OLYMPIA REGIONAL AIRPORT
PORT OF OLYMPIA

Olympia Regional Airport

DRAFT

APPENDIX 4-1

PART 139 FEASIBILITY STUDY

4. Part 139 Commercial Passenger Service Feasibility Study

A.1. INTRODUCTION AND PURPOSE

As an independent study performed after the MPU for the OLM, this Commercial Passenger Feasibility Study was completed for the airport in 2022. The study examined the feasibility of accommodating future commercial activity if ever required. In accordance with the grant assurances by the FAA, the airport is prohibited from denying access to aircraft, and if an airline chose to operate from the airport, then the airport would need to ensure compliance with safety and FAA standards are met. This study investigates and examines what would be required by the airport if the airport was ever required to meet Part 139 (Commercial Service) Requirements.

A.2. COMMERCIAL AVIATION DEMAND FORECASTS

An important initial step in examining the feasibility of commercial aviation activity at OLM is determining the nature and volume of such activity that the airport could hypothetically support. The nature of activity would include the range of flights, number of destinations, and types of aircraft envisioned as part of the airport's commercial activity. The volume includes the number of operations and passenger enplanements that the airport could support with its existing airfield. This analysis will feed into any possible required facility upgrades OLM would need to undergo to service commercial aviation both safely and efficiently.

The following sections detail the background research, assumptions, methodology, and forecast estimates of commercial aviation at OLM. This analysis begins with a review of existing forecasts and documentation, including the GA forecasts already conducted as part of this master plan update, those conducted during the Puget Sound Regional Council (PSRC)'s recent Regional Aviation Baseline Study (RABS), and additional findings and goals of the WSDOT and Washington State CACC.

Following this review is a statement of assumptions under which all the OLM commercial forecasts were conducted, an examination of the nature of activity envisioned for the airport, and finally forecasts of this activity and a commercial critical aircraft, including possible caveats to those forecasts.

A.2.1. Review of Existing Forecasts and Documentation

The commercial activity forecasts for OLM were not created in a vacuum, as several other forecasting sources and studies already exist for the airport and expanded commercial activity in Washington State. The following sections review these forecasts and studies, beginning with a review of the GA forecasts conducted earlier in this master plan update and followed by a review of key analyses done as part of the RABS and by the CACC.

A.2.1.1. Review of Master Plan GA Forecasts and ASV

The main narrative of the OLM master plan update included a forecast of the airport's GA activity, including operations, based aircraft, and critical aircraft. **Table A-1** summarizes those forecasts. The airport's-based fleet is forecasted to grow to 139 aircraft by 2040, and average annual growth of 0.6 percent, while operations are expected to reach nearly 85,000 at a rate of almost 1 percent annually. The airport's critical (design) aircraft is currently a B-II Cessna Citation but is expected to be a C-II Bombardier Challenger CRJ-700 by 2040.

Table 4-1: OLM GA **Forecast Summary, 2020-2040**

Type of Operation	Base Year	Short-Term Forecast	Intermediate-Term Forecast	Long-Term Forecast
	2020	2025	2030	2040
Total Based Aircraft	124	126	129	139
Total Operations	70,466	73,775	77,239	84,665
Critical Aircraft				
Current (2020) Critical Aircraft	Cessna Citation 560		B-II	
Ultimate (2040) Critical Aircraft	Bombardier Challenger 700		C-II	

Source: The Aviation Planning Group 2021, FAA Airport Master Record 5010 2021, FAA TAF 2019, OFM GMA 2017, OLM Master Plan 2013, and WASASP 2017.

Also important to gauging the airport's ability to support commercial service activity is the calculation of ASV. ASV is an estimate of an airport's annual level of aircraft operations that will result in an average annual aircraft delay of approximately one to four minutes. When an airport's activity reaches 60 percent of its ASV, it is recommended that the airport begin to plan for growth in airfield capacity.

The OLM master plan update calculated that the airport's current ASV is 230,000 operations. The 2020 operational level of just over 70,000 operations is 31 percent of ASV, while the 2040 forecasted operational number of just under 85,000 operations is approximately 37 percent of ASV. Any forecasts of commercial activity must be cognizant of ASV.

A.2.1.2. Review of the RABS Forecasts and Statewide Extrapolation

The RABS is a very recent (completed in 2021) study of commercial aviation in the central Puget Sound region of Washington State (King, Pierce, Snohomish, and Kitsap Counties). The central Puget Sound region is the most populous area of the state and therefore also the busiest in terms of commercial aviation, making its findings of particular interest towards efforts to forecast potential commercial aviation at OLM.

One of the RABS's main goals was to identify future aviation needs within the central Puget Sound region by forecasting activity out to 2050. The study utilized three methodologies to forecast activity:

- **Growth Rate**: a top-down methodology that analyzed the region's historical share of national enplanements, the study forecasts of individual airports in the region, and the FAA's Aerospace Forecasts of national activity.

- **Regression Analysis**: a bottom-up methodology that compared historical aviation activity to historical socioeconomic factors known to influence aviation, such as per capita income and employment.
- **Market Share Analysis**: this methodology compared to the central Puget Sound region's share of national enplanements to its forecasted 2050 market share forecasted in the FAA's TAF.[1]

The Growth Rate methodology resulted in the highest enplanement forecast at approximately 55.6 million enplanements in the central Puget Sound region by 2050. The rest of the RABS therefore planned based on this maximum possible need. The study examined numerous scenarios to meet part of or all this demand by 2050, including expanding commercial service to additional airports within the four-county region and/or building a new greenfield airport that would serve as the region's second major commercial hub.[2]

The RABS evaluated existing airports within the central Puget Sound region for their ability to help alleviate some of this 2050 demand. Evaluation criteria included existing airfields and/or ability to expand to single or parallel runways of 7,000 or 9,000 feet; existing airspace constraints or conflicts; potential impact to SEA operations; flood zone hazards; current and future roadway and transit access; incompatible land uses within one mile of 7,000-foot or 9,000-foot runway ends; ability to accommodate additional operations; impact to aerospace manufacturing; population and employment within a 60-minute drive time, and ownership.[3]

Note that while the RABS includes OLM as an airport that could potentially help to alleviate some of this forecasted future demand, it was not included in this detailed evaluation, which was limited only to airports within the four-county central Puget Sound region. OLM is located within the greater Seattle combined statistical area (CSA), which includes OLM's home Thurston County and Skagit, Island, Lewis, and Mason Counties in addition to the counties in the central Puget Sound region.

A.2.1.3. Review of WSDOT and the CACC's Findings and Goals

The CACC was created by the state Legislature in 2019 and originally tasked with recommending, by a 60 percent majority vote, a single preferred location for a new major hub commercial service airport in the state by February 15, 2023.[4] The need for another major hub airport was spurred by the RABS conclusion that demand in the central Puget Sound region alone could reach 55.6 million enplanements by 2050. The CACC's goal is for this new airport to be open by 2040. This original vision was to either expand an existing airport to a size similar to SEA or to build a brand new, greenfield airport following a site selection process.

However, the CACC also recognizes the RABS conclusion that the state likely needs both a large greenfield airport *and* the expansion of multiple existing airports to adequately meet forecasted demand. A CACC status report released in July 2020 specifically discusses three options: expanding one

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[1] PSRC, *Regional Aviation Baseline Study Working Paper 1: Airport and Aviation Activity*, 2019.
[2] Ibid.
[3] PSRC, *Regional Aviation Baseline Study Working Paper 3: Development and Evaluation of Scenarios*, 2021.
[4] The original due date for the CACC's recommendation was January 1, 2022 but was delayed by the COVID-19 pandemic.

or more existing airports, building one SEA sized greenfield airport, or a combination of the two.[5] By the end of 2020, the CACC concluded that the hybrid strategy – both a new airport and expanded utilization of existing facilities – would be the best option, with existing airports helping to alleviate crunched demand until the greenfield airport is operational by 2040.[6]

Another major goal of the CACC beyond finding ways to meet future demand is to make aviation in Washington State more environmentally sustainable. One strategy is to develop and use sustainable aviation fuels (SAF) until new, more advanced aircraft with significantly lower air and noise pollution are widely available for commercial use, with a specific goal of a 10 percent use of SAF at SEA by 2028. The CACC also recommends continuing the work of the recently completed Electric Aircraft Working Group (EAWG), which concluded that electric aircraft can and should play a significant role in Washington's airport system in the future, including commercial aviation.[7]

Concept art of the fully electric or hybrid-electric Heart Aerospace ES-30.
Source: Heart Aerospace 2022.

Discussions with WSDOT staff have revealed additional details and strategies for expanding and enhancing commercial aviation within Washington State. Both WSDOT and the CACC envision expanding or adding commercial operations to existing airports by creating a large network of regional flights on small, 9- to 12-seat aircraft such as a Cessna Caravan retrofit for electric/fuel hybrid use or full electric operation or upcoming full electric aircraft such as the Eviation Alice. These point-to-point flights would greatly expand the reach of commercial aviation in the state and region without requiring the type of airfield expansions typically necessary for scheduled commercial service. WSDOT also wants to provide Washington residents – specifically those that normally drive long distances to SEA – a potential alternative where they would drive a shorter distance to a much smaller airport and then take a smaller, narrowbody aircraft to a hub. Further, WSDOT reemphasized the desire to make this new commercial aviation as sustainable as possible using alternative fuels and fully electric aircraft, including both fixed-wing and electric vertical take-off and landing (eVTOL) aircraft. [8]

WSDOT recognizes OLM as a potential candidate for such a form of commercial aviation for several reasons. First, as far back as 1992, the Puget Sound Air Transportation Committee (PSATC) recommended an additional commercial airport to the south of Seattle to alleviate growing demand at SEA.[9] Additionally, OLM has close proximity to the state's largest population center, is located within the Seattle CSA, and has excellent highway access via Interstate-5, making it a logical choice for residents

[5] CACC, *Commercial Aviation Coordinating Commission: A Status Report*, 2020.
[6] CACC, *Commercial Aviation Coordinating Commission: 2020 Report*, 2020.
[7] Ibid.
[8] WSDOT 2020.
[9] PSTAC, *Flight Plan*, 1992.

living in the southern parts of the greater Puget Sound region. Finally, Olympia being the state capital has the potential to create demand for point-to-point regional travel.

To summarize, the following WSDOT and CACC findings and goals directly impact the forecasts of commercial aviation at OLM:

- WSDOT and the CACC use the RABS forecasts for future planning purposes.
- Washington State is likely to build a large new hub commercial service airport in the long-term and expand or create new commercial service at existing airports in both the short- and long-term to meet future demand.
- WSDOT envisions a new network of regional, point-to-point operations on small, 9- to 12-seat aircraft and the choice to fly to a hub instead of driving a long distance to use SEA.
- WSDOT considers OLM an excellent candidate for supporting these types of commercial aviation.
- The state wants to be a model of sustainable aviation, using alternative fuels until new technologies are widely available and then changing to fully electric aircraft.

A.2.2. Commercial Aviation Forecast Assumptions

Like many long-term forecasting efforts, the forecasting of potential commercial activity at OLM is based on a number of assumptions. Each is described in detail in the following sections.

Assumption: OLM is extremely unlikely to become a major commercial hub.

While the RABS found that Washington State will likely need a second major commercial hub airport to help meet forecasted demand, this study finds it extremely unlikely and infeasible that OLM is an option to fill this need. Some CACC members have expressed support for Olympia Regional to provide additional commercial aviation capacity, but technical engineering and planning analysis will determine whether this is feasible and to what volumes, both in terms of total enplanements and aircrafts used. While such a development is ultimately dependent on decisions by the airport itself – most importantly whether to extend the airport's 5,500-foot runway – the physical constraints of the surrounding built environment make such a change extremely infeasible from financial, environmental, and community perspectives, a viewpoint supported by discussions with WSDOT.

Assumption: The OLM commercial forecasts consider the RABS forecasts.

Like recent work by WSDOT and the CACC, these forecasts build upon the efforts of the RABS. However, the forecast year of the OLM master plan is 2040 (as opposed to the RABS's 2050) and OLM is located outside of the central Puget Sound region, rendering it necessary to somewhat adapt the RABS forecasts for the purposes of this study.

The RABS forecasts were therefore expanded to the entirety of Washington State while pulling the forecast year back to 2040 to match the master plan update. To estimate these full state forecasts, the FAA's TAF is employed in a manner similar to the Market Share Analysis in the RABS. The central Puget Sound region's three commercial service airports – SEA, King County International Airport/Boeing Field, and Paine Field – together accounted for 88.6 percent of all enplanements at Washington's commercial service airports in 2020. By 2040, the TAF forecasts that this percentage will increase to 90.4 percent of the total.[10]

These percentages were then used to extrapolate the RABS forecasts to the entire state, stopping the forecast year with 2040, as shown in **Table A-2**. When extrapolated to all the state's commercial service airports, demand for passenger enplanements is expected to reach over 46.7 million by 2040, an average annual growth rate (AAGR) of 2.7 percent.

Table 4-2: RABS Forecasts Extrapolated to Full State, 2020-2040

Forecast	2020	2025	2030	2040	AAGR
Enplanements	27,578,999	31,250,142	35,701,918	46,738,165	2.7%
Operations	505,148	562,165	630,776	796,525	2.3%

Source: FAA TAF 2021, PSRC 2019.

<u>Assumption: The OLM commercial forecasts have an upper limit.</u>

The upper limit will be determined by either the expanded RABS forecasts calculated in the previous section or the airport's ASV. OLM will support a volume of commercial activity limited either at 10 percent of the additional statewide demand by 2040 or at approximately 45 percent of the airport's ASV (when combined with GA demand), whichever supports the higher number of enplanements. The 10 percent of extrapolated RABS demand was chosen due to the assumption that OLM would be one of multiple airports adding to expanding commercial activity to meet future demand in Washington State.

The 45 percent of ASV limit was arrived at based on two factors. First, OLM is and will continue to primarily be a GA airport, and the introduction and growth of commercial operations at the airport should not impede the ability for future growth of GA activity and facilities. Second, a rule of thumb for airport planning is that an airport should begin to plan for expansion when demand reaches 60 percent of capacity. Creating an upper limit of approximately 45 percent of ASV for combined GA and commercial service leaves OLM with capacity to continue to grow GA activity without having to consider airfield expansions.

Two additional assumptions related to ASV will also impact the upper limit. First, it is assumed that OLM's ASV will not change by the 2040 forecast year unless the airport builds a parallel runway of adequate length to support light jet operations. Such a recommendation is not made by the MPU, nor is it particularly feasible considering the constraints of the built environment. Second, it is assumed that ASV is not impacted by commercial operations on eVTOL aircraft, as they will not utilize the runway and taxiway network at OLM (but may instead require a dedicated vertiport).

<u>Assumption: Commercial aviation at OLM will not begin until after 2030 at the earliest.</u>

The RABS concluded that SEA may exceed capacity prior to 2030, but that study, WSDOT, and the CACC all recommend a diverse approach to meeting future demand, including potentially dispersing demand to multiple regional airports and/or building a new greenfield facility. Initially, Paine Field/Snohomish

[10] FAA TAF 2021. This analysis includes only enplanements recorded at commercial service airports and does not include air taxi enplanements at GA airports.

County Airport is expected to relieve some of SEA's demand before commercial service begins at other airports. Paine Field has an FAA-approved forecast for 4.3 million passengers by 2040 with the capacity for additional commercial growth in the years after that forecast. Paine Field handling much of the initial overflow demand means that commercial service at other airports such as OLM can begin later. As shown in the forecasts later in this document (Sections A.2.3 and A.2.4, specifically), it is assumed that commercial aviation at OLM will not begin until after 2030 at the earliest, start in low volumes, and grow at very gradual rates, or as demand dictates or infrastructure improvements allow.

Assumption: Commercial aviation at OLM will consist of two primary elements: satellite service to a commercial hub and point-to-point regional service.

Based on the findings of the RABS, the constraints of the airport's built environment, the visions and work of the CACC, and the previously stated assumptions, it is assumed that commercial aviation at OLM will consist of two main elements: satellite service to a major hub and point-to-point regional service. Satellite service will include direct, regularly scheduled service to a major western US hub multiple times a day, providing residents of the greater Puget Sound region with an alternative to driving long distances to SEA. Regional service is based on an expanded commercial network throughout the state and regionally via point-to-point flights on smaller, 9- to 12-seat aircraft.

The following sections provide much more detail on both of these elements of commercial service at OLM, discuss any additional assumptions specific to the calculations, the methodologies used for forecasting activity, and detail the forecasts themselves.

A.2.3. Commercial Satellite Service

Both the RABS and CACC recognize that SEA is rapidly approaching maximum available capacity, and that existing airports will need to take on some or more commercial activity demand in the short- and medium-term to alleviate demand until a second major commercial hub can be built in the central or greater Puget Sound region. Based on discussions with WSDOT, this master plan update analyzes OLM's ability to provide permanent satellite service to a major western US hub airport (excluding SEA) to provide regional residents and businesses with an alternative to driving a long distance or dealing with congestion issues at SEA.

The following sections describe the methodology for selecting hub airports, determining the types of aircraft for these flights, and forecasting potential satellite commercial service from OLM.

A.2.3.1. Hub Selection

The first step in forecasting the potential for OLM to support such service is to analyze the best potential hub airports for this activity. Initially, all commercial airports in Washington State (excluding SEA), Oregon, California, Idaho, Nevada, and Utah were considered before removing all airports designated as small hubs. That left the airports shown on **Table A-3** as candidates. Based on the number of destinations – a key determinant for convincing passengers to choose an alternate to SEA and take a connecting flight – the most logical choices are Los Angeles International Airport (LAX), McCarran International Airport (LAS), San Francisco International Airport (SFO), and Salt Lake City International Airport (SLC). However, SLC's comparatively low number of international destinations makes it a less logical choice.

Table 4-3: Candidate Hubs for Satellite Service from OLM

National Enplanement Rank	Airport Name	State	Air Distance to OLM (miles)	Destinations		
				Domestic	International	Total
5	Los Angeles International	CA	928	104	75	179
7	McCarran International	NV	850	130	26	156
16	San Francisco International	CA	645	86	50	136
20	Salt Lake City International	UT	691	94	12	106
24	San Diego International/Lindbergh Field	CA	1,028	60	12	72
31	Portland International	OR	95	59	7	66
37	Sacramento International	CA	574	35	6	41
41	Norman Y. Mineta San José International	CA	665	34	10	44
42	Oakland International	CA	640	37	5	42
47	John Wayne	CA	954	39	4	43
54	Ontario International	CA	933	23	4	27
58	Hollywood Burbank	CA	912	31	2	33

Source: The Aviation Planning Group 2021, FlightConnections.com 2021, Google Earth 2021.
Note: Connection data collected October 13, 2021.

In addition, the airport's flight distance from OLM and the length in time of the connecting flight are also important factors to consider. While Portland International Airport (PDX) has only 66 total destinations, it is a mere 95 miles from OLM, making it a logical choice for many passengers not looking to go to directly to remote locations in the US or a large number of international destinations.

The following four airports are analyzed in detail for satellite service from OLM:

- Los Angeles International Airport (LAX)
- McCarran International Airport (LAS)
- San Francisco International Airport (SFO)
- Portland International Airport (PDX)

Note that this feasibility study will not make a direct recommendation for OLM to pursue a commercial connection with one of these airports specifically but will instead calculate the number of annual operations necessary for OLM to assume a percentage of SEA's existing seat capacity to each of them. The highest resulting number of operations from this analysis will be used in the potential impacts of commercial service on the airport's ASV.

<u>**Assumption: OLM can eventually take on 15 percent of SEA's capacity to one of these airports, gradually growing this activity throughout the forecast period.**</u>

This percentage is based on OLM's proximity to SEA and the central Puget Sound region, the knowledge that Paine Field will initially help to alleviate demand at SEA, and the potential of a new greenfield airport for the region. This percentage will help to alleviate the constraints at SEA while also giving residents a secondary option for reaching many or all their desired destinations. **Table A-4** details the number of daily flights and arriving seats from SEA to each of these four candidate airports.

Table 4-4: Daily Flights and Seat Capacity from SEA to Candidate Hubs, 2021

FAA ID	Airport	Average Daily Flights from SEA	Average Daily Seat Capacity from SEA
LAX	Los Angeles International	11	1,284
LAS	McCarran International	10	1,127
SFO	San Francisco International	10	1,032
PDX	Portland International	10	984

Source: The Aviation Planning Group 2021, FlightRadar24.com 2021.
Note: Daily flight and seat data collected October 13, 2021.

This demand is expected to grow similarly to the forecasted activity in the RABS and the adjusted RABS forecasts on Table A-2. Using the 2.7 percent AAGR in those calculations, the daily demand from SEA to each of these airports is expected to reach the levels shown in **Table A-5**.

Table 4-5: Forecast of Daily Seat Capacity from SEA to Candidate Hubs, 2020-2040

FAA ID	Airport	2020	2025	2030	2035	2040	AAGR
LAX	Los Angeles International	1,284	1,464	1,671	1,906	2,175	2.7%
LAS	McCarran International	1,127	1,285	1,466	1,673	1,909	2.7%
SFO	San Francisco International	1,032	1,177	1,343	1,532	1,748	2.7%
PDX	Portland International	984	1,122	1,280	1,461	1,667	2.7%

Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, PSRC 2019.
Note: 2021 seat counts used for base year 2020.

The next section discusses the aircraft envisioned for these satellite service flights, which will then inform the number of operations OLM will take on based on average seats per flight.

A.2.3.2. Aircraft for OLM Satellite Service Forecasts

To estimate the number of operations necessary to serve up to 15 percent of the seat capacity discussed in the previous section, it is necessary to determine the type or types of aircraft that will likely serve this satellite service at OLM. To do so, two major factors must be considered:

- The ability of OLM's airfield to support operations by these aircraft, and
- Aircraft range and its ability to reach these destinations

In its current layout, OLM's airfield is unable to support more demanding aircraft such as the Boeing 737 and similarly demanding narrowbody aircraft or larger widebody aircraft, and as stated, there is very low feasibility for expanding the airfield so that it is capable of supporting such aircraft. OLM is much better equipped to handle flights on regional jets (RJs) and similarly sized narrowbody aircraft. **Table A-6** lists several aircraft that OLM's airfield can support as it is built today, their ranges, and their seat capacities. Based on their maximum ranges, each of these aircraft is more than equipped to serve flights from OLM to LAX, LAS, SFO, or PDX.

Table 4-6: Suitable Aircraft for Satellite Service to Hub Airports

Aircraft	Range (Miles)	Seat Capacity
Bombardier CRJ-550	1,956	50
Bombardier CRJ-700	1,586	65
Bombardier Q400 (DH4)	1,267	74
Embraer E170	2,474	66
Embraer E190	2,819	96
Embraer ERJ-140	1,901	44
Embraer ERJ-145	2,299	50

Source: Bombardier 2021, Embraer 2021.
Note: Seat capacity assumes dual class layouts.

The seat capacities of typical dual class layouts for these aircraft range from 50 to 96, with an average near 70 seats. However, these aircraft are either jets or turboprops that operate on jet fuel or a jet fuel mixture with biofuels, not 100 percent SAF or electricity. It is hoped that over the course of the forecast period these aircraft will become increasingly compatible with SAF or electric retrofitting. In addition, manufacturer Heart Aerospace hopes to have its 30-seat, electric-hybrid ES-30 piston aircraft certified for commercial use by 2026. However, the ES-30 is only expected to have a range of approximately 180 miles by the mid-2030s when in fully electric mode or 300 miles in hybrid mode, only making it suitable for flights to PDX.[11] The Heart Aerospace aircraft is just one example of an electric aircraft currently being tested that could service OLM in the future.

Assumption: Satellite service flights from OLM to a western hub will initially fly only on RJ aircraft, assuming an average of 70 seats, until longer range electric aircraft or aircraft running on SAF become available.

OLM will be analyzed for its ability to serve flights to the candidate airports on RJ aircraft, while a second analysis will be done analyzing flights from OLM to PDX on the Heart Aerospace ES-30.

A.2.3.3. Commercial Satellite Service Forecasts at OLM

This section further details the methodology used to forecast potential satellite commercial service activity from OLM to one of four western US hubs. First, it is necessary to review all the assumptions made when estimating this future activity. Those assumptions are as follows:

- OLM is not under consideration to become a major commercial hub.
- The OLM commercial forecasts consider the RABS forecasts.
- The OLM commercial forecasts have an upper limit.
- Commercial aviation at OLM will likely not begin until after 2030 at the earliest.
- Commercial aviation at OLM will consist of two primary elements: satellite service to a commercial hub and regional service.
- OLM can eventually take on 15 percent of SEA's capacity to one of these airports, gradually growing this activity throughout the forecast period.

[11] Heart Aerospace 2022.

- Satellite service flights from OLM to a western hub will initially fly only on RJ aircraft, assuming an average of 70 seats, until longer range electric aircraft or aircraft running on SAF become available.

Finally, for multiple reasons, it is not assumed that OLM can or should take on the full 15 percent of connections between one of these airports and SEA immediately. First, SEA is not yet exceeding capacity, so it is not immediately urgent for the airport's demand to be alleviated. Second, as stated in the discussions of the RABS and CACC efforts, OLM is being considered as one of several airports taking on commercial activity to meet future demand throughout the state, and Paine Field is expected to support commercial capacity before other airports. Therefore, these forecasts will assign OLM increasing percentages of these airports' connections to SEA throughout the forecast period, as such:

- 2020 to 2030: 0 percent
- 2035: 5 percent
- 2040: 15 percent

Applying these percentages to the forecasted daily demands shown in Table A-5 results in the estimated daily seat and total enplanements shown in **Table A-7**. OLM assuming 15 percent of the demand from SEA to these airports by 2040 would mean approximately 119,000 annual enplanements from OLM to LAX or approximately 91,000 from OLM to PDX.

Table 4-7: Forecast of OLM Satellite Service Daily Seats and Annual Enplanements, 2020-2040

FAA ID	Airport	2020	2025	2030	2035	2040
Average Daily Departure Seats						
LAX	Los Angeles International	0	0	0	95	326
LAS	McCarran International	0	0	0	84	286
SFO	San Francisco International	0	0	0	77	262
PDX	Portland International	0	0	0	73	250
Annual Enplanement Forecast						
LAX	Los Angeles International	0	0	0	35,000	119,000
LAS	McCarran International	0	0	0	31,000	105,000
SFO	San Francisco International	0	0	0	28,000	96,000
PDX	Portland International	0	0	0	27,000	91,000

Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, PSRC 2019.
Note: Annual enplanements are assumed to be equal to daily seats x 365.25.

To assign these enplanements to operations, these forecasts use the 70-seat average of several RJ aircraft determined in a previous section. This results in the estimated daily and annual commercial aircraft operations depicted in **Table A-8**. Operations to LAX would put the most demand on OLM's airfield with approximately 4,400 annual operations (including departures and arrivals). As stated previously, this feasibility study only recommends that OLM begin satellite passenger service to one of these airports but shows the potential volume to all four so that each can be analyzed and compared to give regional residents the best option, and therefore the highest likelihood of choosing OLM as a true alternative to SEA.

Table 4-8: Forecast of OLM Satellite Service Daily and Annual Operations, 2020-2040

FAA ID	Airport	2020	2025	2030	2035	2040
Daily Operations (Arrivals and Departures)						
LAX	Los Angeles International	0	0	0	4	12
LAS	McCarran International	0	0	0	4	10
SFO	San Francisco International	0	0	0	4	10
PDX	Portland International	0	0	0	4	8
Annual Operations (Arrivals and Departures)						
LAX	Los Angeles International	0	0	0	1,500	4,400
LAS	McCarran International	0	0	0	1,500	3,700
SFO	San Francisco International	0	0	0	1,500	3,700
PDX	Portland International	0	0	0	1,500	2,900

Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, PSRC 2019.

PDX's much closer proximity to OLM – just 95 miles – makes it a candidate for emerging electric or hybrid-electric aircraft activity in the years to come. The 30-seat, fully electric Heart Aerospace ES-30 is expected to be certified by 2026 and has a range of over 180 miles in fully electric mode, making flights to PDX extremely feasible while also supporting WSDOT's sustainability and renewable energy initiatives. For OLM to serve 15 percent of SEA's enplanement demand to PDX on the ES-30, it would require approximately 6,600 annual operations (arrivals and departures) by 2040, as shown on **Table A-9**.

Table 4-9: Forecast of OLM Satellite Service Daily and Annual Operations to PDX on the Heart Aerospace ES-30, 2020-2040

Activity	2020	2025	2030	2035	2040
Daily Operations (Arrivals and Departures)	0	0	0	6	18
Annual Operations (Arrivals and Departures)	0	0	0	2,200	6,600

Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, Heart Aerospace 2021, PSRC 2019.

Such activity would represent a far greater impact on the airport's ASV than even the highest RJ operational count to LAX. For the purposes of calculating the impacts to ASV by satellite commercial service from OLM, these forecasts will use the forecasted operational count of 4,400 annually to LAX.

A.2.3.4. Feasibility Factors for Commercial Satellite Service Forecasts at OLM

There are several factors in support of beginning satellite commercial service from OLM to a western US hub and one that may lower feasibility of beginning such service. Factors that increase the feasibility of this service include the following:

- OLM's airfield, specifically the 5,500-foot Runway 17/35, can support activity on RJ aircraft as it exists today and would not require major upgrades to begin service.
- This activity does not fundamentally change the nature of activity at OLM, as the airport already supports flights in RJs and similarly sized aircraft.

- The airport has excellent access via Interstate-5, making the choice of OLM over SEA convenient for many residents living south of the central Puget Sound region.
- OLM is uniquely equipped to help alleviate growing demand at SEA due to the above factors.

There is only one factor that may lower the feasibility of this activity:

- While the airfield can support this activity, many RJ aircraft would require additional takeoff length to operate at MTOW. OLM's 5,500-foot runway may require some RJs to operate at lower fuel capacity or limit their ability to also transport air cargo.

Overall, adding satellite commercial service from OLM to a western US hub on RJ aircraft is extremely feasible, can help to alleviate the growing demand at SEA, and should be seen as a highly desirable development by many residents of the region looking for an alternative to driving long distances into the central Puget Sound region.

A.2.4. Point-to-point Regional Commercial Service

In addition to meeting future demand in the central Puget Sound region through a second major hub airport and satellite service such as that considered for OLM, WSDOT envisions expanding commercial service throughout the state and region with point-to-point flights on smaller, light transport aircraft, electric pistons such as the ES-30, and small eVTOL air taxis. This regional activity is the second element of commercial aviation being forecasted for OLM as part of this feasibility study.

A.2.4.1. Envisioned Regional Network

In its efforts to analyze the potential of widespread electric aviation in Washington State, the WSDOT EAWG initially examined the potential of every public airport in the state to support this activity, including those not eligible for federal funding. This feasibility study will instead limit its analysis only to airports in the FAA's NPIAS, not because other public-use airports do not have the potential to support regional commercial activity, but merely because NPIAS status allows an airport to receive federal Airport Improvement Program (AIP) funds. Equipping an airport for electric aviation will likely require new infrastructure such as charging stations, which will be easier to procure using federal funding.

There are 64 airports in Washington State in the NPIAS, with only 12 of them currently offering scheduled commercial passenger service. The WSDOT EAWG also specifically examined airports for their ability to support light transport aircraft such as Cessna Caravans, setting a goal of at least 3,000 feet of paved runway length for such activity. Of the 64 NPIAS airports, three are either seaplane bases or have a turf runway, leaving 61 facilities for potential regional commercial service. Of these 61, 50 have a runway of at least 3,000 feet in length. These airports are located all throughout Washington State, from Tacoma Narrows Airport, located just 25 miles from OLM to Spokane International Airport near the state border with Idaho, over 250 miles from OLM. In addition, SEA is removed because adding new operations to that airport would only worsen its already strained capacity, leaving 49 total airports in the analysis.

Examining this large group of airports provides two opportunities. First, it allows this analysis to examine the types of aircraft needed to reach these airports, which will be discussed in the next section. Second, it provides a profile of the level of activity at each airport.

Assumption: Activity from OLM to regional destinations will occur proportionally to an airport's current number of operations related to the full state.

While the eventual regional network will likely not depend solely on current activity levels, this provides a general rule by which to assign aircraft – and therefore seat volumes – to different airports based on both distance and current activity level. In addition, the regional network may not be limited only to Washington State airports. Out-of-state airports within a chosen range (such as 500 nautical miles) could potentially join a regional network to and from OLM and other Washington State airports that do not currently offer scheduled commercial activity.

A.2.4.2. Aircraft for OLM Regional Commercial Service

WSDOT's vision is that this regional service will occur as much as possible on electric aircraft, be it retrofitted aircraft already in use or emerging technologies such as electric piston aircraft or eVTOLs. The ability of such aircraft to fulfill OLM's needs in the proposed regional network depends on the following factors:

- The ability of OLM's airfield to support operations by these aircraft,
- The current or future sustainability of these aircraft, and
- Aircraft range and the ability to reach regional destinations

OLM's primary runway is 5,500 feet in length, making it extremely capable of supporting all types of aircraft being discussed by WSDOT. **Table A-10** lists several light transport aircraft with seating capacities of 9 to 12 that could potentially be retrofitted for electric flights, including single-engine piston, turboprop, and light jets. Also shown are a fully electric piston aircraft (the ES-30) and several eVTOL aircraft in development for commercial use. At 30 seats, the ES-30 has the most capacity of any of these aircraft, meaning OLM would see a drastic growth in enplanements to support this activity. However, eVTOL aircraft do not use the runway and taxiway system, meaning that their flights have no impact on the ASV of the airfield. This would allow far more small flights to nearby airports without straining the capacity of OLM's existing airfield. While most of the eVTOL aircraft listed have a 4-seat capacity, it is assumed that for regional commercial service, airlines would choose the higher capacity, 6-seat models.

Table 4-10: Suitable Aircraft for Regional Commercial Aviation to OLM

Aircraft	Range (Miles)	Seat Capacity
Light Transport Aircraft		
Beechcraft Super King Air 250	1,979	10
Beechcraft Super King Air 350ER	2,078	11
Beechcraft Super King Air 350i	2,490	11
Cessna 208 Caravan	1,232	9
Cessna Citation CJ2	2,050	9
Cessna Citation CJ3	2,348	9
Cessna Citation CJ4	2,491	10
Cessna Citation III	2,702	9
Cessna Citation Ultra	2,260	11

Table 4-10: Suitable Aircraft for Regional Commercial Aviation to OLM

Aircraft	Range (Miles)	Seat Capacity
Hawker 400/Beechjet 400A	2,490	9
Beechcraft 1900D	439	19
de Havilland Canada DHC-6 Twin Otter	919	19
Electric or Hybrid-Electric Fixed-Wing Aircraft		
Heart Aerospace ES-30	180 (electric) 310 (hybrid)	30
Eviation Alice	506	9
eVTOL Aircraft		
Archer	60	5
AutoFlight V1500M	155	4
CityAirbus NextGen	50	4
EmbraerX / Eve	60+	4
Hyundai S-A1	60	4
Joby	150	4
Lilium Jet	155	6
Pipistrel 801 eVTOL	60	5
VA-X4	100+	4
VoloConnect	60	4
Wisk Cora	62	2

Source: Aircraft manufacturers, 2021.

For the purposes of these forecast calculations, these aircraft are being simplified into three groups, categorized as follows:

- Light transport: 12-seat capacity
- Electric or hybrid-electric fixed-wing: 30-seat capacity[12]
- eVTOL: 6-seat capacity

<u>Assumption: Regional commercial aviation from OLM will require multiple types of aircraft, with the chosen aircraft depending on both the distance to and typical activity level of the destination airport.</u>

Other electric fixed-wing aircraft are also in development, with NASA selecting two manufacturers – MagniX USA Inc in Redmond, Washington and GE Aviation in Cincinnati – to support its Electric Powertrain Flight Demonstration (EPFD) effort to research and advance electric aviation, hoping to have such aircrafts in U.S. fleets by 2035.[13] These and other efforts mean that available technologies are likely to change between the base year and forecast year. However, the best information available leads to a conclusion that the three types of aircraft listed above provide the most measurable way to forecast

[12] While other upcoming electric piston aircraft such as the Eviation Alice have smaller seat capacities, using the capacity of the Heart Aerospace ES-30 in calculations allows for more efficient use of OLM's current airfield while also assuming that additional emerging electric piston aircraft will have similar – or greater – seat capacities.
[13] NASA 2021.

regional commercial aviation at OLM, while giving the airport the best chance to help support a regional network of sustainable commercial aviation.

A.2.4.3. Regional Commercial Service Forecasts at OLM

This section further details the methodology used to forecast potential regional commercial service activity from OLM to airports throughout Washington State. First, it is necessary to review all the assumptions made when estimating this future activity. Those assumptions are as follows:

- OLM is not under consideration to become a major commercial hub.
- The OLM commercial forecasts consider the RABS forecasts.
- The OLM commercial forecasts have an upper limit.
- Commercial aviation at OLM will likely not begin until after 2030 at the earliest.
- Commercial aviation at OLM will consist of two primary elements: satellite service to a commercial hub and regional service.
- Activity from OLM to regional destinations will occur proportionally to an airport's current number of operations related to the full state.
- Regional commercial aviation from OLM will require multiple types of aircraft, with the chosen aircraft depending on both the distance to and typical activity level of the destination airport.

This forecast will initially provide an unconstrained forecast, showing OLM assuming 10 percent of the statewide demand for commercial activity shown in the modified RABS forecast (including conventional demand and potential electric aircraft activity). This would see OLM enplaning nearly 4.8 million passengers annually by 2040. To make this calculation, it is necessary to determine the types of aircraft serving which airports, based initially on their distance from OLM. Those airport distances and aircraft are shown on **Table A-11**. Based on distance alone, the 21 airports from between 100 and 200 miles of OLM are expected to fly on electric piston aircraft, while the 11 airports over 200 miles from OLM are expected to fly on retrofitted light transport aircraft. Both electric piston and eVTOL aircraft are capable of flights to airports under 100 miles from OLM, with flights distributed based on distance and the airport's current activity level.

Table 4-11: WA Airport Distance to OLM and Expected Regional **Flight Aircraft**

WA Airport Distance to OLM	Number of WA Airports	Aircraft Assigned to Operations
0 to 50 miles	11	Electric Pistons, eVTOL
> 50 to 100 miles	7	Light Transport, Electric Pistons, eVTOL
> 100 to 200 miles	21	Light Transport, Electric Pistons
> 200 miles	11	Light Transport

Source: The Aviation Planning Group 2021, Google Earth 2021.

The unconstrained forecast, where OLM would assume a full 10 percent of the statewide 2040 demand estimated in the modified RABS forecast, is shown on **Table A-12**. These enplanement forecasts were calculated by distributing enplanements to the 49 Washington State airports included in this analysis based on their distance to OLM and their current operational activity level. Operation forecasts were calculated based on the percentage of flights assigned to light transport, electric piston, and eVTOL aircraft, with the seat capacity determining the necessary number of operations.

Table 4-12: OLM Regional Commercial Forecasts Unconstrained by ASV, 2020-2040

Aircraft	2020	2025	2030	2035	2040
Enplanements					
Light Transport	0	0	0	203,000	231,000
Electric or Hybrid-Electric	0	0	0	1,467,000	1,674,000
eVTOL	0	0	0	9,000	10,000
Total	**0**	**0**	**0**	**1,679,000**	**1,915,000**
Operations (Arrivals and Departures)					
Light Transport	0	0	0	33,800	38,600
Electric or Hybrid-Electric	0	0	0	97,800	111,600
eVTOL	0	0	0	3,100	3,500
Total	**0**	**0**	**0**	**134,700**	**153,700**

Source: The Aviation Planning Group 2021, FAA TAF 2021, Google Earth 2021.

Of the approximately 153,000 operations listed in the above table, approximately 138,000 would impact OLM's ASV by operating on the airport's runway and taxiway system. When combined with the 2040 forecast of GA operations and the highest estimate of satellite service operations (2,600 to LAX), the 2040 operational total at OLM using the airfield would be over 238,000. This amounts to 104 percent of the airport's ASV, well above the planning threshold of 60 percent of ASV.

It is therefore necessary to examine the maximum number of regional commercial operations the airport could support with combined GA and commercial activity still staying within the 45 percent of ASV previously stated as an upper limit for these forecasts. When accounting for both the forecasted future GA operations and the maximum number of operations for satellite service, OLM would have approximately 12,000 operations still available for regional service to use the airfield, plus the activity by eVTOLs.

Table A-13 details the results of these changes. Even constrained by ASV, OLM should be able to support over 164,000 enplanements on over 15,600 commercial operations by 2040. This will still make it a significant airport in the envisioned regional network without having to make major changes to its airfield or begin supporting much larger, widebody aircraft.

Table 4-13: OLM Regional **Commercial Forecasts Adjusted for ASV, 2020-2040**

Aircraft	2020	2025	2030	2035	2040
Enplanements					
Light Transport	0	0	0	16,000	19,000
Electric or Hybrid-Electric	0	0	0	119,000	135,000
eVTOL	0	0	0	9,000	10,000
Total	**0**	**0**	**0**	**144,000**	**164,000**
Operations					
Light Transport	0	0	0	2,700	3,100
Electric or Hybrid-Electric	0	0	0	7,900	9,000
eVTOL	0	0	0	3,100	3,500
Total	**0**	**0**	**0**	**13,700**	**15,600**

Source: The Aviation Planning Group 2021, FAA TAF 2021, Google Earth 2021.

A.2.4.4. Feasibility Factors for Regional Commercial Service Forecasts at OLM

As with satellite service, there are several factors in support of beginning regional commercial service from OLM to airports throughout the state and one that might lower feasibility of beginning such service. Factors that increase the feasibility of this service include the following:

- OLM's airfield, specifically the 5,500-foot Runway 17/35, can support flights on all aircraft envisioned for regional activity as it exists today and would not require major upgrades to begin service.
- This activity does not fundamentally change the nature of activity at OLM, as the airport already supports flights in RJs and similarly sized aircraft.
- The airport has excellent access via Interstate-5, making the choice of OLM over SEA convenient for many residents living south of the central Puget Sound region.
- Olympia being the state capital may create a particular demand for this regional activity.
- OLM is uniquely equipped to help alleviate growing demand at SEA due to the above factors.

There is only one factor that may lower the feasibility of this activity:

- While the airfield can support this activity, OLM will likely need to construct a multi-pad vertiport to support the forecasted number of eVTOL flights.

Overall, adding this type of regional service from OLM to other airports in Washington State is extremely feasible and can help to make OLM and Washington State a national example of electric and sustainable aviation.

A.2.5. Commercial Aviation Forecasts – Critical Aircraft

The FAA-approved GA forecasts in this master plan update determined OLM's current critical/design aircraft as a Cessna Citation 560, giving the airport an ARC of B-II. Those forecasts determined that by 2040, the ultimate design aircraft would be a Bombardier Challenger CRJ-700, giving the airport an ultimate ARC of C-II.

The CRJ-700 is among the aircraft suitable for the most demanding forecasted aspect of commercial service activity at OLM: satellite service to a western hub. Furthermore, it has a typical seat capacity of 65, very close to the average of 64 used in the forecast calculations. A lower seat capacity on the CRJ-700 or other C-II RJ aircraft may have necessitated an ultimate C-III ARC for OLM's commercial activity, but because the CRJ-700 has suitable capacity for the forecasted activity, this is not necessary.

The ultimate design aircraft for commercial activity at OLM is the same as for GA: the Bombardier Challenger CRJ-700. The ultimate ARC for this activity is also the same as for GA: C-II.

A.2.6. Potential Caveats to OLM Commercial Aviation Forecasts

While this feasibility study does not forecast commercial operations to begin at OLM until after 2030 at the earliest, several factors could cause this activity to be pushed back further or diminished in volume. These factors include the following:

- **Potential new greenfield airport**: if a new greenfield airport with capacity near that of SEA is constructed in the central Puget Sound region, it will greatly minimize the need for currently GA airports to alleviate regional and statewide demand. While recommendations of the RABS, WSDOT, and CACC all support construction of a second hub for the region, a site has not yet been selected, so ultimate capacity is not known at this time. The location, capacity, and timing of this airport could all potentially affect new commercial activity at OLM. Additionally, if the greenfield airport opens with limited capacity (only one runway, for example), airports such as OLM may be needed to augment that capacity over a shorter time period.
- **Paine Field's capacity**: As discussed above, Paine Field has an FAA-approved forecast for 4.3 million passengers by 2040. However, WSDOT officials believe that the airport could support additional commercial passenger capacity. The level of this growth would also affect the need for OLM to support commercial activity.
- **Timing of new technologies**: the availability of certain aircraft technologies such as fully electric aircraft and eVTOLs may affect the ability for OLM to build commercial operations in a sustainable manner. If the rollout or widespread availability of these aircraft is delayed it may delay the beginning of commercial operation at OLM or other Washington State airports hoping for a more environmentally friendly model for aviation.

A.2.7. Commercial Aviation Forecast Reviews

WSDOT's vision for commercial activity at OLM is based on the findings on the RABS, CACC, and EAWG and include two major elements of activity: satellite service to a major hub in the western US and point-to-point regional service to airports throughout Washington State. Satellite service was forecasted to four potential hub airports, with activity at least initially occurring on RJ aircraft. Regional activity would make OLM likely one of many airports adding commercial service in some capacity, with flights forecasted to occur on light transport airplanes retrofitted for electric flights, fully electric piston aircraft, and eVTOLs.

The combination of all forecasted commercial activity is depicted on **Table A-14**. By 2040, OLM is expected to support over 280,000 enplanements on approximately 20,000 commercial operations.

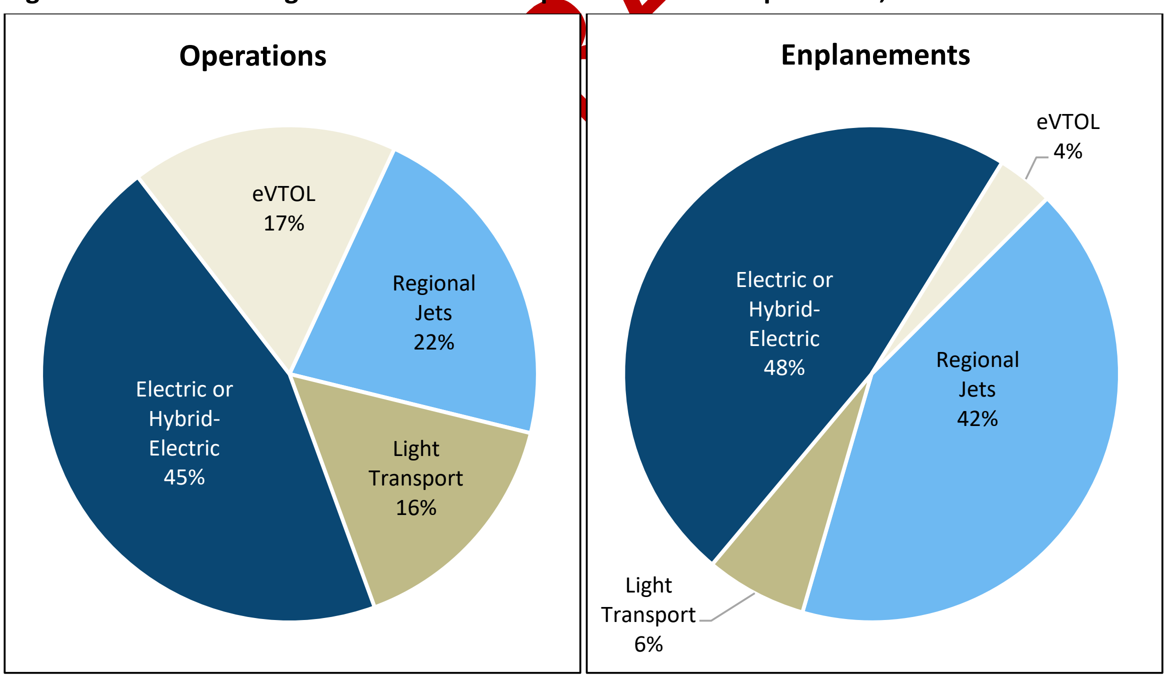
Table 4-14: OLM Commercial Forecast Summary, 2020-2040

Commercial Activity	2020	2025	2030	2035	2040
Enplanements					
Satellite Service (LAX)	0	0	0	34,816	119,171
Regional Service	0	0	0	144,282	164,621
Total	**0**	**0**	**0**	**179,098**	**283,792**
Operations (Arrivals and Departures)					
Satellite Service (LAX)	0	0	0	1,500	4,400
Regional Service	0	0	0	13,700	15,600
Total	**0**	**0**	**0**	**15,200**	**20,000**

Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, Google Earth 2021, PSRC 2019.
Note: LAX forecasts shown for satellite service due to being the highest of the four airports, not because LAX is the recommended airport; these forecasts do not make a recommendation for the connecting airport.

As stated, this activity is expected to take place on four types of aircraft: RJs, light transport aircraft, electric or hybrid-electric fixed-wing aircraft, and eVTOLs. **Figure A-1** summarizes the volume of enplanements and operations forecasted to take place on each. While RJs only assume 21 percent of operations, they account for 55 percent of enplanements due to having the largest seat capacity. Somewhat conversely, eVTOLs have the highest percentage of operations at 33 percent while accounting for only 25 percent of passenger enplanements.

Figure 4-1: Aircraft Usage on Commercial Enplanements and Operations, 2040



Source: The Aviation Planning Group 2021, FAA TAF 2021, FlightRadar24.com 2021, Google Earth 2021, PSRC 2019.

The following section of the feasibility study will examine facilities necessary for OLM to support these types of commercial activity, from any airfield improvements and terminal/gate additions to access and roadway facilities.

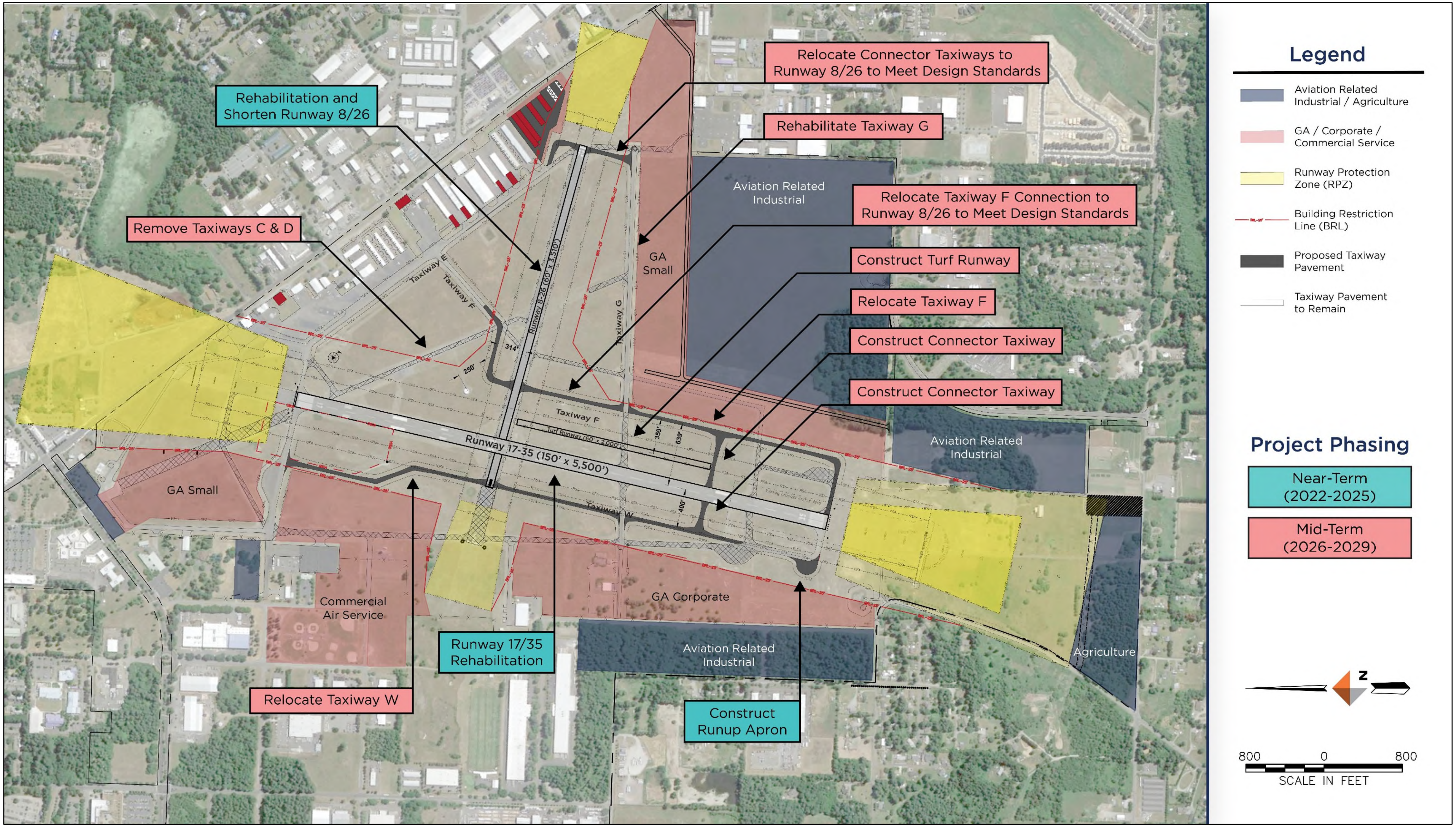
A.3. COMMERCIAL AVIATION FACILITY REQUIREMENTS

This section of the feasibility study examines any facility upgrades OLM would require to support the Part 139 commercial service activity forecasted in the previous section. These facility requirements are presented in addition to GA facility requirements presented in the main part of the MPU, and as such treat the recommended alternative described in the master plan as the base conditions for these Part 139 facility requirements. As with GA facility requirements, the facilities detailed in the following sections are beholden to FAA design standards. Certain commercial-specific facilities will be analyzed independently of the GA facility requirements. For example, it is not assumed that apron expansions for GA activity can also serve commercial activity, but that commercial service will require dedicated hangar and apron space. Further, it is assumed that commercial development will occur on the west side of OLM's airfield and be served by Runway 17/35 and its taxiways.

Like GA facilities requirements, those requirements necessary to support commercial service include airfield facilities, aprons and hangars, operational facilities such as NAVAIDs and lighting, and surface access and automobile parking. In addition, commercial service will require such facilities as a commercial terminal, TSA security checkpoints, commercial gates, and airline ground support equipment, including any facilities needed for alternative or sustainable aircraft fuels.

The facility requirements analysis for Part 139 commercial service activity at OLM assume that the Preferred Alternative of the main portion of the MPU has been adopted and constructed in full. All facility requirements stated in this analysis, then, would be in addition to that Preferred Alternative and capital plan. In cases where a facility is used by both GA and commercial operations – such as runways and taxiways – this analysis will review the facility recommendations and Preferred Alternative. **Figure A-1** displays the Preferred Alternative, including the recommendations most relevant to OLM's potential commercial development. These most notably include a 54.5-acre area for commercial development on the west side of the airfield, north of the current Runway 8 end and the relocation of taxiway W to being a true parallel to Runway 17/35, plus new taxiway connectors from W to the runway. Taxiway B, at the north end of Runway 17/35, and the western portion of taxiway L, are both recommended to remain in their current orientation, thus giving taxiway W four future connections to the runway.

Figure 4-2: Preferred Alternative



Source: The Aviation Planning Group (2022), DOWL (2022).

A.3.1. Commercial Service Critical and Additional Design Aircraft

This commercial service facility requirements analysis begins with a discussion of the critical (design) aircraft as determined in the forecast section. The FAA defines the critical aircraft as an aircraft or a group of aircraft with at least 500 annual operations that regularly operates or is expected to operate at the airport. The ARC, based on the critical aircraft, drives OLM design standards, safety zones, separation between facilities, and overall facility layout.

Like the GA forecasts, the forecasts of commercial aviation at OLM forecasted that the ARC is C-II, with the critical aircraft being a Bombardier Challenger CRJ 700. Therefore, any facilities or design standards for future commercial facilities that are used by all expected aircraft are the same as those required for future GA facilities.

However, because forecasted commercial service activity at OLM will involve varying sizes of fixed-wing aircraft in addition to eVTOLs, it is necessary to select aircraft upon which to design additional facilities such as apron space, vertiports, stands, and terminal gates. It is not expected that a regional jet will park at the hardstands for light transport aircraft, for example, nor does the CRJ 700 impact the design of eVTOL vertiport pads.

These additional (but unofficial) design aircraft are listed in **Table A-1** below. The King Air 250 is the chosen aircraft for light transport while an Embraer 120 chosen as an analog to the Heart Aerospace ES-30 for purposes of facility planning. The exact market of hybrid and electric aircraft is not yet known but will likely be a combination of retrofitted aircraft and new, all electric models. For the purposes of facility estimates in this feasibility study, the King Air is used in place of another aircraft.

In the case of the Lilium Jet eVTOL, the aircraft is not yet certified for use, but was chosen as an ideal example of a larger eVTOL. The Lilium Jet eVTOL is designed to be a vertical takeoff jet and was chosen as the design aircraft because it is expected to be larger than many of the eVTOL aircraft already nearing commercial use. Hence, vertiport pads at OLM will be designed for slightly larger passenger volumes than is initially expected. Additional details on these aircraft and their specific apron, gate, and stand requirements are provided below in the sections on commercial terminal and parking requirements.

Table 4-15: Commercial Service Aircraft Used for Terminal and Apron Design

Aircraft Type	Aircraft
Regional Jet	Bombardier Challenger CRJ 700 (critical aircraft)
Light Transport	King Air 250
Electric or Hybrid	Embraer 120 (analog for Heart Aerospace ES-30)
eVTOL	Lilium Jet eVTOL

Source: The Aviation Planning Group (2022).

A.3.2. Airfield Facility Requirements

Airfield requirements for commercial operations at OLM include any improvements to the airport's two runways (length, width, and strength), changes to the taxiway system necessary to support activity, and apron expansions. It is assumed that commercial operations will not lead to any improvements to Runway 08/26, which will only support commercial flights on light transport aircraft when necessary. At 5,501 feet in length, Runway 17/35 is already better equipped to handle flights by regional jets and similarly sized aircraft. Any runway improvements needed to fully support commercial aviation at OLM are therefore aimed at Runway 17/35.

A.3.2.1. Runway Width, Length, and Surface

The OLM MPU recommended the following for runway length, width, and surface:

- **Runway Width:**
  - **Facility Requirement**: Runways 17/35 and 08/26 both exceed operational width requirement standards for their respective ARCs. While Runway 17/35's excess width can be utilized in the future, Runway 08/26 should be maintained for 75' width.
  - **Preferred Alternative**: Both runways should maintain current width.
- **Runway Length:**
  - **Facility Requirement**: Both runways have adequate length to accommodate the aircraft that regularly utilize the Airport.
  - **Preferred Alternative**: Runway 17/35 should be maintained at 5,501 feet, while Runway 08/26 should be shorted by 647 feet at the 08 end.
- **Runway Surface:**
  - **Facility Requirement**: Both runways have adequate pavement strength to accommodate the aircraft that regularly utilize the Airport.
  - **Preferred Alternative**: Maintain current surfaces and strengths.

Because commercial operations at OLM are expected to primarily utilize Runway 17/35, the shortening of Runway 08/26 has no expected effect on commercial facility requirements. Further, with both the GA and commercial critical aircraft being a CRJ 700 – which has a takeoff length of 5,265 and landing length of 5,040 – the 5,501-foot length of Runway 17/35 is deemed adequate for forecasted commercial activity at the airport. The CRJ 700 is a dual-wheel aircraft with a MTOW of 75,000 lbs. Runway 17/35 is constructed of grooved asphalt and has a maximum dual wheel capacity of 94,000 lbs., well above the MTOW of the CRJ 700. Both Runway 17/35's dimensions and weightbearing capacity are suitable for forecasted commercial development at OLM.

Part 139 Facility Requirement for Runways: none beyond the Preferred Alternative.

A.3.2.2. Runway Design and Safety Areas

The OLM MPU recommended the following for runway design and safety areas:

- **RPZ**:
  - **Facility Requirement**: Based on the visibility minimums for the existing instrument approach procedures, the existing RPZs are adequate in size.
  - **Preferred Alternative**: Ensure control of both Runway 17/35 approach RPZs for C-II design standards with visibility minimum lower than ¾-mile.
- **ROFA and OFZ**:
  - **Facility Requirement**: ROFAs and OFZs are currently compliant with standards on both runways.
  - **Preferred Alternative**: Maintain the current ROFA and OFZ width on Runway 08/26 while reducing length with the runway. Increase Runway 17/35 ROFA and OFA dimensions to meet C-II standards.

- **RSA**:
  - **Facility Requirement**: RSAs are currently compliant with standards on both runways.
  - **Preferred Alternative**: Maintain the current RSA width on Runway 08/26 while reducing length with the runway. Increase Runway 17/35 RSA dimensions to meet C-II standards.

A.3.2.2.1. RPZs

RPZs on Runway 17/35 are currently designated to meet B-II standards but the Preferred Alternative expands them to meet the airport's forecasted C-II ARC with a visibility minimum lower than ¾-mile. **Table A-2** displays all dimensions for both B-II and C-II departure and approach RPZs on Runway 17/35. The approach RPZ on Runway 17 already meets these standards due to its approach visibility minimum lower than ¾-mile. However, as the approach minimums on Runway 35 are enhanced, its approach RPZ will also extend to 2,500 feet in length. OLM should direct the same attention at possible obstructions and nonconformities in future expanded RPZs as it does to current RPZs.

Table 4-16: Runway 17/35 RPZ Design Standards for B-II and C-II ARCs

RPZ Dimension	Existing (B-II)	MPU Recommendation and Part 139 Need (C-II)
RW 17: Visibility Minimum Lower Than 3/4 Mile		
Approach RPZ		
Length (ft)	2,500	2,500
Width at Inner Edge (ft)	1,000	1,000
Width at Outer Edge (ft)	1,750	1,750
Departure RPZ		
Length (ft)	1,000	1,700
Width at Inner Edge (ft)	500	500
Width at Outer Edge (ft)	700	1,010
RW 35: Visibility Minimum Lower Than 3/4 Mile (Existing: Not Lower than 1 Mile)		
Approach RPZ		
Length (ft)	1,000	1,700
Width at Inner Edge (ft)	500	500
Width at Outer Edge (ft)	700	1,010
Departure RPZ		
Length (ft)	1,000	1,700
Width at Inner Edge (ft)	500	500
Width at Outer Edge (ft)	700	1,010

Source: FAA Advisory Circular 150/5300-13B – Airport Design.

Part 139 Facility Requirement for RPZs: Ensure control of expanded C-II RPZs while removing obstructions where applicable and feasible.

A.3.2.2.2. ROFAs/ OFZs

Table A-3 details current and recommended ROFA and OFZ dimensions on OLM's Runway 17/35. The runway meets all requirements for its current B-II ARC and like RPZs will be intensified to C-II standards on both runway ends in the future. While a change to C-II would result in larger dimensions for each of these areas, the airport already meets the requirements for larger areas around Runway 17/35, meaning that no development is necessary under either the MPU or Part 139 study.

Table 4-17: Runway 17/35 ROFA and OFZ Design Standards for B-II and C-II ARCs

ROFA and OFZ Dimension	Existing (B-II)	MPU Recommendation and Part 139 Need (C-II)
RW 17: Visibility Minimum Lower Than 3/4 Mile		
Runway Object Free Area (ROFA)		
Length Beyond Departure End (ft)	600	1,000
Length Prior to Threshold (ft)	600	600
Width (ft)	800	800
Runway Obstacle Free Zone (OFZ) (Inner-Approach)		
Length Beyond Departure End (ft)	2,700	2,700
Width (ft)	400	400
RW 35: Visibility Minimum Lower Than 3/4 Mile (Existing: Not Lower than 1 Mile)		
Runway Object Free Area (ROFA)		
Length Beyond Departure End (ft)	300	1,000
Length Prior to Threshold (ft)	300	600
Width (ft)	500	800
Runway Obstacle Free Zone (OFZ)		
Length Beyond Departure End (ft)	200	200
Width (ft)	400	400

Source: FAA Advisory Circular 150/5300-13B – Airport Design, FAA Terminal Area Procedures 2021.

Part 139 Facility Requirement for ROFA and OFZ: none beyond the Preferred Alternative.

A.3.2.2.3. RSA

Like ROFA and OFZ standards, OLM meets current B-II standards for the Runway 17/35 RSA in addition to future C-II standards. Under C-II, the RSA would be 500 feet wide centered on the runway, with a length beyond departure end of 1,000 feet based on a visibility minimum of lower than ¾-mile (**Table A-4**).

Table 4-18: Runway 17/35 RSA Design Standards for B-II and C-II ARCs

RSA Dimension	Existing (B-II)	MPU Recommendation and Part 139 Need (C-II)
RW 17: Visibility Minimum Lower Than 3/4 Mile		
RSA		
Length Beyond Departure End (ft)	600	1,000
Length Prior to Threshold (ft)	600	600
Width (ft)	300	500
RW 35: Visibility Minimum Lower Than 3/4 Mile (Existing: Not Lower than 1 Mile)		
RSA		
Length Beyond Departure End (ft)	300	1,000
Length Prior to Threshold (ft)	300	600
Width (ft)	150	500

Source: FAA Advisory Circular 150/5300-13B – Airport Design.

Part 139 Facility Requirement for RSA: none beyond the Preferred Alternative.

A.3.2.3. Vertiport Requirements

The preferred alternative of the OLM MPU did not make recommendations regarding a heliport or vertiport. However, with commercial aviation at OLM forecasted to include increased specifically for commercial rotorcraft, it will be necessary to construct a dedicated vertiport for eVTOLs near or abutting the commercial terminal. The following section describes the methodology used to determine vertiport dimensions and the requirements for Part 139 eVTOL activities at OLM.

The FAA has yet to publish a formal advisory circular on eVTOL vertiport design, but early guidance defers to AC 150/5390-2C – Heliport Design as the primary source for such facilities. Like heliport design, eVTOL vertiport design is based on the dimensions of a design aircraft. Heliport design is based on two aircraft size dimensions:

- Overall length (OL)
- Rotor diameter (RD). Because eVTOLs do not have similar rotors has traditional helicopters (which are much wider than the body of the aircraft), overall width or wingspan is used in its place. The RD acronym will still be used in calculations, however.

The Part 139 forecasts assumed a 6-seat eVTOL. AC 150/5390-2C states that the design aircraft can be a single aircraft or composite of many. These facility requirements use among the largest forecasted eVTOLs (in terms of size) for vertiport design, the Lilium Jet eVTOL, a vertical takeoff jet with a wingspan of 45.6 feet. However, these facility requirements still utilize the recommendation to use a composite of aircraft. First, the design will round the wingspan up to an RD equivalent of 50 feet and utilize a suggestion in the AC for calculating OL at 1.2 x RD.

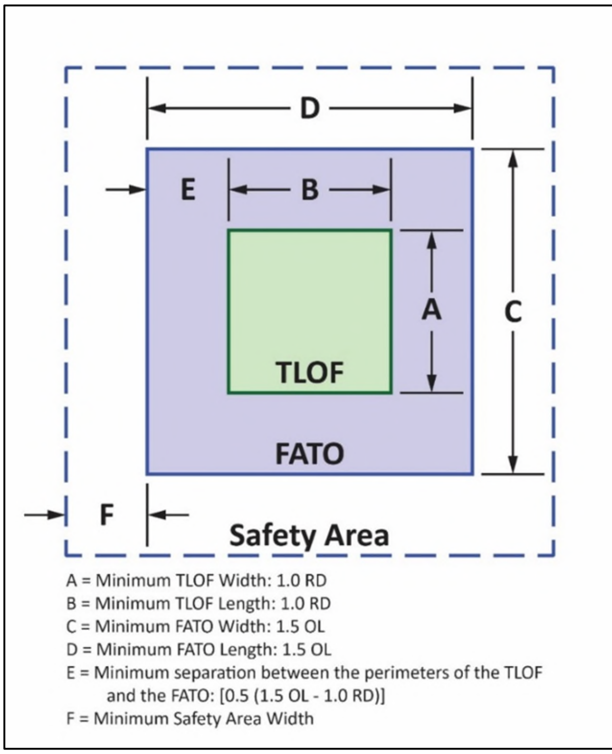
The reasons for 1. Using a larger eVTOL as the start of these calculations and 2. Rounding up the design factors higher are twofold. First, the exact nature of eVTOL advanced air mobility is still developing, and with commercial operations at OLM not forecasted to begin until 2035, it is unclear exactly which aircraft may eventually use these facilities. Second, using what initially appears to be an oversized aircraft gives OLM room to potentially replace some of its commercial regional jet flights on larger eVTOL aircraft without having to expand aprons and landing areas.

Like runway design, FAA vertiport design includes several specific areas for landing and safety, which include the following:

- TLOF – the very center of the vertiport
- FATO – an area around the TLOF providing additional room for final approach and takeoff
- Safety area – a safety area around the FATO

Figure A-2 illustrates how each of these areas relate to the others to form a complete vertiport, in addition to the calculations used to determine the dimensions of each. Based on these design standards, the vertiport at OLM will have a TLOF width of 50 feet, FATO width of 90 feet, and safety area width of 130 feet. This results in an overall vertiport of 130 feet by 130 feet, or 16,900 square feet.

Figure 4-3: Vertiport Design Areas



Source: FAA Advisory Circular 150/5390-2C – Heliport Design.

OLM's eVTOL commercial service will require additional facilities beyond its vertiport, including taxilanes and parking areas located on the commercial apron. The Heliport Design AC states that parking areas should be one RD in diameter with separation between the parking areas of approximately 10 feet (for ground taxiing). Based on forecasted eVTOL operations, OLM should construct three parking areas and associated taxilanes by 2040. The estimated total apron area required for parking, apron, taxilanes, and associated safety areas is 80,000 square feet.

Part 139 Facility Requirement for Vertiports: Construct three eVTOL landing/parking areas (130' by 130').

A.3.2.4. Taxiways

The OLM MPU recommended the following for taxiway layout, dimensions, and design standards:

- **Taxiway Dimensions and Layout**:
  - **Facility Requirement**: Taxiway geometry throughout the airport needs to be revised to meet FAA standards of right-angle intersections. Taxiway W is recommended to be revised to serve as a full-length parallel taxiway along with the analysis of a new full-length parallel taxiway to serve Runway 08/26. It is also recommended to add optimally located exit taxiways to both runways to increase airfield efficiency.
  - **Preferred Alternative**: Realign angled taxiway intersections; realign Taxiway W; remove Taxiways C and D, realign Taxiway F.
- **Taxiway Design Standards:**
  - **Facility Requirement:** Maintain existing.
  - **Preferred Alternative:** Perform a full analysis of turn fillets.

Taxiway redesign at OLM is one of the most significant elements of the MPU preferred alternative and includes a full realignment and reconstruction of Taxiway W, the west side taxiway that will most directly serve commercial operations. Because Taxiway W and other taxiways expected to connect commercial facilities to Runway 08/26 already meet width requirements, the recommendations of the preferred alternative are not necessarily required for commercial operations at the airport. However, the preferred alternative aims to bring OLM's taxiways to a much more standard design than what currently exists at the airport. Furthermore, executing these changes in the short term will allow commercial operations to utilize the new taxiway layout when it begins instead of construction potentially interrupting activity.

Part 139 Facility Requirement for Taxiways: none beyond the Preferred Alternative. However, a short-term construction period of Taxiway W relocation is preferred as to not interrupt commercial operations when they are forecasted to begin in 2035.

A.3.3. Approach and Visual Aid Requirements

The OLM MPU recommended the following for instrument approaches and visual aids:

- **Instrument Approach and Approach Lighting:**
  - **Facility Requirement:** If a ½-mile visibility IAP is desired for Runway 35, OLM should install a MALSR in that runway approach.
  - **Preferred Alternative:** Install a MALSR on Runway 35 to achieve a ½-mile visibility IAP.
- **Runway Edge Lighting:**
  - **Facility Requirement:** Maintain existing.
  - **Preferred Alternative:** Maintain existing.
- **Taxiway Edge Lighting:**
  - **Facility Requirement:** All taxiways should have edge lighting.
  - **Preferred Alternative:** Upgrade taxiway edge reflectors to edge lighting where necessary.

- **NAVAIDs:**
  - **Facility Requirement:** Maintain existing.
  - **Preferred Alternative:** Maintain existing.

OLM currently has a highly performing set of IAPs, edge lighting, visual aids, and NAVAIDs. However, the MPU Preferred Alternative made select recommendations that will greatly enhance the ability of the airport to support Part 139 commercial service operations. Most important for commercial operations is adding a precision approach to the Runway 35 end of Runway 17/35. This approach currently has a non-precision approach (**Table A-5)**. The Preferred Alternative recommended installing a MALSR at the Runway 35 end if a precision approach is desired. These Part 139 facility requirements echo this recommendation as it would greatly enhance the airport's ability to support commercial operations on both ends of the primary runway.

Table 4-19: IAP Recommendations for Part 139 Operations

Runway End & Best IAP	Current Best IAP			MPU Recommendation and Part 139 Need		
	IAP Category	Decision Height (ft)	Visibility Minimum (miles)	IAP Category	Decision Height (ft)	Visibility Minimum (miles)
RW 17: ILS or LOC & RNAV (GPS)	Precision	200	0.5	Precision	200	0.5
RW 35: RNAV (GPS)	Non-Precision	632	1	Precision	200	0.5

Source: FAA Terminal Area Procedures 2021, Olympia Regional Airport 2021.

The airport has adequate runway edge lighting to support commercial operations but, as stated by the MPU Preferred Alternative, requires taxiway edge lighting throughout the airfield. As shown on **Table A-6**, several taxiways currently have reflectors but are recommended to install edge lighting. Further, any taxiway that is moved or reconstructed as part of the Preferred Alternative is also recommended to install edge lighting.

Table 4-20: Taxiway Edge Lighting Recommendations

Taxiway	Edge Lighting	MPU Recommendation and Part 139 Need
Taxiway A	Lighting	Lighting
Taxiway B	Lighting	Lighting
Taxiway C	Reflectors	Lighting
Taxiway D	Reflectors	Lighting
Taxiway E	Reflectors	Lighting
Taxiway F	Reflectors	Lighting
Taxiway G	Reflectors	Lighting
Taxiway L (East)	Reflectors	Lighting
Taxiway L (West)	Lighting	Lighting
Taxiway W	Lighting	Lighting

Source: Olympia Regional Airport 2021.

OLM is also quite well equipped in terms of visual aids and other NAVAIDs, including a beacon, PAPIs on Runway 17/35, a segmented circle, wind cone, and ASOS for weather reporting. These facilities are capable of supporting the forecasted Part 139 commercial service operations.

Part 139 Facility Requirement for IAPs and Visual Aids: none beyond the Preferred Alternative.

A.3.4. Commercial Terminal Requirements

To support Part 139 commercial service operations, OLM will need to construct a new, dedicated commercial terminal on the airport's east side, where such development is marked on the Preferred Alternative. It is expected that this will be a simple linear terminal due to the airport's limited forecasted commercial service operations and the simple layout of a linear terminal. These types of terminals contain all required passenger processing facilities for a given air carrier in one single-unit building. It features a single consolidated passenger security screening checkpoint and a common hold room area adjacent to the aircraft parking area. Aircraft boarding is achieved through gates that lead to aircraft parking either via a jet bridge (for regional jets) or aircraft parking apron (for other fixed-wing aircraft and eVTOLs). However, despite a linear terminal being the expected layout for OLM's commercial terminal, a more detailed layout will be determined during the alternatives phase of the feasibility study.

A.3.4.1. Taxiways

Two approaches were used to estimate the minimum size requirement for this facility: a top-down calculating using a guidebook developed under the Transportation Research Board (TRB)'s Airport Cooperative Research Program (ACRP), and a bottom-up approach estimating the footprints of various terminal facilities such as security checkpoints, hold rooms, restrooms, and more. The following sections detail the results of these methodologies.

A.3.4.1.1. Top-Down Part 139 Terminal Size Estimate

ACRP Report 25: Airport Passenger Terminal Planning and Design Volume 1: Guidebook is a detailed reference for airports designing new commercial service passenger terminals. The document includes several tools for designing terminals, including a comprehensive list of essential terminal facilities, how to account for activity and demand forecasts, and the design of the building itself. Relevant to estimating a terminal size for OLM, however, is the section on gross terminal area planning factors. The document uses a factor called narrowbody equivalent gate (NBEG) to estimate typical terminal sizes based solely on the forecasted number of gates and expected volume of activity.

Table A-7 shows the areas estimated in this ACRP document for commercial terminals, with size based on square feet per NBEG and airport size. OLM is forecasted to have limited commercial operations at approximately 12,700 by 2040, with no operations on aircraft larger than a regional jet. OLM is therefore assumed to be a Smaller Domestic airport per the specification of the ACRP report and conservatively assigned the lower size estimate for such an airport. OLM is therefore expected to require approximately 15,000 square feet per NBEG. The facility requirement for OLM's forecasted eight regional jet operations per day in 2040 is estimated to be three gates to allow adequate room for enplaning, deplaning, and temporary parking between operations. Based on this top-down methodology, OLM is estimated to need a commercial terminal of at least 45,000 square feet, or 15,000 square feet for each of its three narrowbody jet gates.

Table 4-21: ACRP Report 25 Typical Terminal Sizes

Terminal	Square Feet/NBEG Lower	Square Feet/NBEG Upper
Smaller Domestic	15,000	18,000
Larger Domestic	18,000	24,000
International	28,000	40,000

Source: ACRP Report 25: Airport Passenger Terminal Planning and Design Volume 1: Guidebook, Transportation Research Board (2010).

A.3.4.1.2. Bottom-Up Part 139 Terminal Size Estimate

A bottom-up estimate for the size of OLM's commercial terminal was calculated using a much more detailed methodology. This exercise involved estimating the area of each terminal facility and element individually before summing them to a total required terminal area. Each facility's size was estimated using terminals at existing commercial airports to which OLM is expected to be comparable as well as known space requirements for facilities such as passenger scanning machines and typical concession sizes. Facilities included in this analysis include the following:

- Ticket counter areas and lobbies
- Airline ticket offices
- Bag make up, screening, and claim area
- Security screening queue and screening area
- Secure/holding area and deplane corridor
- Rental car offices
- Administration 0ffices
- Restrooms (inside and outside security)
- Transportation Security Administration (TSA) offices
- Concessions
- Building mechanical rooms

The estimated area needs for these terminal areas are summarized in **Table A-8**. The bottom-up estimate is a minimum area of approximately 35,000 square feet, with the most space dedicated to concessions and public areas such as lobbies and baggage claim.

Table 4-22: Bottom-Up Terminal Facility Requirements

Terminal Facility	Estimated Area (sq ft)	Facility Details
Public Areas	8,500	Lobby, passenger check-in, baggage claim
TSA Screening	1,900	TSA screening and passenger queue
Holding Areas	4,500	Secure holding areas and deplane corridor
Restrooms	1,500	Restrooms in lobby area and passenger holding
Concessions	10,000	
Offices	4,700	Airline ticket, administration, rental car, and TSA offices
Other Facilities	4,000	Baggage screening and mechanical rooms
Total Estimated Terminal Area Using Bottom-Up Methodology	**35,100**	

Source: The Aviation Planning Group (2022), DOWL (2022).

A.3.4.1.3. Recommended Part 139 Terminal Size

Based on the close proximity of the results of both the top-down and bottom-up terminal area estimates, the near-midpoint of 40,000 square feet is recommended for OLM. However, it bears emphasis that this is merely the minimum recommendation, as the exact terminal size will also depend on the necessary building layout in addition to factors such as parking requirements and location, jet gate layouts, road access, and apron size.

It is also possible that the alternatives phase of this feasibility study concludes that the best course of action is to separate terminal facilities for fixed-wing and eVTOL commercial operations, which would likely require in additional space requirements for a separate, if much smaller, eVTOL terminal. This may act as more than mere convenience for eVTOL passengers, however, as flights with fewer than nine passengers do not fall under 49 CFR 1542 Airport Security, excusing such passengers from TSA passenger screening. The Part 139 forecasts did not estimate eVTOL operations with nine or more passengers, thereby forecasting a scenario in which eVTOL commercial operations at OLM would not require screening. As with all recommendations for a commercial terminal at the airport, however, the alternatives phase will determine the best course of action for both combined and separate fixed-wing and eVTOL terminals.

Part 139 Facility Requirement for a Commercial Terminal: Construct a new commercial service terminal building with a minimum total size of 40,000 square feet. Develop alternatives examining both combined and separate fixed-wing and eVTOL terminals.

A.3.5. Commercial Apron and Hardstand Requirements

One of the biggest considerations to make when designing commercial aviation facilities is the amount of apron space that will be required for parking, pushback, and safe taxiing of commercial aircraft. Wingtip clearance and jet blast areas are of primary concern when designing parking areas and locating taxilanes. Apron requirements are based on the sizes and clearance areas of the commercial design aircraft detailed earlier in the chapter.

Table A-9 details the number of gates and additional parking areas expected to be needed to safety accommodate the forecasted 2040 volume of fixed-wing commercial operations at OLM. It is expected that regional jet gates will utilize jet bridges while light transport and electric or hybrid-electric gates will utilize hard stands, with six total gates for these aircraft. An additional parking area for each aircraft was also estimated to avoid conflicts in cases of congestion. Total parking and pushback area estimates were made using tools in AviPLAN Airside Pro software. As a result, a minimum apron area of 259,000 square feet is estimated for fixed-wing commercial aircraft at OLM.

Table 4-23: Commercial Gates, Parking, and Apron Requirements

Aircraft Type	2040 Daily Operations	2040 Daily Enplanements	Gates	Type of Gate	Parking and Pushback Area (sq ft)	Total Parking Areas	Total Apron Area (sq ft)
Regional Jets (CRJ-700)	8	436	3	Jet Bridge	36,000	4	144,000
Light Transport	4	36	1	Hard stand	23,000	2	46,000
Electric or Hybrid-Electric	14	252	2	Hard stand	23,000	3	69,000
Total	**26**	**724**	**6**			**9**	**259,000**

Source: The Aviation Planning Group (2022), AviPLAN Airside Pro (2022).

However, this area only accounts for minimal taxilanes. The alternatives analysis will likely result in a much larger recommended apron area, giving additional room for taxiways, a deicing pad, additional parking, and equipment storage.

Part 139 Facility Requirement for Gates and Aprons: Construct a commercial apron with a minimum 259,000 square foot minimum area to accommodate 6 gates, 9 total parking areas, and minimal taxilanes with the understanding that facilities and taxiway layouts may necessitate a larger apron.

A.3.6. Surface Access and Automobile Parking Requirements

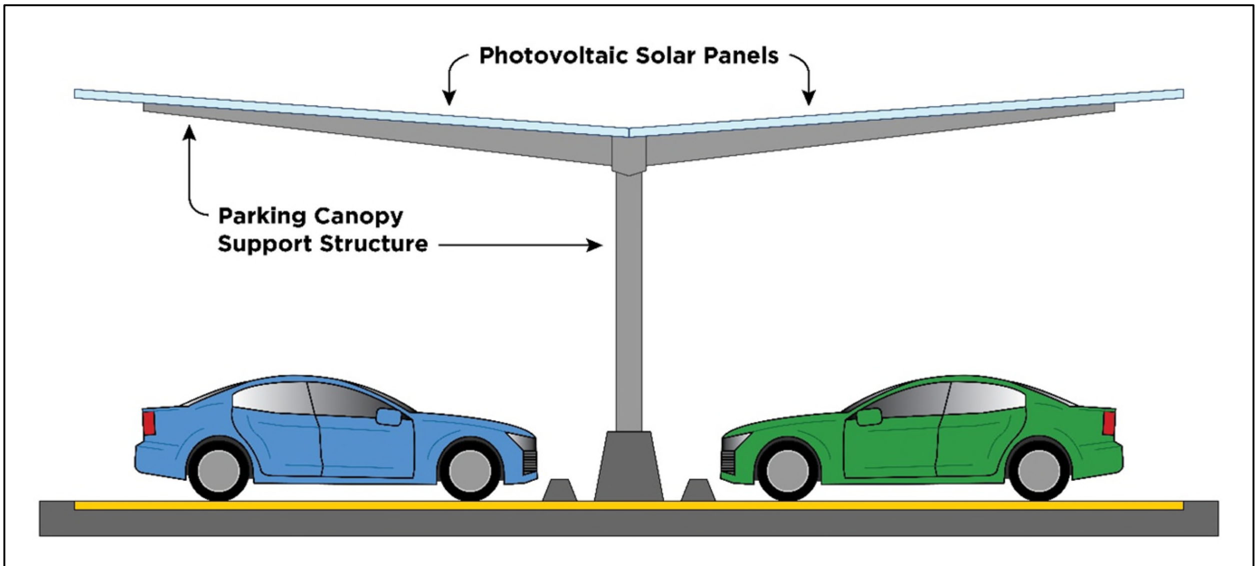
New commercial facilities on the west side of the airport will require enhanced access and parking facilities capable of meeting short-term and long-term parking needs of passengers. The following sections details these parking and access requirements.

A.3.6.1. Automobile Parking

Commercial operations at OLM would require additional automobile parking to accommodate airport users. Based on the 2040 forecast of 284,00 annual enplanements (780 daily enplanements), parking requirements were reviewed versus the Institute for Traffic Engineers (ITE) *Parking Generation Manual*. Using a 15% peaking factor, the 85th percentile parking demand is 0.67 parking spots per daily enplanements. This results in a recommended parking lot size of approximately 600 stalls.

In addition, new parking facilities at OLM provide an opportunity to increase renewable energy production. Placing a canopy with photovoltaic (PV) solar panels over part or all of the parking lots would enhance sustainability in two ways, both in the production of solar energy and in saving air conditioning energy consumption in automobiles during hotter months. A conceptual solar panel canopy is shown in **Figure A-3**.

Figure 4-4: PV Panel Parking Canopy Concept



Source: The Aviation Planning Group (2022).

Lastly, new parking facilities at OLM should cater to electric vehicles to the best extent possible by providing both electric charging stations and offering preferred parking to these vehicles.

Part 139 Facility Requirement for Automobile Parking: Construct new parking facilities with approximately 610 stalls. Where possible, construct a solar panel canopy over parking facilities. Provide priority parking for electric vehicles and install electric charging stations.

A.3.6.2. Roadways Access

The areas where a commercial terminal is most feasible for OLM already has significant surface access via Interstate 5 and Tumwater Blvd. New Market St SW, Terminal St SW, and 76th Ave SW provide direct access from Tumwater Blvd to this area of the airport property. If commercial aviation moves forward at OLM, these roads should be evaluated for their potential to handle the additional traffic that may come with commercial activity. They should be evaluated for their ability to feed new parking facilities in addition to being evaluated for new signaling and signage, routing, and multimodal access.

It is not anticipated that Part 139 commercial aviation at OLM would require the construction of new city roadways. However, access lanes connecting the terminal and parking lot to city streets will likely need to be constructed.

Part 139 Facility Requirement for Roadways Access: Evaluate New Market St SW, Terminal St SW, and 76th Ave SW for their abilities to meet additional parking caused by commercial aviation, including access to new parking, additional signaling and signage, changes to routing, and multimodal access. As needed, construct access lanes from city streets to airport parking and the commercial terminal.

A.3.6.3. Transit Access
The hope for OLM is that, in addition enhancing sustainability through prioritization of electric vehicle parking and charging, the OLM terminal building will also be accessible via the region's transit system. The 12 and 13 bus routes of Intercity Transit have stops north of the airport on Tumwater Blvd. While a specific facility requirement is not made as part of this feasibility study, the Airport is encouraged to reach out to Intercity Transit to possibly collaborate a new stop at the commercial terminal specifically. This would not only enhance sustainability by lowering individual automobile usage, but also increase access to the airport for residents that only utilize transit.

A.3.7. Support Facilities
Successfully offering Part 139 commercial service to a community and region requires much more than just a terminal, access, and new apron facilities. Commercial operations require additional facilities and service vehicles for fueling, baggage transport, catering, and other services. The following sections provide an overview of the required support facilities for commercial aviation at OLM.

A.3.7.1. Aircraft Fuel and Renewable Energy
New commercial aviation development at OLM will require fueling and renewable energy facilities to support both aircraft operating on current energy sources and those expected to use SAFs and other energy sources. At OLM, that means Jet A fuel, a source of SAF, and electric charging stations or portable equipment for eVTOLs and other fully electric aircraft.

A.3.7.1.1. Aircraft Fuel
A commercial service fuel farm should be designed so that Jet A tanks can be converted to SAFs as activity demand and technology allow. Therefore, instead of installing one 50,000-gallon tank for regional jet activity, OLM should install two 25,000-gallon tanks with the intention of converting one of these for SAF in beyond the MPU planning period. Another 25,000-gallon tank should be installed specifically for SAF as commercial operations begin at OLM.

Part 139 Facility Requirement for Aircraft Fueling: Construct a dedicated commercial fuel farm with 2 25,000-gallon tanks for Jet A and 1 25,000-gallon tank for SAF.

A.3.7.1.2. Electric Charging Stations
Beyond fuel, several fully electric aircraft are forecasted to operate commercial operations at OLM, including eVTOLs, the Heart Aerospace ES-30, and older aircraft retrofit for full electronic use. The ultimate layout of commercial facilities will dictate if OLM should install stationary charging stations at commercial gates or acquire portable charging units. Ideally, the airport will purchase and install a combination of portable and stationary electric aircraft charging stations.

Part 139 Facility Requirement for Electric Charging Stations: Install 2 electric aircraft charging stations (1 each for fixed-wing and eVTOL aircraft) or acquire 2 mobile charging units.

A.3.7.2. Aircraft Maintenance
The addition of Part 139 commercial service adds new concerns for aircraft maintenance and upkeep for the airport. However, because this activity is operated by the airlines, the decision to construct a dedicated commercial service maintenance facility is not solely up to the airport, but must be the result

of collaboration between OLM and the airlines. Therefore, no direct recommendation for a commercial maintenance facility is made by this feasibility study. However, the alternatives phase will still evaluate potential locations for such a facility alongside the commercial terminal and apron on the west side of OLM. In this way, land could be reserved specifically for this purpose in the event that the airlines and airport move forward with construction of this facility.

A.3.7.3. Ground Support Equipment (GSE)

Commercial operations require additional GSE such as fueling trucks, oxygen carts, baggage carts, electric charging carts, and more. A commercial airport requires a dedicated space on the commercial apron for such equipment. When compared to the aircraft it serves, GSE takes up relatively limited space. It is recommended that approximately 5,000 square feet of commercial apron be dedicated for GSE parking and storage. This area was derived from analyzing commercial operations and GSE storage at airports with comparable passenger volumes to that forecasted for OLM.

Part 139 Facility Requirement for a GSE Storage: Set aside approximately 5,000 square feet for GSE storage and parking.

A.3.7.4. Deicing

Commercial operations at OLM will likely require deicing facilities during colder months of the year, ensuring safer operations. The deicing facility should be completely contained per modern containment design to ensure that the nearby environment is not contaminated by deicing fluids.

Dimensions of the deicing pad are based on the dimensions and clearance areas of the critical aircraft (CRJ 700). The deicing pad should allow for simultaneous deicing of two aircraft, their clearance areas, deicing equipment, and personnel. This amounts to a total area of approximately 40,000 square feet.

Part 139 Facility Requirement for a Deicing Pad: Construct a deicing pad on the commercial apron with a total area of approximately 40,000 square feet.

A.3.8. Facility Requirements Summary

The previous section of the appendix detailed facilities that OLM will need to upgrade or build to best support its forecasted number of passengers and commercial operations. In some cases, such as the airfield itself, the Preferred Alternative of the MPU will fully support these operations. In other areas, such as terminal and apron facilities, OLM will need to make significant capital investment to bring these services to the community and region. **Table A-10** summarizes Part 139 facility requirements for OLM.

Table 4-24: Part 139 Facility Requirements

Facility	Preferred Alternative Recommendation	Additional Part 139 Recommendation
Runways		
Runway Width	Maintain existing	None
Runway Length	Runway 17/35: Maintain Runway 08/26: Shorten by 647'	None
Runway Surface	Maintain existing	None

Table 4-24: Part 139 Facility Requirements

Facility	Preferred Alternative Recommendation	Additional Part 139 Recommendation
RPZ	Ensure control of both Runway 17/35 approach RPZs for C-II design standards with visibility minimum lower than ¾-mile.	Ensure control of expanded C-II RPZs while removing obstructions where applicable and feasible.
ROFA & OFZ	Maintain the current ROFA and OFZ width on Runway 08/26 while reducing length with the runway. Increase Runway 17/35 ROFA and OFA dimensions to meet C-II standards.	None
RSA	Maintain the current RSA width on Runway 08/26 while reducing length with the runway. Increase Runway 17/35 RSA dimensions to meet C-II standards.	None
Vertiport Requirements		
Vertiport Landing Areas	NA	Construct 3 eVTOL landing/parking areas with 130' x 130' dimensions (16,900 square feet each)
Taxiways		
Taxiway Layout and Dimensions	Taxiway geometry throughout the airport needs to be revised to meet FAA standards of right-angle intersections. Taxiway W is recommended to be revised to serve as a full-length parallel taxiway along with the analysis of a new full-length parallel taxiway to serve Runway 08/26. It is also recommended to add optimally located exit taxiways to both runways to increase airfield efficiency. Realign angled taxiway intersections; realign Taxiway W; remove Taxiways C and D, realign Taxiway F.	None
Taxiway Design Standards	Maintain existing; perform a full analysis of turn fillets	None
Approach and Visual Aids		
Instrument Approach & Approach Lighting	If a ½ mile visibility IAP for Runway 35 is desired, the Airport should install a MALSR, along with precision runway markings	Install a MALSR on Runway 35 to achieve ½-mile visibility
Runway Edge Lighting	Maintain existing	None
Taxiway Edge Lighting	Upgrade edge reflectors to lighting where necessary	None
Other NAVAIDs and Visual Aids	Maintain existing	None
Commercial Terminal and Apron		
Commercial Terminal	NA	Construct a minimum 40,000-square foot terminal to serve fixed-wing and eVTOL operations. Include 3 jet bridge gates and 1 gate each for light transport hardstands,

Table 4-24: Part 139 Facility Requirements

Facility	Preferred Alternative Recommendation	Additional Part 139 Recommendation
		hybrid/electric hardstands, and eVTOL hardstands
Commercial Apron & Taxilanes	NA	Construct a commercial apron with a minimum 259,000 square foot minimum area to accommodate 6 gates, 9 total parking areas, and minimal taxilanes with the understanding that facilities and taxiway layouts may necessitate a larger apron.
Surface Access and Automobile Parking		
Automobile Parking	Add additional automobile parking	Construct new parking facilities with approximately 600 stalls. Where possible, construct a solar panel canopy over parking facilities. Provide priority parking for electric vehicles and install electric charging stations.
Roadway Access	Maintain existing	Evaluate New Market St SW, Terminal St SW, and 76th Ave SW for their abilities to meet additional parking caused by commercial aviation, including access to new parking, additional signaling and signage, changes to routing, and multimodal access. As needed, construct access lanes from city streets to airport parking and the commercial terminal.
Transit Access	NA	Coordinate with Intercity Transit to modify an existing bus route to stop at the commercial terminal
Support Services and Facilities		
Commercial Fuel Farm	NA	Construct a dedicated commercial fuel farm with 2 25,000-gallon tanks for Jet A and 1 25,000-gallon tank for SAF.
Electric Aircraft Charging	NA	Install 2 electric aircraft charging stations (1 each for fixed-wing and eVTOL aircraft) or acquire 2 mobile charging units
Aircraft Maintenance	It is recommended that an aircraft maintenance facility be added to the airport to provide service to based and transient aircraft	Construction of a dedicated commercial aircraft maintenance hangar is dependent upon decisions of the airlines themselves
Deicing	None	Construct a deicing pad on the commercial apron with an area approximately 40,000 square feet.
GSE Storage	NA	Construct a covered ramp section to store and protect GSE (approximately 5,000 square feet)
ARFF	None	Depending on the size of commercial aircraft serving the airport aircraft rescue firefighting may be required. The proposed location must meet FAA requirements and is ideally situated south of the air traffic control tower. Part 139.317 determines the necessary rescue and

Table 4-24: Part 139 Facility Requirements

Facility	Preferred Alternative Recommendation	Additional Part 139 Recommendation
		firefighting equipment required. At a minimum a 1500-gallon water truck, with capacity for additional required chemicals, is recommended.

Source: The Aviation Planning Group (2022), DOWL (2022).

The next section of this feasibility study will present development alternatives for bringing Part 139 commercial passenger service to OLM. These alternatives will go into far greater detail on the location, dimensions, and layout of the recommended facilities, from the terminal and apron to eVTOL vertiports and electric charging stations.

A.4. COMMERCIAL AVIATION FEASIBILITY FUTURE CONCEPT ALTERNATIVE

The alternative identification and evaluation process for the commercial services feasibility future concepts provides for the implementation of the recommended facility needs identified within the facility requirements from the above section of this appendix. The Preferred Alternative, through the evaluation process, is shaped to the needs of the airport based on the forecasted feasibility needs. This Preferred Alternative is the result of significant review and coordination with the Port and community engagement.

A.4.1. Development of the Commercial Aviation Feasibility Future Concept Alternative

Similar to the Master Plan Update (MPU), bringing together elements of the master planning process and incorporating the strategic vision of the Port and the Airport Master Plan Update TAC is important when determining future airport development. Evaluation criteria weighed when developing alternatives for future development at the OLM required each of the following areas to be evaluated: Safety, Efficiency, Land Management, Fiscal Sustainability, and Environmental Awareness. The draft Commercial Aviation Feasibility Preferred Alternative was presented in the Public Open House in October, 2022.

A.4.2. Commercial Aviation Feasibility Future Concept Requirements

The Commercial Aviation Feasibility Future Concept Preferred Alternative reflects extensive analysis of the facility needs, fiscal abilities, environmental constraints, current use, and forecasted growth of the Airport. The FAA, through Advisory Circular 150/5070-6B, establishes the framework for the master planning process based on the individual airport's overall complexity, size, and use.

It is critical that any planned development at the Olympia Regional Airport is in full compliance with FAA standards. The general development items of the Airport not associated with the immediate terminal area that were addressed by the Commercial Aviation Feasibility Future Concept were found in the above facility requirements as follows:

- **Runway Width:** Both runways should maintain current width.
- **Runway Length:** Runway 17/35 should be maintained at 5,501 feet, while Runway 08/26 should be shortened by 647 feet at the 08 end. (Because commercial operations at OLM are expected to primarily utilize Runway 17/35, the shortening of Runway 08/26 has no expected effect on commercial facility requirements.)
- **Runway Surface:** The current surfaces and strengths should be maintained.
- **RPZ:** Control of both Runway 17/35 approach RPZs for C-II design standards with visibility minimum lower than ¾-mile should be ensured.
- **ROFA and OFZ:** The current ROFA and OFZ width on Runway 08/26 while reducing length with the runway should be maintained. An increase to Runway 17/35 ROFA and OFA dimensions to meet C-II standards should be accomplished.
- **RSA:** The current RSA width on Runway 08/26 while reducing length with the runway should be maintained. An increase to Runway 17/35 RSA dimensions to meet C-II standards should be accomplished.
- **Taxiway Dimensions and Layout:** Taxiway intersections should be reangled, Taxiway W and Taxiway F should be realigned, and Taxiways C and D should be removed.
- **Taxiway Design Standards:** A full analysis of the turn fillets should be performed.
- **Instrument Approach and Approach Lighting:** A MALSR on Runway 35 to achieve a ½-mile visibility IAP should be installed.
- **Runway Edge Lighting:** Existing edge lighting should be maintained.
- **Taxiway Edge Lighting:** All taxiways should have edge lighting.
- **Visual Aids and Navigational Aids (NAVAIDs):** Existing NAVAIDs should be maintained.
- **Part 139 Facility Requirement for Aircraft Fueling:** Construct a dedicated commercial fuel farm with 2 25,000-gallon tanks for Jet A and 1 25,000-gallon tank for SAF.

Development items of the Airport associated with the immediate terminal area that were addressed by the Commercial Aviation Feasibility Future Concept were found in the above facility requirements as follows:

- **Part 139 Facility Requirement for a Commercial Terminal:** Construct a new commercial service terminal building with a minimum total size of 40,000 square feet. This should include examining both combined and separate fixed-wing and eVTOL terminals.
- **Part 139 Facility Requirement for Gates and Aprons:** Construct a commercial apron with a minimum 259,000 square foot minimum area to accommodate 6 gates, 9 total parking areas, and minimal taxilanes with the understanding that facilities and taxiway layouts may necessitate a larger apron.
- **Part 139 Facility Requirement for Automobile Parking:** Construct new parking facilities with approximately 610 stalls. Where possible, construct a solar panel canopy over parking facilities. Provide priority parking for electric vehicles and install electric charging stations.
- **Part 139 Facility Requirement for Roadways Access:** Evaluate New Market St SW, Terminal St SW, and 76th Ave SW for their abilities to meet additional parking caused by commercial aviation, including access to new parking, additional signaling and signage, changes to routing, and multimodal access. As needed, construct access lanes from city streets to airport parking and the commercial terminal.

- **Part 139 Facility Requirement for Electric Charging Stations:** Install 2 electric aircraft charging stations (1 each for fixed-wing and eVTOL aircraft) or acquire 2 mobile charging units.
- **Part 139 Facility Requirement for a GSE Storage:** Set aside approximately 5,000 square feet for GSE storage and parking.
- **Part 139 Facility Requirement for a Deicing Pad:** Construct a deicing pad on the commercial apron with a total area of approximately 40,000 square feet.

The inclusion of the facility requirements into the Commercial Aviation Feasibility Future Concept Preferred Alternative ensure that the airport meets the demand requirements based on the feasibility forecast. The Commercial Aviation Feasibility Future Concept Preferred Alternative layout is focused on the immediate terminal area, though items above not associated with the immediate terminal area included in the overall Commercial Aviation Feasibility Future Concept Preferred Alternative.

A.4.3. Environmental Review of Projects

The environmental review is not intended to fulfill the requirements of environmental review required by National Environmental Policy Act (NEPA) or provide a definitive determination of what level of environmental review pursuant to NEPA will be required. The purpose of this environmental review is to inform the community, airport sponsor, and regulatory agencies of the importance of minimizing the environmental impacts of proposed airport development and to provide a general indication of the likely need for further investigation.

Table A-11 provides an indication of the likely need for further environmental analysis to determine the exact impacts, if any, that are associated with the proposed improvements. Appropriate environmental documentation in accordance with FAA Order 5050.4B, NEPA Instructions for Airport Actions and FAA Order 1050.1F, Environmental Impacts: Policies and Procedures is required to be completed prior to commencing with project actions.

Prior to starting NEPA documentation for an Implementation Plan project the Airport or its contractor should coordinate with the FAA Seattle Airports District Office
(ADO) Environmental Specialist to officially determine the appropriate level NEPA documentation (e.g., CE, EA, EIS). It is recommended that projects connected in function, place, and/or time be evaluated in the same NEPA documentation in an effort to save time and money. Connected actions (projects that do not have independent utility from another project) must be considered in the same NEPA document to avoid segmentation.

Table A-11 Environmental Analysis

FAA Resource Category	FAA Threshold of Significance	Potential Concerns
Air Quality, including Greenhouse Gases (GHGs) and Climate	Potentially significant air quality impacts associated with an FAA project or action would be demonstrated by the project or action exceeding one or more of the NAAQS for any of the time periods analyzed. The six criteria air pollutants include carbon monoxide (CO), particulate matter (PM, ozone (O3), sulfur dioxide (SO2), lead (Pb), and nitrogen oxide (NOx). With respect to GHGs and climate, federal standards for aviation- related GHG emissions are still being developed.	The Airport is located in Thurston County, and according to the EPA, is designated in an attainment area for all NAAQS. A portion of Thurston County, specifically the Olympia, Tumwater, and Lacey area is designated an attainment/maintenance for PM10. Air Quality will be addressed as part of any future NEPA review.
Coastal Resources	No specific thresholds have been established; however, if a local Coastal Development Permit cannot be issued due to a lack of consistency with a local coastal program, the FAA typically will not make a Federal Coastal Consistency determination either.	N/A
Compatible Land Use	Compatible land use evaluations for airports must consider the land uses in the vicinity of an airport to ensure those uses do not adversely affect safe aircraft operations. In addition, if an airport action would result in impacts exceeding FAA thresholds of significance which have land use ramifications, such as disruption of communities, relocation of businesses or residences, and induced socioeconomic impacts, the effects of the land use impacts shall be discussed. Local land use policy inconsistencies may also indicate land use compatibility issues.	The land uses within the vicinity of OLM consist of commercial, industrial, and mixed use. Future development at the Airport is unlikely to present a significant noise impact to surrounding land use based on the current 65 DNL noise contour, providing that compatible land use in the future is maintained by the City of Tumwater.
Construction Impacts	Construction impacts alone are rarely significant pursuant to NEPA. See significance threshold(s) for the resource(s) that construction could affect.	FAA-required best management practices (see Advisory Circular (AC) 150/5370-10G, Standards for Specifying Construction of Airports, Item P- 156, Temporary Air and Water Pollution, Soil Erosion and Siltation Control), as well as State and local permits, would be implemented during construction projects at the Airport.
Department of Transportation (DOT) Act: Section 4(f)	When the action's physical use would be more than minimal, or its constructive use substantially impairs the Section 4(f) property. In either case, mitigation is not enough to sustain the resource's designated use.	No direct impacts or substantial impairment (constructive use) of Section 4(f) resources were found as a part of the Master Plan process. This will be reviewed as a part of any NEPA review for future projects.

FAA Resource Category	FAA Threshold of Significance	Potential Concerns
Farmland	When the combined score on Form AD1006 ranges between 200 and 260. Impact severity increases as the total score approaches 260. NOTE: Form AD-1006 is used by the U.S. Department of Agriculture, Natural Resources Conservation Service (NRCS) to assess impacts under the FPPA.	No concerns.
Fish, Wildlife, and Plants	The United States Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service determines a proposed action would likely jeopardize a species' continued existence or destroy or adversely affect a species' critical habitat.	The City of Tumwater, Port of Olympia and regulatory agencies (including FAA) are working jointly on the Brush Prairie HCP developed to balance growth and the preservation of primarily three covered species: Olympia pocket gopher, streaked horned lark and the Oregon spotted frog. The HCP is a detailed plan for achieving this goal and is required under Section 10 of the Endangered Species Act, under which permits can be issued to "take" an endangered species by causing harm to the species or its habitat. In this case, "take" is expected to result from new development, from maintenance of City and Port facilities, and from maintenance performed at the conservation reserve sites. The plan includes a detailed description of the activities to be performed, both for development and species protection, and their effects upon the species. Future projects will be reviewed against HCP.
Floodplains	Executive Order 11988, Floodplain Management directs federal agencies to "avoid to the extent possible the long and short-term adverse impacts associated with the occupancy and modification of floodplains and to avoid direct and indirect support of floodplain development wherever there is a practicable alternative"	No concerns. A review of the on-line Flood Insurance Rate Maps prepared by FEMA, shows the Airport is not located within the 100-year floodplain. The Airport is within a Minimal Flood Hazard, Zone X. This is an area defined as being outside the SFHA, known as the 100-year floodplain. Zone X areas are higher than the elevation of the 0.2% annual chance flood. Any subsequent project-related environmental review process will evaluate the need for additional floodplain analysis.

FAA Resource Category	FAA Threshold of Significance	Potential Concerns
Hazardous Materials, Pollution Prevention, and Solid Waste	Hazardous materials: · When an action involves a property on or eligible for the NPL. Uncontaminated properties within an NPL site's boundary do not always trigger this significance threshold. Pollution prevention: · See significance thresholds for water quality. Solid waste: · There are no solid waste thresholds of significance established.	There are no NPL sites located on the Airport. The Airport currently recycles cardboard, aluminum, glass, plastics, paper products, and batteries. Construction would produce construction debris. The effects of additional waste and its disposal to landfills will be considered during any environmental review process of future development.
Archaeological, and Cultural Resources	An action adversely affects a protected property and the responsible FAA official determines that information from the State and/or tribal Historic Preservation Officer addressing alternatives to avoid adverse effects and mitigation warrants further study.	Any areas at the Airport that would be disturbed by new development should be surveyed for cultural resources prior to ground disturbance and monitored during construction unless previously disturbed to the point that artifacts could no longer be intact. In the event that unknown resources are found during construction, all applicable State and Federal laws regarding such finds must be followed. Based on the historical inventory completed as part of this master plan, there are no historical resources that would be adversely affected by the master plan. However, A cultural resources survey and Section 106 and Government to Government consultation will need to be undertaken prior to any development.
Light Emissions and Visual Effect	Light emissions: · An action's light emissions create annoyance to interfere with normal activities. Visual effects: · Consultation with Federal, State, or local agencies, tribes, or the public shows these effects contrast with existing environments and the agencies state the effect is objectionable.	Light emissions: · All new lighting associated with the proposed development would remain on the airfield and other developed portions of the Airport. Visual effects: · Proposed improvements on Airport property will be evaluated to determine any significant change to the overall appearance of the Airport from off- airport areas.

FAA Resource Category	FAA Threshold of Significance	Potential Concerns
Natural Resources and Energy	An action's construction, operation, or maintenance would cause demands that would exceed available or future (project year) natural resource or energy supplies.	Planned development projects at the Airport are not anticipated to result in a demand for natural resources or energy consumption beyond what is available by service providers.
Noise	An action, compared to the No Action alternative for the same timeframe, would cause noise sensitive areas located at or above the 65 decibel (dB) DNL to experience a noise increase of at least DNL 1.5 dB. Additionally, an increase from DNL 63.5 dB to DNL 65 dB is a significant impact.	Noise maps were not prepared for this Master Plan Update. Noise analysis is not required for GA if there are less than 90,000 annual piston powered aircraft operations or 700 annual jet powered aircraft operations. However, any subsequent project-related environmental review process will evaluate the need for a noise analysis.
Secondary (Induced) Impacts	Induced impacts will not normally be significant except where there are also significant impacts in other categories, especially noise, land use, or direct social impacts.	In general, the recommended projects are being designed/planned to accommodate forecast aviation growth rather than proposing development that would induce growth at the Airport.
Socioeconomic Impacts, Environmental Justice, and Children's Environmental Health and Safety Risks	Socioeconomic issues: · An action would cause: o Extensive relocation, but sufficient replacement housing is unavailable; o Extensive relocation of community businesses that would cause severe economic hardship for affected communities; o Disruption of local traffic patterns that substantially reduce the Levels of Service of roads serving the Airport and its surrounding communities; o A substantial loss in community tax base. Environmental justice issues: · If an action would cause disproportionately high and adverse human health or environmental effects on minority and low-income populations, a significant impact may occur. Children's health & safety risk: · An action causing disproportionate health and safety risks to children may indicate a significant impact.	As a part of the masterplan, no impacted populations were found to be are located within the boundaries of the OLM study area. Socioeconomic impacts, environmental justice and children's environmental health and safety risks will be provided as part of any subsequent NEPA review.
Water Quality	An action would not meet water quality standards. Potential difficulty in obtaining a permit or authorization may indicate a significant impact.	Environmental review of future projects will assess possible impacts on any drinking wells, local receiving waters including those related to stormwater runoff.

FAA Resource Category	FAA Threshold of Significance	Potential Concerns
Wetlands, jurisdictional or non-jurisdictional	An action would: · Adversely affect a wetland's function to protect the quality or quantity of a municipal water supply, including sole source aquifers and a potable water aquifer. · Substantially alter the hydrology needed to sustain the affected wetland's values and functions or those of a wetland to which it is connected. · Substantially reduce the affected wetland's ability to retain floodwaters or storm runoff, thereby threatening public health, safety, or welfare. · Adversely affect the maintenance of natural systems supporting wildlife and fish habitat or economically- important timber, food, or fiber resources of the affected or surrounding wetlands. · Promote development that causes any of the above impacts. · Be inconsistent with applicable State wetland strategies.	The National Wetlands Inventory does not indicate the presence of wetlands on the Airport. Project specific wetlands determinations and/or delineations should be performed for future Airport improvement proposals. If any proposed projects impact these wetlands, the Airport will coordinate with the U.S. Army Corps of Engineers to determine the extent of the impacts and any mitigation measures, if required.
Wild and Scenic Rivers	No specific thresholds have been established.	N/A

A.4.4. Commercial Aviation Feasibility Future Concept Preferred Alternative

The creation of the Commercial Aviation Feasibility Future Concept Preferred Alternative and terms for development was heavily influenced by discussions with the Olympia Regional Airport Management, the Technical Advisory Committee, The FAA and WSDOT Aviation Division, interested Stakeholders, and the community.

Runway, Runway Protection, and Approaches

Runway 17/35's width, length, surface and edge lighting are to be maintained to FAA standards as part of the Preferred Alternative. The runway protective surfaces (RPZ, ROFA, OFZ, RSA) are also identified to be maintained to a C-II standard. Ensuring adequate runway and runway protection standards meet the future needed requirements is imperative to the feasibility of future commercial services and in compliance with FAA standards and assurances. In addition to the existing approaches, approach lighting and NAVAIDs for Runway 17, a MALSR on Runway 35 to achieve a ½-mile visibility IAP should be installed.

Taxiways

Standards for the taxiways around the Airport will need to be met through the preferred alternative. These standards require the taxiways to connect to the runway at 90 degree angles, not be within the middle third of the runway, and have the fillets updated to meet current design standards. For the preferred Alternative the taxiway intersections should be reangled, Taxiway W and Taxiway F should be realigned, and Taxiways C and D should be removed. Additionally, a full analysis of the turn fillets should be performed to bring them up to standards during future projects. Taxiway edge lighting should be planned throughout the airport for night and low visibility operations.

Aircraft Fuel

Additional fuel storage will need to be considered for commercial activity at the Airport. It is recommended to construct a dedicated commercial fuel farm, in the vicinity of the existing fuel farm area, with two (2) 25,000-gallon tanks for Jet A and one (1) 25,000-gallon tank for SAF.

ARFF (Aircraft Rescue and Fire Fighting)

To meet Part 139 requirements ARFF equipment and trained personnel may be required. Per 139.315 ARFF indices are determined by:

(1) The length of air carrier aircraft and

(2) Average daily departures of air carrier aircraft.

For the purpose of Index determination, air carrier aircraft lengths are grouped as follows:

(1) Index A includes aircraft less than 90 feet in length.

(2) Index B includes aircraft at least 90 feet but less than 126 feet in length.

(3) Index C includes aircraft at least 126 feet but less than 159 feet in length.

(4) Index D includes aircraft at least 159 feet but less than 200 feet in length.

(5) Index E includes aircraft at least 200 feet in length.

The location of a proposed ARFF station is south of the existing air traffic control tower. Required response times can be met from this location, although other locations are also feasible. The station should be staffed during all commercial flights with trained ARFF personnel and required equipment.

Commercial Terminal Area

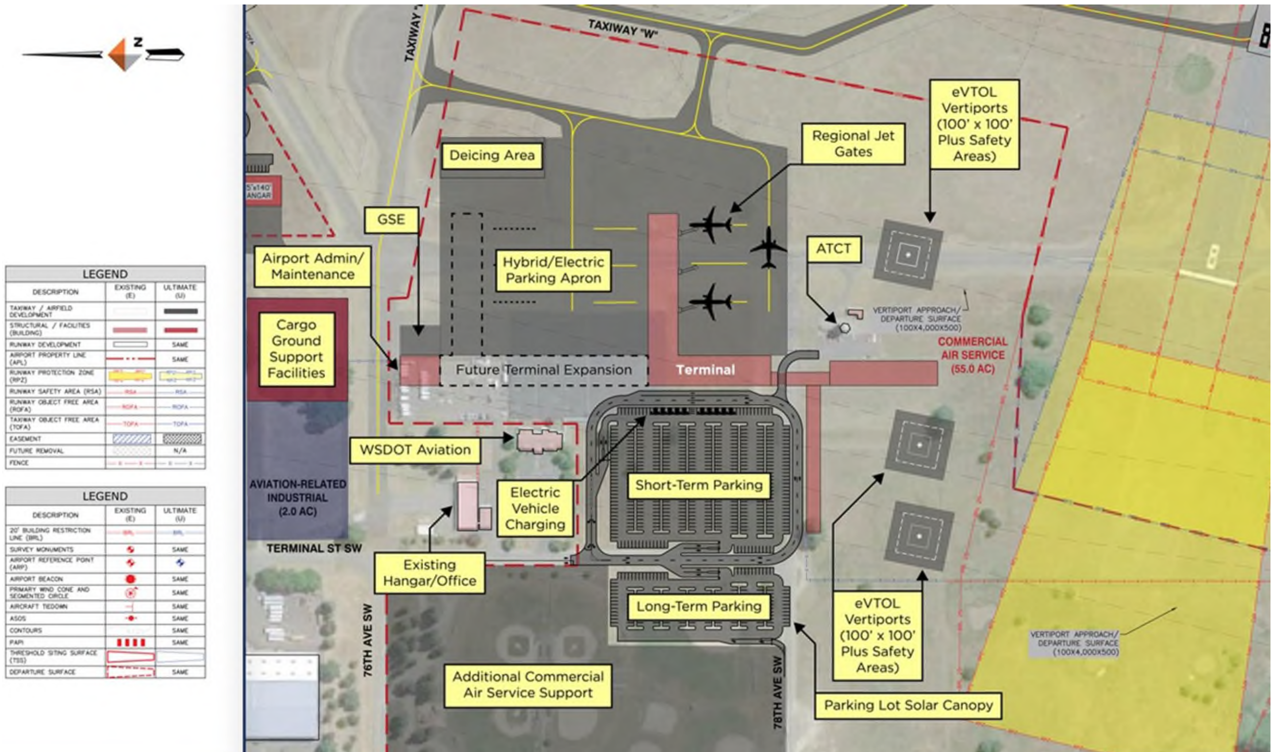
Construction of a new commercial service terminal building with a minimum total size of 40,000 square feet will be required in order to conduct commercial operations. In addition to a commercial terminal building, there may also be a future need for eVTOL aircraft. Separate terminals for each will allow for both types of operations at the airport and separate the fixed-wing and eVTOL aircraft for safety in the terminal area.

The apron area for the commercial area will require a minimum 259,000 square foot area to accommodate 6 gates, 9 total parking areas, a deicing pad, and minimal taxilanes with the understanding that facilities and taxiway layouts may necessitate a larger apron. Three (3) eVTOL vertiports are planned for to accommodate the eVTOL operations. The installation of two (2) electric aircraft charging stations (1 each for fixed-wing and eVTOL aircraft) is recommended, though there is also the potential opportunity to acquire 2 mobile charging units while utilizing a singular recharging location for the mobile units. Commercial activity will require GSE for the aircraft, which will need to be stored in an approximate 5,000 square foot storage and parking area close to the apron and aircraft parking areas.

Roadway access to a future terminal area will require the evaluation of New Market St SW, Terminal St SW, and 76th Ave SW for their abilities to meet additional parking caused by commercial aviation, including access to new parking, additional signaling and signage, changes to routing, and multimodal access. Access lanes from city streets to airport parking and the commercial terminal are able to be constructed as need. The construction of a new parking facilities with approximately 610 stalls is estimated to be required based on this feasibility studies forecasted demand. Where possible, a solar panel canopy over parking facilities can be constructed to provide renewable energy and covered parking. Priority parking for electric vehicles can be put into place in the vehicle parking area with the installation of electric charging stations.

The Commercial Aviation Feasibility Future Concept Preferred Alternative, as depicted in **Figure A-4**, is focused on the immediate terminal area, though it also includes the items recommended above, though not shown as they are not associated with the immediate area of the terminal.

Figure 4-4: Commercial Aviation Feasibility Future Concept Preferred Alternative



A.4.2.1. Commercial Aviation Feasibility Future Concept Preferred Alternative Conclusion

Identifying the Commercial Aviation Feasibility Future Concept Preferred Alternative for future planning purposes at OLM is an essential step in understanding the feasibility and what it would require in advance of a part 139 operations. The Commercial Aviation Feasibility Future Concept Preferred Alternative is directly translated into the drawings contained as a separate page outside of the ALP. Consideration for all aspects of this feasibility study have been thoroughly analyzed to reflect the elemental needs of the Airport for commercial activity and operations in the future if required based on the feasibility forecast demand.