the airport. Examining the data available as a whole regarding aircraft activity at the airport can often

offer a clearer look at the existing situation at an airport. A base year of 2022 has been set for the airport, and historical data will be used to establish trends.

2.3.1. Current Fleet Mix Information

With CLS featuring a single 5,000-foot runway, the airport is capable of servicing the needs of most commonly used GA aircraft from smaller single-engine piston-type aircraft up to large turbine-driven corporate aircraft. The pavement at CLS is capable of withstanding aircraft weighing less than 30,000 pounds in a single-wheel configuration all the way up to 85,000 pounds for aircraft in a dual tandem-wheel configuration. The volume of GA operations from itinerant and training aircraft operations, and the convenient location in proximity to Seattle, Washington and Portland, Oregon for based aircraft are two influential factors in facility needs at CLS.

Aircraft dimensions and speed upon approach to the airport are the two largest determining factors in airport design. An aircraft's Airport Approach Category (AAC) is classified A through E stratified by speed (in knots) on approach to a runway, while Airplane Design Group (ADG) is classified I through VI stratified by wingspan. When utilized in tandem, AAC and ADG are used to determine the appropriate Airport Reference Code (ARC) for a facility. ARC guides necessary design geometry and construction at an airport. An airport's critical aircraft is deemed to be the most demanding aircraft (or group of aircraft with similar characteristics) with no less than 500 annual operations. Parameters used to classify AAC and ADG for a critical aircraft are detailed in **Table 2-2**.

Table 2-2: AAC and ADG Parameters for Determining Critical Aircraft

AAC	Aircraft Approach Speed	Example Aircraft
A	< 91 knots	Cessna 150/Pilatus PC-6
B	91 knots to < 121 knots	Cessna Citation I/Bombardier Q400
C	121 knots to < 141 knots	Gulfstream III
D	141 knots to < 166 knots	Boeing 777 Series/B787/Gulfstream IV
E	166 knots or more	Certain military aircraft
ADG	**Aircraft Wingspan**	**Example Aircraft**
I	< 49 feet	Cessna 421 Golden Eagle/Piper PA-31
II	49 to < 79 feet	CRJ/Saab 340
III	79 to < 118 feet	Boeing 737-700/Airbus A-320/Embraer ERJ 190-100
IV	118 to < 171 feet	B767 Series/Airbus A-310
V	171 to < 214 feet	B777 Series/B787/A330 Family
VI	214 feet to < 262 feet	Boeing 747-8/Airbus A-380-800

Source: FAA, 2021.

The largest aircraft commonly utilizing CLS is the Cessna Citation CJ3, which is classified as a B-II aircraft. Other aircraft within the B-II category which operate with less frequency at CLS include the Cessna Citation CJ2, the Beechcraft Model 90 King Air, Beechcraft Model 200 Super King Air, and the Cessna Citation V. Other common aircraft at CLS which are typical of GA airports include single engine Cessna, Piper, and Mooney aircraft which fall in the category of A-I. Smaller business jets within the B-I classification include larger turboprop aircraft like the Pilatus PC-12.

At non-towered airports such as CLS it is not possible to have an exact fleet mix figure, however, reported Instrument Flight Rules (IFR) operations are a good identification of fleet mix. Typically, the most demanding aircraft fly IFR, and therefore Traffic Flow Management System Counts (TFMSC) data

that collects IFR operational activity is a good source to lean on despite not representing much of the Visual Flight Rules (VFR) traffic at the airport. **Appendix 2-X** offers a summary of IFR operations by month for the previous 20 years.

2.3.2. Current Aircraft Operations

In order to forecast a variety of classes of aviation activity, it is necessary to establish a strong foundational dataset regarding the baseline year and existing airport operations. There are a multitude of sources where data can be gathered to assess the current level of activity at an airport. At smaller GA airports such as CLS, data may be less available due to the lack of sophisticated data logging programs. FAA data as well as other present data sources from the airport such as ADS-B logs and airport sign-ins can be useful in augmenting underreported operational figures.

2.3.2.1. ADS-B Tracking

The airport operations tracking service MotionINFO has collected operational data through tracking of ADS-B signals on aircraft. Over the past five-years there has been a significant increase in ADS-B traffic counts, and this is largely due to the increased usage, and installations of, ADS-B out equipment on aircraft. It is very important to note that the CLS airport does not lie within a Mode C Veil where ADS-B equipment is required for aircraft, therefore it is not uncommon for aircraft operating at CLS to have no such equipment which is then unreported on an ADS-B tracking service. For that reason, operational statistics reported at CLS using ADS-B tracking software should be acknowledged as only a portion of all operations and is by no means considered to record the full picture of operations at CLS.

Table 2-3: CLS ADS-B Tracking Reported, 2019-2022

Reported Year	Reported Based Aircraft
2019	4,216
2020	12,510
2021	12,336
2022	20,797

Source: MotionINFO Data 2023.
Note: Base year of the forecast is 2022.

2.3.2.2. FAA 5010 Operations

The most recently published FAA 5010 Master Record for all operations at CLS for the year 2020 are detailed in **Table 2-4**. At non-towered airports without sophisticated operations tracking software, figures represented in the 5010 Master Record are often estimates of activity provided by airport management.

Table 2-4: FAA 5010 Master Record Operations for CLS, 2020

Type of Operation	Count
Air Carrier	0
Air Taxi	4,500
GA Local	23,000
GA Itinerant	20,000
Military	210
Total	**47,710**

Source: FAA 5010 Master Record for the operational period ending December 31, 2020.

2.3.2.3. GA Operations

GA operations at CLS can include flights conducted in both Instrument Flight Rules (IFR) and Visual Flight Rules (VFR). The FAA 5010 Master Record, with data as recent as 2020, indicates a near even split between local and itinerant GA operations at CLS. With 1,532 reported IFR operations in 2022, it is evident that VFR flights compose the vast majority of operations occurring at CLS.

Due to Chehalis being located relatively equidistant between the Seattle, Washington and Portland, Oregon areas, the airport sees plenty of itinerant traffic traveling north/south across the Pacific Northwest of the United States. Much of the airport's pilot sign-in logs document itinerant activities at CLS which are believed to comprise a considerable share of operations and fleet mix. Of the entries analyzed, many signaled itinerant operations at the airport for the purpose of flight training. Local and itinerant flight training occur at CLS frequently due to its location outside of the congested flight areas to the north and south. Being located between Portland and Seattle, the airport sees many student pilots from across Washington and Oregon as well as further from Northern California and Idaho utilizing the airport for flight training. One reason for this activity is that Chehalis is located far enough away from many airports with greater flight training activity to qualify for cross-country flight hours which are an important part of a pilot's training.

2.3.3. Current Instrument Operations

While at present IFR operations do not comprise the majority of flights at CLS, it is important to understand the trends within this type of operation as the FAA aerospace forecast suggests increased activity among jet aircraft with more commonly fly IFR procedures. The presence of an Instrument Approach Procedure (IAP) allows for instrument flights to arrive with precision navigation at CLS. At present, CLS has one IAP for Runway 16. Given the likelihood of Instrument Meteorological Conditions (IMC) in the U.S. Pacific Northwest throughout the year, the existence of an IAP provides expanded operational opportunities at CLS. IFR operations forecasts are not traditionally a required part of an airport master plan update, though understanding trends within this type of operation can offer insight into operations that can be useful in developing future forecasts.

The TFMSC published by the FAA provides information specific to IFR operations at an airport. This data provides various information that can be dissected to understand monthly trends, aircraft utilization, and the flight's point of departure or arrival. This dataset is comprised of records from FAA ATC enroute computers. The source data is generated when a pilot files an IFR flight plan or when controllers within the National Airspace System (NAS) issue an IFR clearance. IFR data for CLS including total operations of the sort within the past year as recorded by the FAA TFMSC is detailed in **Table 2-5**.

Table 2-5: IFR Operations at CLS, 2022

Month	Arrivals	Departures	Total IFR Operations During Month
FAA TFMSC Data 2022			
Jan	63	62	125
Feb	58	50	108
Mar	68	62	130
Apr	61	57	118
May	62	59	121
Jun	94	72	166
Jul	64	63	127
Aug	75	64	139
Sep	73	64	137
Oct	74	65	139
Nov	59	57	116
Dec	55	51	106
Annual Total IFR Operations	**806**	**726**	**1,532**

Source: FAA TFMSC, 2023.

The B-II category of aircraft holds the most IFR operations in 2022. Small single-engine aircraft only account for a minority share of all IFR operations despite comprising the majority of based aircraft. One reason for this is that CLS lies outside of congested and controlled airspace and may fly VFR without the need for clearance from a controller. Those types of operations would not be recorded by the TFMSC despite being a large portion of total operations at CLS. **Table 2-6** provides a breakdown of IFR activity by AAC and ADG for the previous year.

Table 2-6: IFR Activity by AAC and ADG, 2022

AAC	ADG	2022
A	I	341
B	I	309
C	I	2
A	II	50
B	II	733
C	II	8
Total		**1,443**

Source: FAA TFMSC, 2023.

2.3.4. Current Based Aircraft Information

The most recent FAA 5010 Master Record for CLS (**Table 2-7**) indicates a total of 56 based aircraft, of which 4 are jet aircraft. The latest FAA National Based Aircraft Inventory Program (NBAIP) data reports CLS as having an airport-verified 57 based aircraft as detailed in **Table 2-8**. Because of the (similarity/dissimilarity) between the two records, the more recent 2023 NBAIP report will be established as the base year data for the forecast.

Table 2-7: FAA 5010 Master Record Based Aircraft at CLS

Aircraft Type	Count
Fixed-Wing Aircraft	
Single-engine	49
Multi-engine	3
Jet	4
Fixed-wing total	**56**
Other Aircraft	
Helicopters	0
Gliders	0
Military	0
Ultra-Light	0
Other Total	**0**
Airport Total	**56**

Source: FAA 5010 Master Record accessed July 31, 2023.

Table 2-8: National Based Aircraft Inventory Program at CLS

Aircraft Type	Currently Validated*
Single-engine	51
Multi-engine	2
Jet	4
Helicopter	0
Total	**57**

Source: FAA NBAIP, 2023.

*National Based Aircraft Inventory validated based aircraft numbers for 2023

2.4. RELEVANT HISTORICAL TREND ANALYSIS AND EXISTING FORECASTS

One element important to the forecast generation process is the blending of micro-level local trends and how they will interact with macro-level regional and national trends. This chapter has already discussed some macro-level trends in the direction of GA as a whole, but important to that trend is how the same trends have manifested locally at CLS in the past. The following section of this study documents local trends and forecasts and how they correlate to regional trends that have been previously completed. Synthesizing multiple trends into a more bespoke understanding of the direction of operational statistics at CLS factors strongly into developing accurate forecasts of aviation activity over the forecast period.

2.4.1. Local Trends and Forecasts

While it is essential to approach aviation forecasting in a manner that incorporates trends at the regional and national levels, trends seen at the local level offer the most direct insight into short-term developments in aviation activity. Airport data as well as airport sponsor input regarding the existing conditions and historical trends seen at the airport can provide important perspectives used to augment the data collected from FAA sources.

2.4.1.1. Historic Based Aircraft Numbers

The quantity of aircraft based at CLS has remained relatively stable in recent history, recording approximately 50-60 verifiable based aircraft. Since the mid-2000s, the number of based aircraft has slightly shrunk from highs during that time as the result of more accurate based aircraft reporting and FAA 5010-1 Airport Master Record reliability. Prior to this, based aircraft numbers should be considered to have uncertain reliability as standards of the time loosely defined what constituted a based aircraft. When considering that present-day based aircraft counts align similarly to that of the 1990s as well as the airport today having a lengthy hangar waiting list, a logical deduction can support that highly inflated based aircraft figures ranging between 60-100 based aircraft are inaccurate and unreliable. Despite a more accurate figure being reported lower, the plateaued trend of recent years suggests that CLS has reached near maximum based aircraft capacity given the existing facilities at the airport.

Reported based aircraft at CLS throughout the past thirty years is detailed in **Table 2-9**. The recorded data is representative of the FAA 5010-1 Airport Master Record program and the FAA National Based Aircraft Inventory Program (NBAIP) which provides based aircraft reports at basedaircraft.com. Post-2005 the number of recorded based aircraft dropped significantly, mostly due to the implementation of the FAA NBAIP which provides more accurate tracking of based aircraft, removing erroneously counted quantities of aircraft that may have originally been counted as based aircraft but are actually seasonally based aircraft which classify as a based aircraft elsewhere. A plateau in the number of based aircraft for nearly a decade in conjunction with airport hangars being at capacity indicates that future airport development has the potential to uncork latent demand for aircraft to be based at CLS which the facilities are not currently capable of supporting.

Table 2-9: Reported Based Aircraft, 1990-2022

Reported Year	Reported Based Aircraft
1990	56
1995	56
2000	57
2005	68
2010	34
2015	54
2020	56
2022	57[1]

Source: FAA TAF, 2023 and 5010 Airport Master Records, 2020.
Note: Decreases since 2005 have been due to a combination of the Great Recession, as well as the implementation of the FAA's National Based Aircraft Inventory Program database for tracking based aircraft.
[1]National Based Aircraft Inventory validated based aircraft numbers for 2023.

2.4.1.2. Hangar Availability / Sponsor Input

Hangar availability being in short supply as a result of high aircraft storage demand can be indicative of latent demand for aviation activity in the short-term period of the forecast due to a lack of hangars at an airport or in the region overall. This indication is however not a strong sign of demand over a long-term forecast period. The development of hangars at airports can be used to attract new aircraft and operators to an airport. CLS representatives and stakeholders have expressed that demand exists for new and existing hangars based on the current waitlist and continued requests for hangar development. Airports such as CLS with mostly full hangars and plenty of developable property can be relatively confident that further development of aviation facilities will spur some level of aviation activity growth in both based aircraft and operations.

2.4.1.3. Previous CLS Master Plan Update Based Aircraft Forecast

The most recent MPU conducted at CLS was published in 2001. The forecast chapter of that study sees aviation activity highly associated with forecasted population growth in Lewis County. Because the previous aeronautical forecast is more than 22 years old at the time of publication of this MPU, the trends and figures analyzed in the previous forecast have little influence over the forecast developed in this chapter due to relevancy being diminished by worldwide influences of aviation activity in the following two decades such as the Great Recession and COVID-19 pandemic. Furthermore, based aircraft figures at CLS have been lower than previous forecasts partly due to the implementation of the FAA NBAIP which offers more accurate tracking of based aircraft.

2.4.1.4. Current FAA TAF Based Aircraft Forecast

Current FAA TAF reports for airports such as CLS are traditionally derived from previous master plan forecasts and are updated with current data as it becomes available. Due to the lack of a current forecast in recent history, the forecast has remained stagnant at the reported 5010 based aircraft numbers, conducted in 2020, (**Table 2-10).** As previously mentioned, existing hangar capacity is limited and when hangars are constructed in the future the based aircraft will likely grow due to the existing demand exhibited by the current hangar waiting list of 40+ aircraft.

Table 2-10: FAA TAF of CLS Based Aircraft, 5-Year Intervals, 2022-2042

Year	TAF Forecast Based Aircraft
2022	56
2027	56
2032	56
2037	56
2042	56

Source: FAA TAF, 2023.

2.4.1.5. Aircraft Operations Versus Based Aircraft

When a supplemental forecast of aircraft operations is needed, the FAA has a formula that can be used to estimate total operations as a function of both full-time based aircraft and part-time seasonally based aircraft. This method accounts for aircraft which utilize airport hangars as well as outside aircraft storage aprons. The formula provides guidance on estimating operations per based aircraft as follows:

- 250 operations per based aircraft for rural GA airports with little itinerant traffic
- 350 operations per based aircraft for busier GA airports with more itinerant traffic
- 450 operations per based aircraft for busy reliever airports
- 750 operations per based aircraft for busy airports featuring unusual circumstances or high itinerant operations not normally seen at GA facilities

Using data from the FAA TAF reporting statistics for 2022, a total of 48,739 operations divided by 56 based aircraft yields a resulting ratio of approximately 870 operations per based aircraft. Among the reasons for this ratio being particularly high relative to what would be expected for an airport the size of CLS is the volume of itinerant operations seen at the airport which may be in relation to CLS location nearly equidistant enroute between the Portland, Oregon and Seattle, Washington areas. As seen in the airport terminal building's pilot sign-in log, many operations at CLS are conducted for the purpose of

flight training. CLS receives significant training operations that are not based at CLS in part due to its distance from Oregon, Northern California, and Eastern Washington which provides acceptable cross-country training requirements for student pilots. Additionally, occasional military operations from nearby Joint Base Lewis-McChord contribute to the number of operations that are not factored into the number of based or seasonally based aircraft.

It is reasonable to assume the airport would receive 350 operations per based aircraft per year as a busier GA airport, providing for a total operations count of the 57 verified based aircraft to reach 19,950. This would be representative of the high volume of itinerant traffic received at the airport with approximately 28,789 operations attributed to itinerant traffic (59.1% of total operations) in the base year of 2022.

2.4.1.6. Historic General Aviation Operations

Total annual reported itinerant and local aviation operations from 2010-2022 are presented in **Table 2-11**. As an airport without an air traffic control tower, the data presented is again limited to the operational estimates documented in the FAA TAF.

Table 2-11: CLS Annual GA Operations Reported, 2010-2022

Year	Itinerant	Local	Totals
2010	24,710	23,000	47,710
2011	24,710	23,000	47,710
2012	24,710	23,000	47,710
2013	24,710	23,000	47,710
2014	24,710	23,000	47,710
2015	24,710	23,000	47,710
2016	24,710	23,000	47,710
2017	24,710	23,000	47,710
2018	24,710	23,000	47,710
2019	24,710	23,000	47,710
2020	24,710	23,000	47,710
2021	24,710	23,000	47,710
2022	25,457	23,282	48,739

Source: FAA TAF, 2023.

2.4.1.7. Historic Instrument Operations

Across the entire nation, instrument approach capabilities and procedure usage are increasing. The most reliable source of data regarding instrument operations over time is the FAA TFMSC. **Table 2-12** details the total instrument operations recorded at CLS since 2002. While the year-to-year is relatively up-and-down over the period, the compound annual growth rate over the last 20 years is 3.66%, 3.59% over the last 10 years, and in the last 5 years, the airport has seen a CAGR of 5.02% in total IFR operations.

Table 2-12: TFMSC Instrument Operations at CLS, 2002-2022

Year	Total IFR Operations
2002	746
2003	810
2004	879
2005	899
2006	1,127
2007	1,246
2008	1,402
2009	1,239
2010	1,305
2011	1,107
2012	1,077
2013	1,069
2014	1,058
2015	1,206
2016	1,217
2017	1,199
2018	1,312
2019	1,483
2020	1,498
2021	1,641
2022	1,532

Source: FAA TFMSC, 2023.

2.4.2. Regional Trends and Forecasts

Regional forecasts and data can detail the momentum of aviation activity for airports within the same state as CLS as well as the greater FAA region that it is a part of. Analyzing these trends can illustrate the direction of operations and based aircraft within a smaller area than a national forecast, detailing relevant local growth compared to the rest of the nation. As airport capacity is limited, growth for the region as a whole can indicate the potential for spillover activity becoming present at CLS due to limited development at other airports nearby.

2.4.2.1. FAA Northwest Mountain Region TAF

As part of the FAA's NPIAS, FAA TAF statistics and forecasts are provided not just at the local and national level, but also at the regional level. The FAA Northwest Mountain Region includes Washington as well as nearby Oregon and other regional states such as Idaho, Montana, Utah, Wyoming, and Colorado. The FAA forecasts an AAGR of 1.39% for total operations and 0.9% for based aircraft within the region over the next 25 years. Statistics will, of course, vary from airport to airport due to the presence of varying operations which may inflate these numbers at some airports relative to others such as flight schools or charter operations. As a gross estimate, however, this is a useful consideration in the momentum of aviation activity in the region. **Table 2-13** illustrates historical data for the FAA Northwest Mountain Region as well as forecasts for the 20-year period beginning in 2022.

Table 2-13: Historic and TAF Operations and Based Aircraft for Northwest Mountain Region, 1990-2042

Year	Total Operations	Based Aircraft
Historic Data		
1990	9,568,869	17,185
1995	10,429,444	17,572
2000	11,636,965	20,585
2005	11,541,341	23,465
2010	10,756,287	21,902
2015	10,165,572	21,913
2020	9,785,005	21,261
2022	10,452,533	21,729
Forecasts		
2027	11,339,872	22,765
2032	11,959,738	23,771
2037	12,612,684	24,816
2042	13,338,508	25,923
AAGR 2022-2042	**1.23%**	**0.89%**

Source: FAA TAF, 2023.

2.4.2.2. FAA Washington State TAF

The FAA similarly provides the same dataset at the state level. The FAA TAF estimates that the State of Washington will experience an AAGR of 1.05% for total operations and 1.14% for the number of based aircraft over the 20-year period beginning in 2022 (**Table 2-14**). As previously stated, this data aids in contextualizing trends that may impact CLS.

Table 2-14: Historic and TAF Operations and Based Aircraft for Washington State, 1990-2042

Year	Total Operations	Based Aircraft
Historic Data		
1990	2,820,613	4,563
1995	3,208,215	4,790
2000	3,610,414	5,872
2005	3,427,252	6,631
2010	3,178,399	5,963
2015	2,911,283	5,554
2020	2,731,936	5,004
2022	2,916,493	5,153
Forecasts		
2027	3,226,030	5,451
2032	3,416,300	5,746
2037	3,622,338	6,057
2042	3,830,825	6,409
AAGR 2022-2042	**1.37%**	**1.10%**

Source: FAA TAF, 2023.

2.4.2.3. Washington State Aviation System Plan

Washington State completed its latest aviation system plan update in 2017 (WASP). This update is the latest iteration of the continuing 20-year plan to assist the State, FAA, and individual airports in understanding the influences affecting aviation within the state and to help individual airports and the State make appropriate plans for the future. The WASP report is characteristic of other FAA funded state system planning studies and the organization of the report is similar to individual airport master plans. These similarities are due to state system plans using the same FAA Master Planning guidance as individual airport master plans, found in FAA AC 150/5070-6B. The WASP defines the three pillars of the Washington Aviation System as air cargo, commercial uses, and GA.

As part of the new WASP, the State of Washington has developed its own airport classification system to better describe an individual airport's contribution to the state airport system. **Figure 2-3** depicts the WASP airport classifications.

Figure 2-3: Washington State Aviation System Plan Airport Classification System

CLASSIFICATION	PRIMARY ACTIVITIES	FACTORS TO CLASSIFY AIRPORTS
Major	▪ Commercial service ▪ Aircraft or aerospace manufacturing	▪ ARC C-III or greater ▪ Primary Activity: commercial service and/or aerospace manufacturing/MRO ▪ Population over 40,000
Regional	▪ Corporate GA and travel business	▪ ARC B-II or greater ▪ Primary Activity: corporate GA and travel business ▪ Population over 30,000
Community	▪ GA-personal transportation/business and recreational ▪ Pilot training	▪ Not metro or regional ▪ Paved primary runway surface ▪ 15 or more based aircraft
Local	▪ GA-personal transportation/recreational ▪ Pilot training ▪ Agriculture	▪ Not metro or regional ▪ Paved primary runway surface ▪ Less than 15 based aircraft
General Use	▪ GA-personal transportation/recreational, including backcountry	▪ Unpaved primary runway surface (including all seaplane bases)

Source: WASASP, 2017.

As part of the classification system, CLS holds the designation of a "Regional" Airport. A full description of this new classification is:

"A Regional Airport primarily serves as a base for corporate and business travel via GA aircraft and commuter passenger service through the airlines. These trips are typically in smaller aircraft, with an ARC of B-II or greater, and may or may not include scheduled commercial airline service. The population must be a minimum of 30,000 but is more likely between 34,000 and 2.1 million."

CLS fits with the WSDOT definition of a "Regional" Airport very appropriately and continues to have room for growth and expansion.

The forecasts developed as part of the latest WASP are of importance to the CLS forecast. The overall average annual growth rates forecast by the WASP for the 20-year period and relevant to CLS are as follows:

- GA aircraft operations statewide 0.7%
  - Regional Classified Airports 1.1%
- Air Carrier / Air Taxi Commuter aircraft operations statewide 2.0%
- Enplanements statewide 3.1%
- Based Aircraft statewide 1.1%
  - Regional Classified Airports 0.8%

These numbers also resemble most FAA TAF-based forecasts and provide further credence to the projected activity of the aviation industry in Washington as a whole. It is not uncommon for information acquisition of this type in a statewide plan to be from consolidated databases rather than being specific to an individual airport. The information is not meant to be entirely conclusive for each individual airport, but rather to identify trends for the entire state.

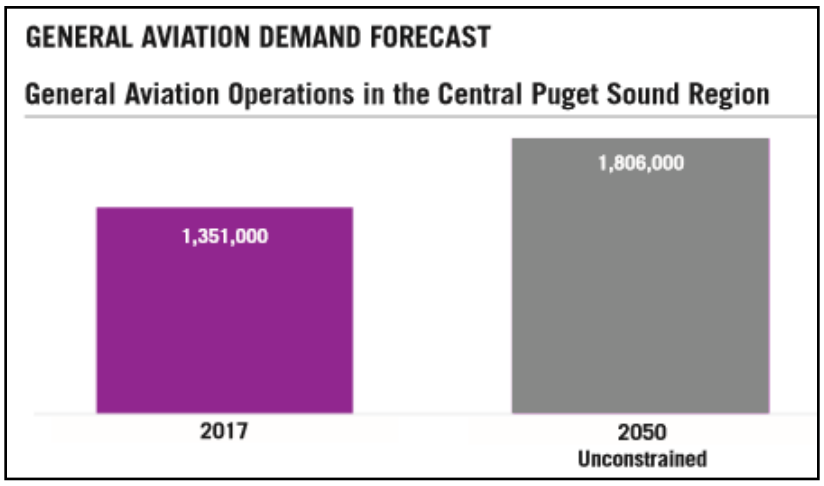
2.4.3. Other Relevant Influences on Trends and Forecasts

During the aviation forecasting process, it is necessary to examine other potential contributing factors to aviation activity that could in turn influence airport development. Some of these factors may be easy to quantify with data, while others may be more speculative and vague. It is important for the forecaster to utilize professional judgment to assess the relevance of these factors while ensuring stakeholder input is incorporated into forecasts of aviation activity beyond what data can tell. While large commercial airports may be difficult to forecast due to an overwhelming amount of data, smaller GA airports such as CLS have the potential to be equally challenging to forecast due to the limited availability of relevant data. As a result, input from local stakeholders as well as forecaster discretion are imperative in the development of aviation activity forecasts that reflect local trends.

2.4.3.1. Regional Studies

The Puget Sound Regional Council (PSRC) Aviation Demand Study, a focused study of aviation demand in the region north of CLS, forecasted a 34% increase in GA operations by 2050 (**Figure 2-4**). Though CLS is not included in the study it is representative of the activity occurring and forecasted in the communities adjacent to the regional study. The study states that GA demand in the Puget Sound Region continues with a steady increase, even with the observed decline in recreational flights nationally. In 2017 the Puget Sound region accounted for 1,351,000 operations and formulates a forecasted estimate of 1,806,000 operations annually by 2050. This study indicates that airports in the Puget Sound region, similar to CLS with significant business, training operations, and "for profit" activity, will experience significant growth in operations over the next few decades.

Figure 2-4: PSRC 2050 Forecasts for Aviation Demand

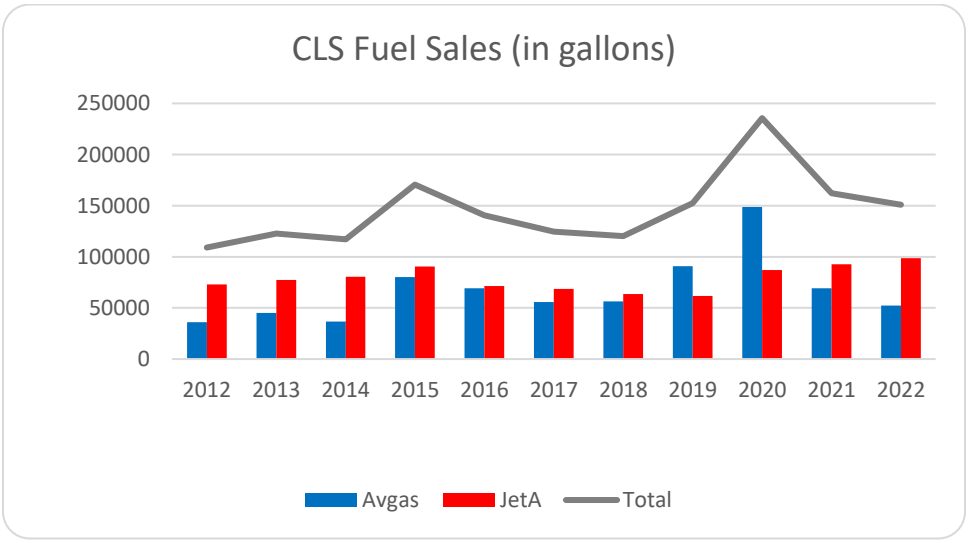


Source: PSRC 2050 Forecasts for Aviation Demand 2018.

2.4.3.2. Fuel Sales at CLS

Another metric that is measurable from CLS itself is fuel sales. Sales obviously will fluctuate across the year, but annualized sales can provide a general view of growth year to year. **Figure 2-5** illustrates trends in fuel sales of both JetA and 100LL in the past decade. The decline in fuel sales from 2020 onward can likely be attributed to the COVID-19 pandemic and the period in which the industry was in recovery from pandemic effects. Despite this dip in demand for fuel, the net gallons sold from 2012 to 2022 saw a CAGR of 3.31%. Fuel sales growth indicate positive increases in itinerant and local operations. The addition of more jet aircraft to the airfield has led to an increase in Jet-A fuel sales. Unfortunately, records showing the amount of fuel sold to based vs transient aircraft are not kept by the airport. It is recommended that these records are tracked for future forecasts. Future fueling opportunities may exist with the introduction of hydrogen fuel cells and electric aircraft charging, and these metrics should be tracked.

Figure 2-5: Fuel Sales Records for CLS, 2012-2022



Source: CLS Airport Management Records 2023.

2.4.3.3. Airport Users and Survey Responses

Among issues raised by pilots who are either based at CLS or regularly visit the airport, hangar availability was noted to be one of the most prominent desired future developments. Seventy-one percent of respondents indicated that they store their aircraft in hangars, while the remaining respondents rely on apron tie-down spots. This same 71/29 split is seen in the response of pilots having their aircraft based at CLS compared to elsewhere, lending towards the comments that hangar space at CLS is highly correlated to based aircraft levels. When prompted to rate issues on their importance, the further addition of t-hangars and box hangars for rent was rated as medium or high importance by more than half of all responses. Given the option to further explain their responses, multiple pilots cited a waiting list for hangar availability as a prohibiting factor for their operations at CLS.

Nearly half of all respondents indicated that the nature of their flying consisted of flight training and flights conducted locally. This supports data seen across FAA records for the airport which show a significant share of operations not being conducted in IFR.

2.4.3.4. Demographics

Regional demographics and socioeconomics are often attributed to have an influence over aviation demand. A positive impact can be seen in aviation demand when regional population, income, and employment see sustained growth. Declining trends within the same indicators can have a negative impact on the future of aviation demand in the region. Medium projections of the population for Lewis County from the Washington Office of Financial Management (OFM) Growth Management Act (GMA) are detailed in **Table 2-15**.

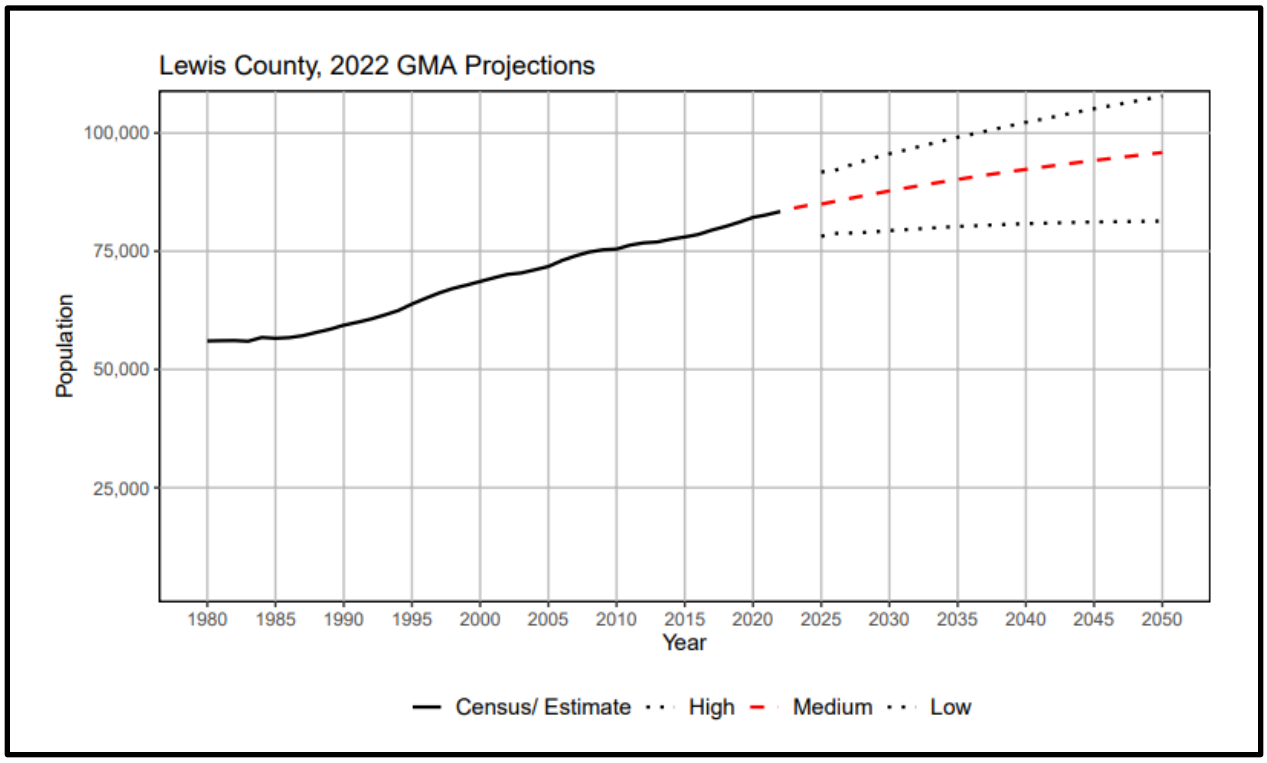
Table 2-15: Lewis County Recorded Populations with Medium Projections

Year	Total Population
2010	75,455
2015	78,006
2020	82,149
2025	84,957
2030	87,746
2035	90,188
2040	92,313
CAGR	
2010-2020	0.85%
2020-2030	0.66%
2030-2040	0.51%

Source: OFM GMA, 2022.

U.S. census data relative to that of Chehalis, Lewis County, and the State of Washington establishes a collective population forecast for the area. The 20-year population projections developed by the Washington OFM offer valuable insight into local population trends. The most reliable series of estimates for population growth in Lewis County suggests a stable increase in population through 2040, increasing to an anticipated population of 92,313 residents.

Figure 2-6: Lewis County 20-Year Population Estimates



Source: OFM GMA, 2022.

2.5. CLS FORECASTS

Through the aggregation of local, regional, and national trends in population, economics, and aviation activity, it is possible to develop a forecast for based aircraft and aviation operations that are essential to determining necessary airport development activities.

2.5.1. Forecasting Methodology

Regulatory guidance on aviation forecasting as outlined in FAA Advisory Circular 150/5070-6B offers a wide scope of forecast application and methodology. The reason for this wide scope can be seen in the need to accommodate aviation activity forecasting at airports with a wide range of complexity and operational characteristics. The use of professional judgment is a necessity in determining appropriate forecast methods to be used in any given forecast study. The FAA recognizes an array of forecasting methodologies, including:

1) **Regression Analysis** - A technique that infers a relationship between aviation demand categories such as enplanements (dependent variables) and a counterpart economic measure such as population or income (independent variable). This methodology is relatively simple and relies on sourcing relevant and reasonable forecasts for the independent variable.
2) **Trend Analysis** - This technique is dependent on the continuity of historical trends forward into the forecast period. A simple equation is developed where time is the independent variable.

This method serves as the most fundamental use of statistical analysis in aviation forecasting. While often used as a supplement to other techniques, this method generates value from being simple to apply in cases where a more sophisticated methodology would be more complicated and costly than necessary for the forecast study. This reason is especially true in the case of smaller GA airports such as CLS.

3) **Market Share Analysis or Ratio Analysis** - Built upon the assumption of a top-down relationship existing between national, regional, and local aviation activity, this technique develops a forecast for future activity representative to a share of forecasted activity at higher levels of aggregation. This forecasting method is useful in the case of local aviation activity maintaining a relatively constant share of regional or national aviation activity.
4) **Smoothing** - A technique in statistics which, when applied, asserts a greater weight to recent trends within the historical dataset. This method for forecasting is often applied in cases of short-term forecast generation.

Multiple forecasts were developed for both based aircraft and aircraft operations at CLS through the end of the forecast period. Each forecast features a foundational regression analysis with other forecasts building from that to include trend analysis, market share analysis, and smoothing. Many of the historical data resources and trends identified in these forecasts have already been discussed in this chapter. Specific resources utilized in the development of the following section include:

- FAA 5010 Airport Master Record
- FAA TAF
- CLS 2001 Master Plan
- 2022 GMA Projections
- WASP
- FAA TFMSC
- FAA Aerospace Forecasts

2.5.2. Based Aircraft Forecasts

Two forecast methodologies are presented in the following section regarding future levels of based aircraft at CLS through the end of the forecast period. The first method described is built from a foundation of regression and trend analysis, while the second builds upon that methodology by employing market share analysis. As required by the FAA, forecast data in this section is presented in the baseline, short-term (+5 years), medium-term (+10 years), and long-term (+20 years) format. **Appendix 2-X** features full forecast data year by year throughout the forecast period.

2.5.2.1. Based Aircraft Forecast #1 – Regression and Trends Analysis

The first of the two presented forecast methodologies employ a hybrid analysis of historic and forecasted growth rates from local, regional, and national indications of growth within the GA fleet. It is important to note that a triggering event such as the development of new hangars could dramatically shift trends relative to what has been seen in the past twenty years with the airfield at or near built capacity. The growth rates sourced to create a hybrid growth rate are detailed in **Table 2-16**.

Table 2-16: Indicators and Growth Rates Employed in CLS Based Aircraft Forecast #1

Level of Indicator	Specific Indicator	Source	Average Annual Rates
Local	FAA CLS Based Aircraft Stats (1990-2022)	FAA 5010 / TAF	0.00%
Local	2001 Master Plan Based Aircraft Forecast	CLS MP 2001	1.34%
Local	FAA CLS Based Aircraft Forecasts (2023-2042)	FAA TAF	0.00%
Regional	FAA NWMR Forecasts (2023-2042)	FAA TAF	0.83%
Regional	FAA Washington State Forecasts (2023-2042)	FAA TAF	1.04%
Regional	2017 WASASP Forecasts (all classes)	WASP	1.10%
Regional	2017 WASASP Forecasts (Regional class)	WASP	0.80%
National	FAA National Forecasts (2020-2040)	FAA TAF	0.77%

Source: CLS Master Plan 2001, FAA TAF 2023, WSDOT WASP 2017.

Taking these growth rates as an average will yield a future-facing annual average growth rate of 0.73%. Applying this growth rate to CLS's existing base year fleet results in the future fleet detailed in **Table 2-17**. This forecast predicts a possible 66 aircraft fleet by 2042, up nine based aircraft from the base year of 2022. In this forecast, all aircraft types are forecasted to grow at the same rate. It is important to note that this forecast is blind to any triggering event such as the construction of new hangars and is limited by historical based aircraft and hangar availability.

Table 2-17: Results of CLS Based Aircraft Forecast #1

Aircraft Type	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Single-engine	51	53	55	59
Twin-engine	2	2	2	2
Jet	4	4	4	5
Helicopter	0	0	0	0
Total Based Aircraft Forecast	**57**	**59**	**61**	**66**

Source: The Aviation Planning Group, 2023.

2.5.2.2. Based Aircraft Forecast #2 – Regression, Trends, and Market Share Hybrid Analysis

The alternative methodology for forecasting the growth of based aircraft at CLS uses a similar foundation to the previously described methodology but importantly assumes that the different types of aircraft will change over time at differing rates. Such a methodology will be more reflective of the FAA Aerospace Forecast which analyzes varying growth in the national fleet based on trends in each type of aircraft. The forecasted changes to the national fleet as represented in the FAA Aerospace Forecast are detailed in **Table 2-18**. While the share of single-engine aircraft is expected to decline, all other major categories of the GA fleet are expected to grow, significantly so in terms of jet aircraft. The trend seen in this table is consistent with the documented growth in the operational counts of larger aircraft and instrument operations in recent history, which are far more likely to be performed by jets than small single-engine aircraft.

Table 2-18: Forecasted Changes to National Fleet, 2022-2042

Year	Single-Engine	Multi-Engine	Jet	Helicopter	Total
2022	125,655	22,225	15,730	10,175	**173,785**
2027	120,235	22,050	18,370	10,950	**171,605**
2032	115,270	22,150	21,190	11,820	**170,430**
2042	108,175	23,180	26,975	13,680	**172,010**
Percentage of Total Fleet					
2022	72.3%	12.8%	9.1%	5.9%	**100.0%**
2027	70.1%	12.8%	10.7%	6.4%	**100.0%**
2032	67.6%	13.0%	12.4%	6.9%	**100.0%**
2042	62.9%	13.5%	15.7%	8.0%	**100.0%**

Source: FAA Aerospace Forecast FY2023-2043, 2023.

The methodology used in this model assumes that future hangar development will allow for more storage of large aircraft at the airport beyond what is presently available. As larger hangar space is available and business aviation demand swells will the growth of Chehalis and the region as a whole, larger twin-engine turboprops and jet aircraft would be expected to have a larger share of the based aircraft fleet at CLS. The results of this methodology are detailed in **Table 2-19**. The resultant prediction of 66 based aircraft by 2042 is very similar to that of the previous methodology, although grows beyond the airport's present capacity due to existing hangar availability having a significant influence on the growth rates seen in the first forecast methodology. This second forecast places a far greater influence on trends in each category of aircraft within the fleet mix but still draws from the airport's history as well as trends in the broader region and nationally.

Table 2-19: Results of CLS Based Aircraft Forecast #2

Aircraft Type	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Single-engine	51	51	51	51
Twin-engine	2	3	4	7
Jet	4	5	6	8
Helicopter	0	0	0	0
Total Based Aircraft Forecast	**57**	**59**	**61**	**66**

Source: The Aviation Planning Group, 2023.

2.5.2.3. Preferred Based Aircraft Forecast

Both forecasts described above provide a relatively conservative approach to forecasting growth at CLS, but with a more nuanced focus on trends within the based aircraft fleet, the second forecast methodology provides a reasonable estimate of the airport's future in more detail.

For the reasons discussed above, Based Aircraft Forecast #2 is the preferred based aircraft of the CLS MPU.

2.5.3. GA Operations Forecasts

The following section contains a detailed account of the multiple forecast methodologies used in the study of CLS GA operations. The first method utilizes a simple regression analysis with an independent variable of population. The second methodology aggregates multiple historical trends to create a hybrid regression model. The tables in this section include baseline, short-term (+5 years), medium-term (+10 years), and long-term (+20 years) levels of activity as required by the FAA. For further reference and year-by-year forecast data, see **Appendix 2-X**.

2.5.3.1. Operations Forecast #1 – Population Forecast Regression Analysis

The first method utilized to forecast operations at CLS through the end of the 20-year forecast period in 2042 pairs aviation operations growth to population growth as forecasted by the Washington OFM GMA for Lewis County. The population estimates note an annual growth rate of approximately 0.55% from 2020 through 2045 which is just beyond the scope of the forecast period. Using this rate of growth for operations yields a total of 54,390 operations by 2042 which is an equal rate of growth for both local and itinerant operations. Full 5-, 10-, and 20-year projections are detailed in **Table 2-20**.

Table 2-20: Results of CLS Operations Forecast #1

Type of Operation	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Itinerant Operations (+0.55% annually)				
Air Taxi / Commuter	4,645	4,774	4,907	5,184
GA	20,602	21,175	21,764	22,991
Military	210	216	222	234
Itinerant Operations Total	**25,457**	**26,165**	**26,892**	**28,409**
Local Operations (+0.55% annually)				
GA	23,282	23,929	24,595	25,981
Military	0	0	0	0
Local Operations Total	**23,282**	**23,929**	**24,595**	**25,981**
Total Aircraft Operations Forecast	**48,739**	**50,094**	**51,487**	**54,390**

Source: The Aviation Planning Group, 2023.

2.5.3.2. Operations Forecast #2 – Aviation and Population Regression and Trends Hybrid Analysis

A hybrid regression can be synthesized by factoring in multiple sources of data and trends indicative of change in the number of aviation operations annually. In the creation of a hybrid regression for growing aviation operations at CLS, local, regional, and national projections were evaluated for their validity and sorted between their likely impact on local traffic, itinerant traffic, or both. **Table 2-21** summarizes all average annual rate of change statistics used to develop the hybrid regression.

Table 2-21: Indicators and Growth Rates Employed in CLS Operations Forecast #2

Level of Indicator	Specific Indicator	Source	Average Annual Rates	Growth Rate Applied To
Local	FAA CLS GA Local Operations Stats (1990-2022)	FAA 5010/TAF	0.46%	Local
Local	FAA CLS GA Itinerant Operations Stats (1990-2022)	FAA 5010/TAF	1.50%	Itinerant
Local	2001 Master Plan GA Operations Forecast	CLS MP 2001	1.30%	Both
Local	FAA CLS Local GA Operations Forecasts (2023-2042)	FAA TAF	1.18%	Local
Local	FAA CLS Itinerant GA Operations Forecasts (2023-2042)	FAA TAF	2.87%	Itinerant
Local	Population growth estimate 2020-2045	2022 GMA Projections	0.55%	Both
Regional	FAA NWMR Local Forecasts (2023-2042)	FAA TAF	0.76%	Local
Regional	FAA NWMR Itinerant Forecasts (2023-2042)	FAA TAF	1.32%	Itinerant
Regional	FAA Washington State Local Forecasts (2023-2042)	FAA TAF	0.80%	Local
Regional	FAA Washington State Itinerant Forecasts (2023-2042)	FAA TAF	1.46%	Itinerant
Regional	WASASP Forecasts (all classes)	2017 WASP	0.70%	Both
Regional	WASASP Forecasts (regional class only)	2017 WASP	1.10%	Both
National	FAA National Forecasts (5-year local operations)	FAA TAF	-0.15%	Local
National	FAA National Forecasts (5-year itinerant operations)	FAA TAF	-0.19%	Itinerant
National	FAA National Forecasts (10-year local operations)	FAA TAF	0.63%	Local
National	FAA National Forecasts (10-year itinerant operations)	FAA TAF	1.37%	Itinerant
National	FAA National Forecasts (20-year local operations)	FAA TAF	0.50%	Local
National	FAA National Forecasts (20-year itinerant operations)	FAA TAF	1.13%	Itinerant

Source: CLS Master Plan 2001, FAA TAF 2023, OFM GMA 2022, WSDOT WASP 2017.

Averaging growth rates across local and itinerant statistics, this forecast utilizes a 0.71% annual rate of growth for local operations and a rate of 1.19% annually for itinerant operations. By 2042, this forecast sees 59,092 aviation operations within the year, split by approximately 54.6% itinerant operations to 45.4% local operations. As a result of both rates of growth being higher than the 2022 OFM GMA projections used in the first operations forecast, the total operations in the second forecast model are 4,702 operations yearly higher at the end of the 20-year forecasting period.

Table 2-22: Results of CLS Operations Forecast #2

Type of Operation	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Itinerant Operations (+1.19% annually)				
Air Taxi / Commuter	4,645	4,928	5,229	5,887
GA	20,602	21,859	23,193	26,110
Military	210	223	236	266
Itinerant Operations Total	**25,457**	**27,010**	**28,659**	**32,263**
Local Operations (+0.71% annually)				
GA	23,282	24,122	24,993	26,829
Military	0	0	0	0
Local Operations Total	**23,282**	**24,122**	**24,993**	**26,829**
Total Aircraft Operations Forecast	**48,739**	**51,133**	**53,651**	**59,092**

Source: The Aviation Planning Group, 2023.

2.5.3.3. Preferred Operations Forecast

The two methodologies utilized to forecast aviation operations at CLS show similarity in the near-term, but begin to diverge in the intermediate- and long-term forecast periods. This is largely due to the second methodology using many variables to address both local and itinerant operations trends, while the first method only uses population as a factor in determining the growth of both. In addition to being highly reasonable to select the second methodology lending to the synthetization of many forecasts and trends, the second methodology is also preferred because it acknowledges the shifting trends of CLS between the divide of local and itinerant operations.

For all of the reasons listed above, Operations Forecast #2 (available in section 2.5.3.2.) is the preferred forecast for aviation operations for this CLS MPU.

2.5.3.4. Instrument Approach Procedure Forecasts

The FAA TAF and TFMSC reports do not provide any kind of forecast regarding total instrument operations for individual airports. For the purpose of grasping a more complex understanding of the future development of both local and itinerant operations, it is necessary to establish a forecast of future instrument operations. FAA TFMSC data as well as the operations forecast discussed earlier in this chapter form the base dataset utilized to generate this forecast using data from 1990 to the base year of 2022.

One reason it is necessary to forecast instrument activity is that as previously mentioned in this chapter, jet aircraft and multi-engine aircraft are expected to maintain higher shares of the GA fleet nationally at the expense of single-engine piston aircraft. As larger and more modern aircraft gain greater shares of the national GA fleet as described in the latest FAA aerospace forecast, it is reasonable to draw the conclusion that instrument operations will be utilized more often, especially in the case of airports with growth potential such as CLS which has some jet usage now but could see even greater jet growth in the future if there was storage capacity available.

Instrument operations are a subset of total aviation operations, the methodology used to calculate and predict future instrument operations relies on analyzing the instrument operations share of total operations. To develop this model, the percentage of total operations that are conducted in IFR is estimated by comparing the yearly FAA TFMSC count to the total yearly operations as detailed in the FAA TAF historical data. A growth rate is then calculated across the share of total operations that instrument operations comprise over the long-, intermediate-, and short-term historical data. Doing such indicates an acceleration in the share instrument operations take of total aviation operations, having a CAGR of 3.05% in the past 20 years, 3.37% in the past 10 years, and an accelerated 4.58% CAGR in the past 5 years leading into the base year of 2022. To then apply this to a future forecast of instrument operations, the 2022 instrument share of total operations (approximately 3.14%) is applied to an annual growth rate of 4.58% and then that future share of operations by year is applied to the total aviation operations forecast previously discussed in this chapter. This method is far more reasonable than a static growth rate over the 20-year period because it accounts also for the growth in total operations at the airport which will also be growing simultaneously. **Table 2-23** details the forecast of instrument operations calculated using the methodology described in this section.

Table 2-23: CLS Instrument Operations Forecasts

Type of Operation	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Instrument Operations	1,532	2,010	2,638	4,546

Source: The Aviation Planning Group, 2023.

2.5.3.5. AAM Forecasts

Advanced Air Mobility (AAM) is a new transportation system that includes fully electric fixed-wing aircraft, hydrogen-powered aircraft, and vertical takeoff and landing (VTOL) aircraft. These aircraft are being developed for commercial use and can be powered by electric, hybrid, or hydrogen fuel cells. Lewis County is set to play a large part within the Pacific Northwest Hydrogen Hub which is receiving up to one billion in government funding, and will be an anchor and demonstrator for hydrogen in the region. With other local hydrogen initiatives, CLS may see increased opportunities with hydrogen fueled aircraft. Fixed-wing electric aircraft would use the runway and be counted as a standard operation, while VTOL aircraft would require additional vertiport infrastructure. This would allow for more small flights to nearby large airports and communities that Lewis County residents commute to for work, travel, and recreation without straining the capacity of CLS's existing airfield. Most of the current VTOL aircraft in development have a seating capacity between four and six seats. For regional commercial service, air carriers would likely choose a higher seating capacity for operations. We have assumed a five-seat model in our calculations, which allows for a fully autonomous five-seat variant or a six-seat variant with a pilot.

Residents of Lewis County commute for work regularly, with 12.1% of Chehalis residents and 11.8% of Lewis County residents commuting over 60 minutes for work daily. **Table 2-24** provides the commute times for residents within Chehalis, Centralia, and Lewis County.

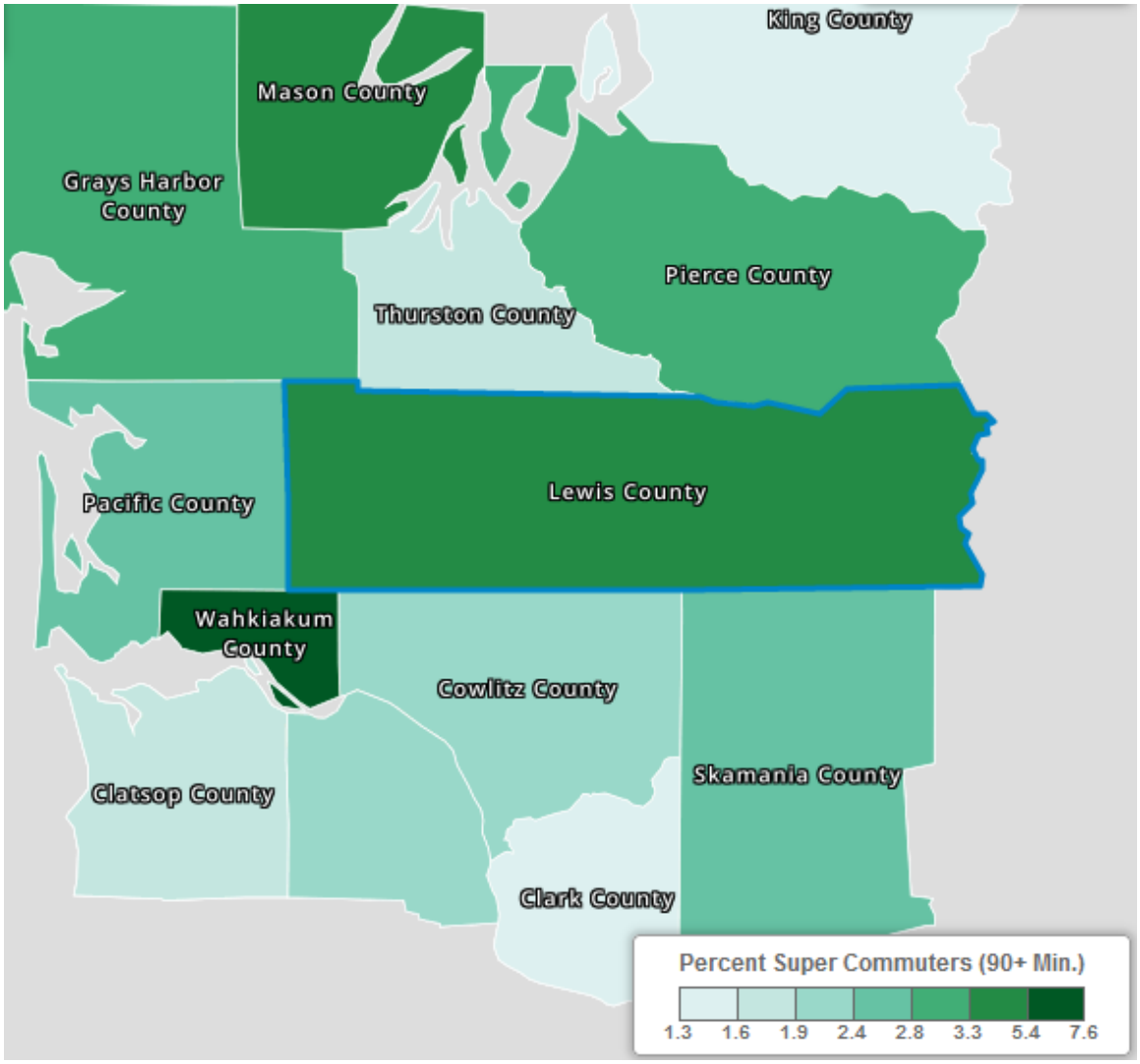
Table 2-24: Lewis County Commute Times

Commute Time (minutes)	Chehalis Residents	Centralia Residents	Greater Lewis County Residents
<5	3.5%	6.9%	6.9%
6-9	20.9%	11.5%	11.5%
10-14	27.8%	13.4%	13.4%
15-19	14.2%	15.9%	15.9%
20-24	5.1%	11.7%	11.7%
25-29	3.7%	6.2%	6.2%
30-34	5.6%	8.2%	8.2%
35-39	2.5%	4.4%	4.4%
40-44	1.2%	3.0%	3.0%
45-59	3.4%	7.0%	7.0%
60-89	***3.5%***	***5.8%***	***5.8%***
>90	***8.6%***	***6.0%***	***6.0%***

Source: Sperling's Best Places, 2023.

Understanding that a large population is commuting for more than one hour, it must be examined as to what communities the commuters are traveling to for work. Approximately 2.5% of commuters who are commuting over an hour are traveling to the Olympia area, while nearly 4.75% and 5.25% of workers are commuting to the Portland area and the Seattle area respectively. **Figure 2-7** shows the locations where commuters are commuting to that travel more than 90 minutes for work.

Figure 2-7: Lewis County Commute Locations Greater than 90 Minutes



Source: Sperling's Best Places, 2023.

Emerging technologies could help alleviate the travel burden on highways for some commuters, especially those who travel long distances. According to the recent census, over 48,000 workers in Lewis County, which constitutes 60% of the population in the predominant age range for the standard workforce, commute to Olympia, Portland, and Seattle areas. Of these, 11.8% have a commute time greater than an hour. **Table 2-25** shows the percentage of commuters traveling to each of these areas and the corresponding number of commuters from Lewis County.

Table 2-25: Lewis County Commuters to Olympia, Portland and Seattle

Area	% of population commuting over 60 minutes to the respective location	Commuters over 60 minutes
Olympia	2.50%	144
Portland	4.75%	274
Seattle	5.25%	303

Source: Sperling's Best Places, 2023.

The certification and wide utilization of AAM aircraft are anticipated to enter the U.S. market commercially by 2028, per the FAA. For forecasting purposes, the utilization rates begin to calculate at the long-term planning levels for AAM activity, beginning in year 10 of this planning cycle. Of the commuters traveling over an hour for their commute times, it is forecasted that 2% of those users will be using AAM by 2032, increasing to 3.5% by 2037, and reaching 5% by the end of the planning period (2042). These forecast numbers are based on the slow adoption of new technology by the majority, early adopter interest, and practicality depending on the ease of transportation on the receiving end of the AAM flight. **Table 2-26** examines the percentages based on commuters utilizing AAM to the respective market areas.

Table 2-26: Lewis County Commuters to Olympia, Portland, and Seattle

Area	2023	2027	2032	2037	2042
Olympia	0.0%	0.0%	2.0%	3.5%	5.0%
Portland	0.0%	0.0%	2.0%	3.5%	5.0%
Seattle	0.0%	0.0%	2.0%	3.5%	5.0%

Source: Sperling's Best Places, 2023.

In addition to commuters, those traveling for business and pleasure out of the regional commercial service airports, Seattle Tacoma International Airport (SEA) (to include area airports around SEA) and Portland International Airport (PDX), could engage in AAM activity to fly from CLS for their commercial service flight needs to reduce the commute and have parking for their vehicles while away. Business Traveller, a magazine and website dedicated to business travelers, reports that 12% of the U.S. population are regular travelers, and make up 66% of the passengers on flights annually. With this understanding, the market catchment for regular travelers is understood to be a subset of the population, and for Lewis County, 12% would represent approximately 10,000 people. Active business travelers travel on average once per month. This is extrapolated in **Table 2-27** to understand how the population of Lewis County would respond with 12% of the population being active flight takers who are taking 12 flights per year.

Table 2-27: Lewis County Active Travelers to Commercial Service Airports

% of Population Connecting for Air Travel Annually					
Area	**2023**	**2027**	**2032**	**2037**	**2042**
Portland	0.0%	0.0%	0.5%	1.0%	2.0%
Seattle	0.0%	0.0%	0.5%	1.0%	2.0%
Population Connecting for Air Travel Annually					
Area	**2023**	**2027**	**2032**	**2037**	**2042**
Portland	0	0	585	1,169	2,339
Seattle	0	0	585	1,169	2,339

Source: The Aviation Planning Group, 2023.

With the technology of AAM at the forefront of the industry at this current time, forecasting for future uses is imperative in the long term. Combining the commuter and active traveler adoption of AAM aids in the understanding of the forecast of AAM at CLS. The utilization will grow from early adoption to active travelers, and then become more common just as air travel did a century ago. **Table 2-28** provides the forecasted daily and annual enplanements and operations for AAM over the long-term planning period. AAM operational counts have been factored into the annual operation forecasts for CLS.

Table 2-28: CLS AAM Forecast

DAILY SEAT CAPACITY					
Destination	**2023**	**2027**	**2032**	**2037**	**2042**
Olympia	0	0	6	10	14
Portland	0	0	14	26	40
Seattle Area	0	0	15	28	43
Total	**0**	**0**	**35**	**63**	**98**
ANNUAL SEAT CAPACITY / ENPLANEMENTS					
Destination	**2023**	**2027**	**2032**	**2037**	**2042**
Olympia	0	0	2,106	3,684	5,263
Portland	0	0	5,170	9,339	14,677
Seattle Area	0	0	5,591	10,076	15,730
Total	**0**	**0**	**12,867**	**23,099**	**35,670**
DAILY OPERATIONS					
Destination	**2023**	**2027**	**2032**	**2037**	**2042**
Olympia	0	0	2	4	5
Portland	0	0	5	9	14
Seattle Area	0	0	6	10	15
Total	**0**	**0**	**13**	**23**	**34**
ANNUAL OPERATIONS					
Destination	**2023**	**2027**	**2032**	**2037**	**2042**
Olympia	0	0	731	1461	1,826
Portland	0	0	1,826	3,287	5,114
Seattle Area	0	0	2,192	3,653	5,479
Total	**0**	**0**	**4,749**	**8,401**	**12,419**

Source: The Aviation Planning Group, 2023.

2.5.4. Comparison to TAF

The FAA utilizes forecasts developed as part of the airport master planning process to augment data provided in FAA TAF datasets. FAA Advisory Circular 150/5070-6B provides guidance stating that airport master plans must include a comparison of developed forecasts to existing FAA TAF reports for the airport. This is done to create a baseline for the development of planning forecasts and ensure the reasonableness of forecasts between the FAA reports and airport planning documents. For a forecast to be compatible and consistent with the existing FAA TAF, forecasts for based aircraft and total operations must fall within the following criteria:

- Forecasts differ by no more than 10% over a five-year forecast period.
- Forecasts differ by no more than 15% over a ten-year forecast period.

For developed planning forecasts not consistent within the parameters relative to the FAA TAF as described above, an explanation describing the reasons for differences in the forecasted scenarios must

occur. It is not uncommon for differences in forecasted activity to occur, especially so at GA airports without commercial service with limited historical data.

Table 2-29: Master Planning Forecast Comparison to FAA TAF

Forecast and Year	Master Plan Preferred Forecast with AAM	TAF	Percent Difference (Forecast vs TAF)
Based Aircraft			
Base Year: 2022	57	56	1.75%
Short-Term Forecast: 2027	59	56	5.08%
Intermediate-Term Forecast: 2032	61	56	8.20%
Long-Term Forecast: 2042	66	56	15.15%
Aircraft Operations			
Base Year: 2022	48,739	47,710	2.16%
Short-Term Forecast: 2027	51,133	51,983	-1.64%
Intermediate-Term Forecast: 2032	58,400	57,990	0.71%
Long-Term Forecast: 2042	71,511	72,590	-1.49%

Source: The Aviation Planning Group, 2023.

Based aircraft forecasts for CLS are marginally higher than the FAA TAF, differing by 1.75% in the five-year forecast period and 5.08% in the ten-year forecast period which falls within the parameters set by the FAA described above. The FAA is reliant on planning studies to provide more accurate forecasts that are sourced from local analysis and data in order to augment the TAF. One reason for the forecast presented in this chapter exceeding TAF projections is that the airport has been constrained by hangar availability which limited the FAA TAF to forecast stagnation, while the CLS forecast presented in this chapter drew from a multitude of sources for fleet trends. State and regional forecasts expect a continued small growth of the GA fleet which could not be reflected in CLS in recent years due to hangar demand exceeding availability.

Aircraft operations at CLS are projected to grow across the entire 20-year forecasting horizon. The preferred aircraft operations forecast is compliant with the five- and ten-year constraints for percent difference from the published FAA TAF. Without AAM operations included, projected operations are 1.64% below the TAF in the five-year forecast period and 7.48% below the TAF in the ten-year forecast period. With AAM operations included in the total aircraft operations forecast, the CLS MPU forecast for aircraft operations falls 1.64 below the FAA TAF in the short term, 0.71% above the TAF in the intermediate term, and just 1.49% below the TAF in the long-term forecasting period.

2.5.5. Critical Aircraft

Reliable information regarding the type of aircraft regularly utilizing CLS can be sourced from a variety of datasets including FAA TFMSC data, FAA TAF data, CLS airport fuel sales, and airport management records. IFR flight information, while not the entirety of operations at CLS, also gives assistance in determining the critical aircraft for CLS.

Determining the “Critical Aircraft” or “Design Aircraft” is crucial to future planning efforts at CLS for all aspects of airport development. An airport’s critical or design aircraft is the most demanding aircraft (or group of like-aircraft) that conducts at least 500 operations over the course of a year at the facility. The FAA classifies aircraft with similar performance and dimensions as detailed previously in **Table 2-2**. This

classification serves as the basis for determining the critical aircraft. The critical aircraft is representative of all similarly classified aircraft within ADG B-II.

The Cessna Model 525B Citation CJ3, a B-II category aircraft with an approach speed of less than 121 knots, accounted for 676 operations alone in 2022 according to TFMSC records, easily satisfying the role as CLS's most demanding aircraft by FAA definition. Additionally, the TFMSC database indicates that the B-II category as a whole, including the CJ3, totaled 733 operations in the same year.

The 2001 CLS Master Plan, while identifying a critical aircraft that fell within the parameters of B-I aircraft, notes that future growth would lead to a reasonable development of the airport to the B-II standard. The previous forecast held true as confirmed by the TAF, TFMSC, and airport management records. ADG B-II standards have been utilized in the creation of the Airport Layout Plan accompanying both the 2001 Master Plan and the 2019 Airport Layout Plan Update.

Current Critical Aircraft: B-II – Cessna Model 525B Citation CJ3

Ultimate Critical Aircraft: B-II – Cessna Model 525B Citation CJ3

Cessna Model 525B Citation CJ3

2.6. FORECAST SUMMARY

A summary of planning activity levels regarding total operations and based aircraft for the CLS forecast over the upcoming 20-year period can be seen in **Table 2-30**. From 2022 to 2042, the total based aircraft at CLS are forecasted to grow from 57 to 66 aircraft, representing a total increase of 15.79% and an average annual increase of 0.74%. During the same period, the operations at CLS are forecasted to grow from 48,739 to 71,511 total operations, representing a total increase of 46.72% and an average annual increase of 1.94%. CLS currently uses a critical aircraft classification of B-II, and is expected to remain the same in the future.

Table 2-30: Master Planning Forecast Summary for CLS, 2023-2043

Type of Operation	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2022	2027	2032	2042
Total Based Aircraft	57	59	61	66
Total Operations	48,739	51,133	58,400	71,511
Critical Aircraft				
Current (2022) Critical Aircraft	Cessna Model 525B Citation CJ3		B-II	
Ultimate (2042) Critical Aircraft	Cessna Model 525B Citation CJ3		B-II	

Source: The Aviation Planning Group, 2023.