Paine Field Master Plan 2040

Executive Summary

0

May 2024

PREPARED FOR
Snohomish County

PREPARED BY
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1 Introduction

A Master Plan is one of the most important documents from an airport management and operation perspective, as it guides future growth and development. A Master Plan provides a road map for efficiently meeting aviation demand through the near future while preserving the flexibility necessary to respond to changing industry conditions.

The goal of a Master Plan is to build the overall framework needed to guide future airport development. The plan must also allow the airport to keep pace with aviation growth cost effectively, while also considering potential environmental and socioeconomic impacts. Master Plans also provide the airport with the tools to react to uncertainties by examining key trends in the aviation industry, such as changing airline business models, improvements in technology, and local and regional economics that could affect airport activity. The Master Plan is a multi-year study that may or may not have recent data in the inventory chapter for tenants, air carriers and routes for example. These changes do not impact the analysis of the forecast, facility requirements, alternatives, development plan, airport plan and environmental chapters.

Snohomish County and the Federal Aviation Administration (FAA) officials identified the need to update Paine Field's (PAE) Master Plan – a type of plan focused on how to meet future aviation demand and how to guide airport development – to address current FAA requirements and account for the implementation of commercial passenger service at the airport. The resulting PAE Master Plan 2040 outlines a framework for the development of airport facilities and will guide future long-term on-Airport land use and development decisions.

2 Inventory

2.1.1 Historical Traffic

PAE generated 511,023 enplaned passengers for the year-ending February 2020, which corresponds to the first year that the airport had commercial passenger service with a heavy California market. Post COVID-19 through the summer of 2023, PAE has experienced a sluggish return of airline capacity and subsequently enplaned passenger volumes. Traffic demand along the west coast, particularly California, has remained relatively weak through the summer. It is estimated that PAE passenger volumes will likely be within 10-15% of the 2019 levels within the imminent future. Should AS continue adding capacity, particularly to selected California markets (as business travel continues improving) and/or in the form of upgraded 737-900 flying in currently served markets, PAE could approach 2019 levels in the near future.

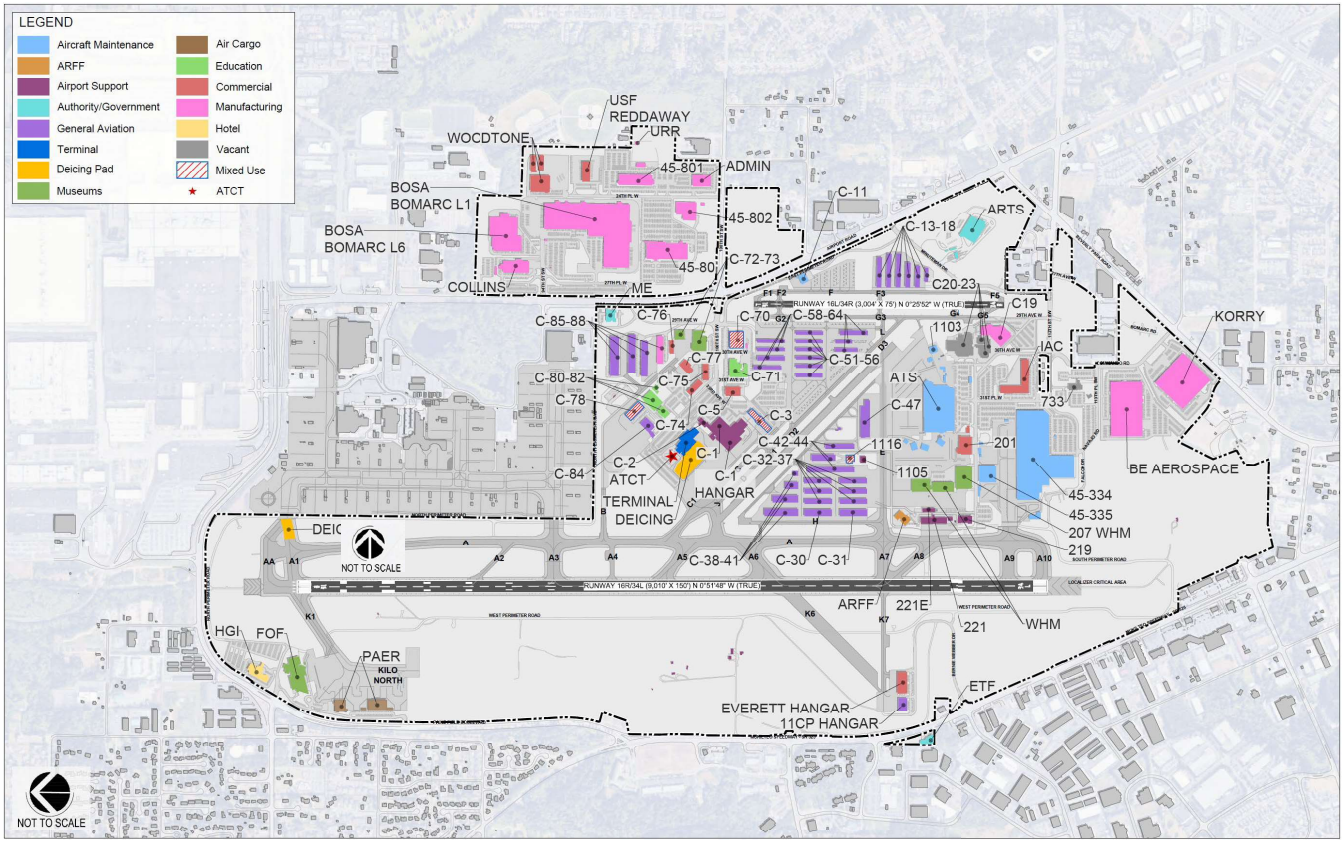
2.1.2 Major Facilities

PAE consists of the following major facilities and facility types:

- Two parallel runways
- One passenger terminal, with three gates
- 294 General Aviation (GA) hangars and 55 general storage units

- Support facilities (i.e., Aircraft maintenance, aircraft manufacturing, etc.)
- Other on-airport facilities (i.e., Air cargo, commercial, education, hotel, museum)

Exhibit 2-1 – Existing Facilities Map



Source: Landrum & Brown, 2020

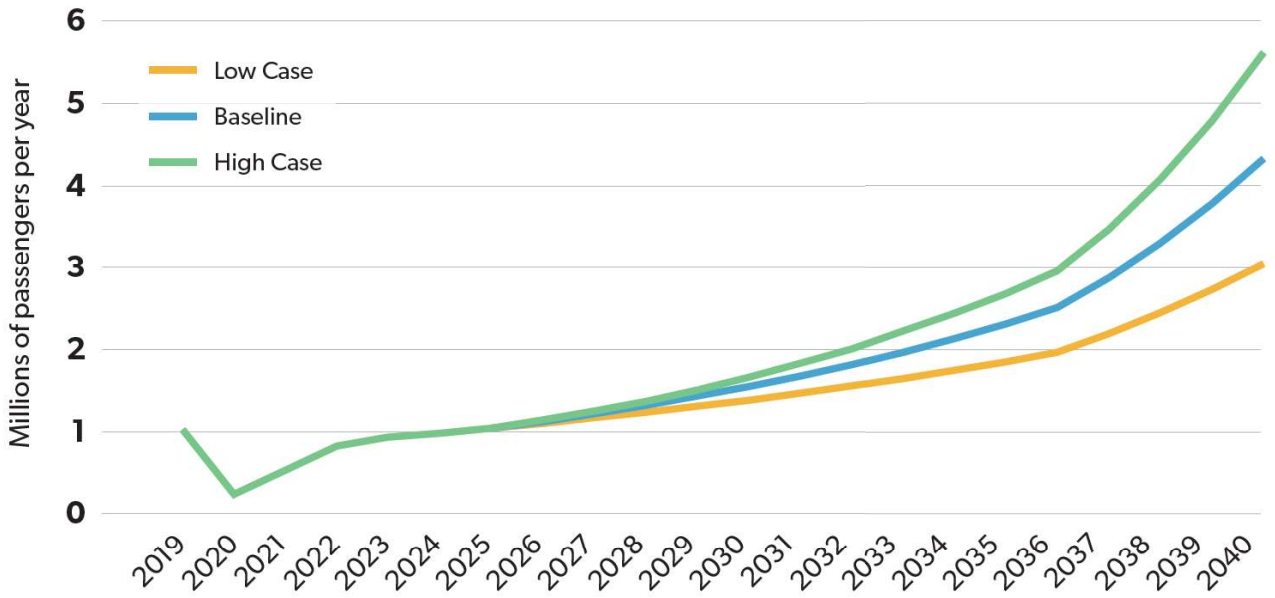
3 Aviation Forecasts

Forecasts help to provide airports with projections to see what can be expected over a certain period of time to demonstrate what potential activity there will be. The projections can be used to adequately plan, size, and phase the development of future facilities to meet future projected growth. Several methods were used to quantify potential aviation related activity over the next 2 decades. Master Plan forecasts have to be within the guidelines of the FAA's approved Terminal Area Forecasts (TAF).

3.1 Passenger Forecast Summary

The forecasted passenger results are presented in **Exhibit 3.1-1** and **Table 3.1-1.**

Exhibit 3.1-1 – Forecast Scenarios



Source: Landrum & Brown analysis

Table 3.1-1 – Forecast Summary

	2019*	2020	2025	2030	2040	CAGR vs 2019		
						2025	2030	2040
Commercial Passengers (000s)	1,022	226	1,022	1,535	4,322	0.0%	3.8%	7.1%
Operations								
Itinerant								
Passenger Air Carrier	16,660	5,342	16,660	18,741	41,506	0.0%	1.1%	4.4%
All Other Air Carrier	1,800	1,062	3,099	3,355	3,932	9.5%	5.8%	3.8%
Commuter	-	-	-	-	-	-	-	-
Air Cargo	760	422	1,248	1,248	1,248	8.6%	4.6%	2.4%
Air Taxi	1,239	1,735	1,239	1,239	1,239	0.0%	0.0%	0.0%
Total Commercial Operations	**20,459**	**8,561**	**22,246**	**24,538**	**47,925**	**1.4%**	**1.7%**	**4.1%**
General Aviation	56,966	49,337	58,057	59,168	61,445	0.3%	0.3%	0.4%
Military	395	649	535	535	535	5.2%	2.8%	1.5%
Total Itinerant Operations	**77,820**	**58,547**	**80,838**	**84,286**	**109,905**	**0.6%**	**0.7%**	**1.7%**
Local								
General Aviation	59,728	64,104	67,074	70,182	76,837	2.0%	1.5%	1.2%
Military	447	733	561	561	561	3.9%	2.1%	1.1%
Total Local Operations	**60,175**	**64,837**	**67,635**	**70,743**	**77,398**	**2.0%**	**1.5%**	**1.2%**
Total Operations	**137,995**	**123,384**	**148,473**	**155,028**	**187,303**	**1.2%**	**1.1%**	**1.5%**
Annual Instrument Approaches	2,113	1,590	2,195	2,288	2,984	0.6%	0.7%	1.7%
Peak Hour Operations	78	n/a	84	85	93	1.4%	0.8%	0.8%
Air Freight (Metric Tons)	n/a	n/a	16,000	18,280	23,860	n/a	2.7%	2.7%
Based Aircraft	536	536	563	592	654	0.9%	0.9%	0.9%
Average Aircraft Size	76	76	76	102	127	0.0%	2.7%	2.5%
Load Factor	80.7%	80.7%	80.7%	80.7%	82.0%	0.0%	0.0%	0.1%

Source: Compiled by Landrum and Brown
* Sources for 2019: May 2021 TAF for: Air Taxi, All General Aviation and Military Operations. CY 2019 FAA Traffic Flow Management System for All Other Air Carrier Operations. CY 2019 Snohomish County Airport Statistics for Air Cargo Operations. Year-ending March 3, 2020 Snohomish County Airport Statistics for Commercial Passengers and Passenger Air Carrier operations.

3.2 Forecast vs TAF Summary

Finally, it is important to compare the forecasts to the TAF to see the variance in percent difference. **Table 3.2-1** summarizes the comparison of the TAF versus the forecasts. Is it important to note that the baseline passenger traffic through 2025 is in-line with FAA TAF. Also, aircraft operations are generally in-line with the FAA TAF forecast. Overall

Table 3.2-1 – Forecast Summary vs FAA TAF

	Year	Airport Forecast	FAA Terminal Area Forecast (TAF)	AF/TAF % Difference
Total Passengers				
Base Yr.	2019*	1,022,046	531,314	N/M
Base Yr. + 5 Years	2025	1,022,046	1,070,798	-4.6%
Base Yr. + 10 Years	2030	1,535,412	1,339,446	14.6%
Total Operations				
Base Yr.	2019*	137,995	129,496	6.6%
Base Yr. + 5 Years	2025	148,473	146,465	1.4%
Base Yr. + 10 Years	2030	155,028	153,357	1.1%
Based Aircraft				
Base Yr.	2019*	536	536	0.0%
Base Yr. + 5 Years	2025	563	555	1.4%
Base Yr. + 10 Years	2030	592	571	3.6%

Notes: *Passenger volume for 2019 is for the time-period year-ending March 3, 2020; this is due to Airport opening for commercial service on March 4, 2019. Source: PAE Airport records. FAA TAF Baseline year was only for 7 months of operations at PAE.

*Passenger aircraft operations were conducted the same way (year-ending March 3, 2020); again, FAA TAF for 2019 only included only 7 months of passenger aircraft operations

*2019 figures for General Aviation, Air Taxi and Military Operations came from the May 2021 TAF. 2020 figures for these sectors were sourced from the Air Traffic Activity System (ATADS)

*Based Aircraft for 2019 taken from PAE Airport records (July 2021); TAF forecast used the current TAF CAGR of 0.58% and then applied against 536 Based Aircraft for 2019 (TAF for 2019 showed 476 Based Aircraft).

4 Facility Requirements

To provide sufficient capacity to meet the projected demand throughout the planning period at PAE future planning requirements for airport facilities have been established. In addition to providing sufficient capacity, consideration has been given throughout the project to providing acceptable levels of service for all airport users. The requirements were calculated using FAA standards, where applicable, as well as established industry planning standards.

4.1 Summary of Planning Activity Levels and Facility Requirements

For the purposes of master planning, the requirements presented are tied to three Planning Activity Levels (PAL). The use of PALs rather than years provides PAE with flexibility to plan for the implementation of future projects based on actual growth in traffic, rather than a specific timeline. The associated activity levels for each PAL are shown in **Table 4.1-1**.

Table 4.1-1 – Planning Activity Levels

Planning Activity Level	Million Annual Passengers (MAP)	Annual Operations[1]	Passenger Operations	General Aviation Operations	Based Aircraft	Peak Hour Passengers	Peak Hour Operations
Existing (2019)	1,022,046	137,995	16,660	116,694	536	330	78
PAL 1 (1.0 MAP)	1,022,046	148,473	16,660	125,131	563	330	84
PAL 2 (1.5 MAP)	1,535,412	155,028	18,741	129,350	592	596	85
PAL 3 (4.3 MAP)	4,322,426	187,303	41,506	138,282	654	1,368	93

1 Includes Passenger, General Aviation, Air Cargo, Air Taxi, Military, and all other air carrier operations
Source: Landrum & Brown

A summary of the forecast demand for each PAL and its resulting facility requirements are presented in **Table 4.1-2**. Some of the key points summarized include:

- **Airfield Facilities**
  - The existing runway system provides sufficient capacity through the planning period.
  - Airfield taxiway improvements to improve traffic flow, and optimization of Rapid-Exit taxiways (RETs) for Runway 16R-34L.

- **Passenger Terminal Facilities**
  - A total of seven contact gates and eight additional remote parking positions will be required in PAL 3. The three existing contact gates are sufficient for PAL 2 demand.
  - The existing passenger terminal building (44,000 sf) will require incremental expansion through the planning period, requiring approximately 240,000 sf in PAL 3.

- **Landside Facilities**
  - The existing terminal curb will require incremental expansion through the planning period, requiring approximately 2,400 sf in PAL 3.
  - The existing passenger parking space, 613 will require incremental expansion through the planning period, requiring a total of 2,593 spaces in PAL 3.
  - Improvements along 100th St. SW – including at the intersection of Airport Road – will require changes/improvements to meet an acceptable level of service.

- **Aviation Support Facility Requirements**
  - The current deicing positions will require expansion.
  - General Aviation (GA) facilities will require expansion as the number of based aircraft expands from 563 to 654.

The requirements that have been established in **Table 4.1-2** serve as a template for how concepts and the development plan were created. See the following two chapters to see how these facility requirements have led to specific recommendations.

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Table 4.1-2 – Summary of Facility Requirements

Facility	Existing	PAL 1 (1.0 MAP)	PAL 2 (1.5 MAP)	PAL 3 (4.3 MAP)
Passenger Terminal Facilities				
Total Building Area (sf)	44,000	46,210	81,480	239,030
• Public/Airline Areas	39,250	36,830	60,400	148,050
• Concession/Support Areas	4,750	9,380	21,080	90,080
Total Aircraft Stands	3	7	7	15
• Contact/Active Gates	3	3	3	7
• Inactive Gates	4	4	4	8
Landside				
Total Passenger Parking Spaces	971	613	921	2,593
• Premium Public Parking	647	328	493	1,398
• Economy Public Parking	308	225	337	950
• Valet Parking	60	60	90	255
Curb Length (Shared[1]) (sf)	518	518	1,043	2,394
Support Facilities				
Deicing Positions	3 (On-Gate)	3 (On-Gate) 2 (Central)	3 (On-Gate) 2 (Central)	7 (On-Gate) 4 (Central)
Commercial Fuel[2] (JET A Gallons)	6 Tanks 360,000	2 Tanks 98,000	3 Tanks 128,000	6 Tanks 310,000
General Aviation Fuel (100L Gallons)	20,000	18,096	18,668	19,968
Air Cargo	-	Land Reservation to Support Future Growth		
Aircraft Maintenance (MRO)	350,000	Apron Reservation to Support Future Growth		
Aircraft Rescue and Firefighting (ARFF)	1 Station	Existing Facility Meets Demand		
Airport Support (sf)				
▪ Administration Building	14,543	12,329	13,599	26,558
▪ Maintenance Building	24,064	24,677	31,006	37,461
Flight Catering Building (sf)	-	2,045	3,128	9,111
General Aviation (sf)				
▪ FBO Terminal Building	16,500	17,700	18,300	19,587
▪ T Hangar Building	356,100	356,100	388,800	435,800
▪ Box Hangar Building	384,200	391,000	399,100	419,100
▪ Tie-Down Positions (count)	147	153	158	168
Ground Service Equipment (sf)				
▪ Apron Staging	98,103	98,103	98,103	228,906
▪ Maintenance and Storage	2,150	2,150	2,150	5,380
Police Building (sf)	1,652	2,500	2,811	6,226

[1] Assumes arrivals and departures share the same curb
[2] Assumes 2-day fuel reserves to serve commercial terminal only, utilizing existing 60,000 sf tanks
Source: Landrum & Brown

5 Concepts and Alternatives

Concepts have been prepared for PAE based on improving airport operations, addressing deficiencies and meeting traffic forecast demand. Facility requirements were presented in the prior section and developed to meet the demand levels for three PALs as previously stated.

5.1 Airfield Recommendations

Recommendations for airside development will consist of runways, runway exits, taxiway systems & deviations, the Runway Protection Zone (RPZ), and the decommissioned runway. PAE has two parallel runways oriented in the north-south direction (16-34). The western Runway 16R-34L is 9,010 feet and 150 feet wide. The eastern Runway 16L-34R serves as a secondary parallel runway for smaller GA aircraft and is 3,004 feet long and 75 feet wide. The alternatives identified improvements to the runway high speed exits, aircraft parking positions, taxiway geometry, and safety enhancements.

The following summarizes the key recommendations:

- Provide two high speed exits for Runway 16R arrivals (removes Taxiway A6 and A9)
- Provide one high speed exits for Runway 34L arrivals (removes Taxiway A2 and A4/A5)
- Implement Airport preferred alternative to resolved Hot Spot 2
- ADG-V new parking positions
- Construct flexible airside ramp in decommissioned runway site
- Realign Taxiway Intersection of C1, C, J, and D (3-Node Concept)
- Shift Taxiway A7 and K7
- Reconfigure Intersection - Taxiway G5 and Runway 34R end

5.2 Terminal

The purpose of the passenger terminal alternatives is to define the amount of land needed to satisfy the future terminal area requirements. At the appropriate time the terminal will be designed and phased including the actual configuration and design of the passenger terminal and the associated apron area.

- Preserve space for a 200,000 sf (or a two-story 100,000 sq. ft. footprint) of additional terminal building space. It is also assumed that the passenger terminal will be a two-level structure.
- Preserve space for a total of seven contact gates
- Preserve space for a total of 15 aircraft parking positions (seven contact plus eight remote positions)
- Accommodate deicing capabilities (four off-Stand, or seven on-Stand)

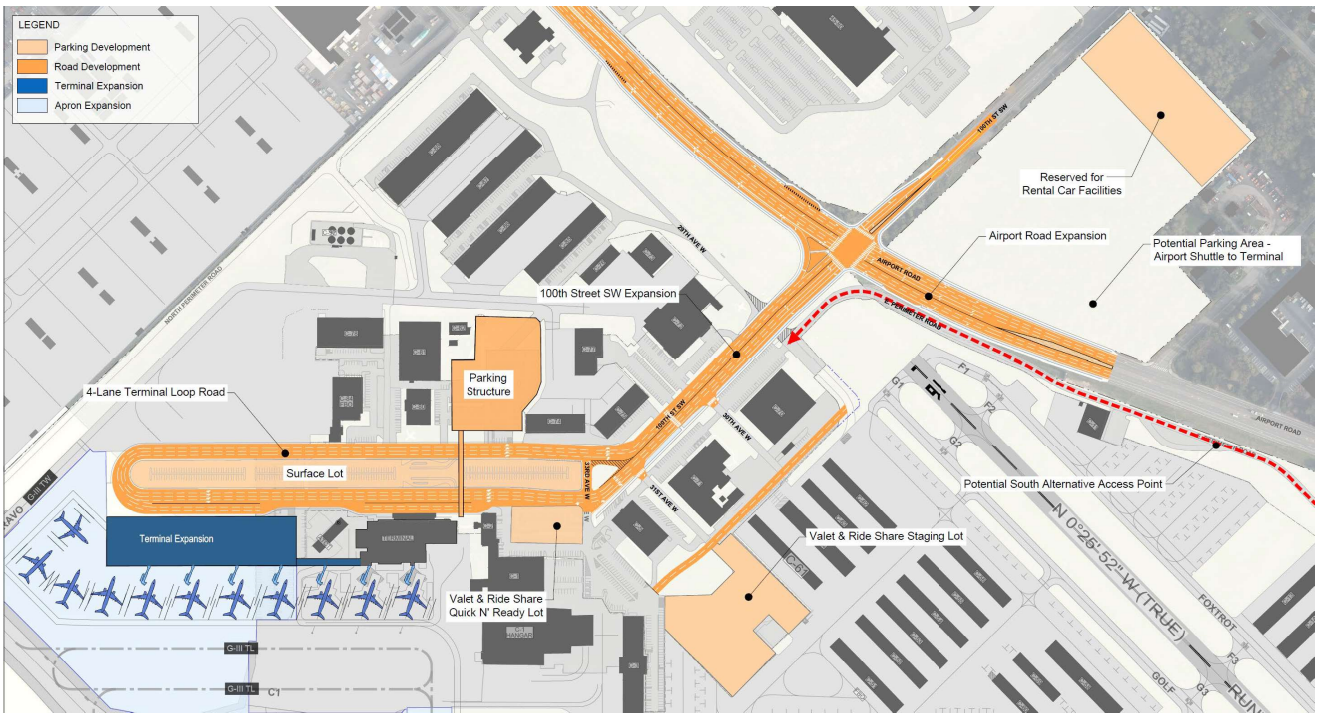
5.3 Landside Recommendations

The landside evaluation consists of looking at the existing network of facilities used by several modes of ground transportation systems. It focuses on the capacity of the airport access, terminal access, airport parking, terminal curb front, and the rental car areas. **Exhibit 5.3-1** shows where the recommendations are located. There were alternative evaluations made as well as which are not part of the recommendations seen below. Included amongst these is an expanded signalized intersection option or a roundabout option at Airport Rd and 100th St SW. There also was an alternative North Perimeter Road Connection option and a South Perimeter Road Connection Alternative, and terminal loop road expansion alternatives.

The following summarizes the key findings:

- Expand Signalized Intersection (Airport Road and 100th St SW Intersection)
- Expand Entrance Road (100 St SW)
- Expand Terminal Loop Road (100 St SW)
- Expand Terminal Curb Front
- Implement South Access Point for non-passenger traffic and Construct Back-of-House Road (to be determined)
- Construct Parking Structure
- Expand Premier Surface Lot
- Convert Economy Lot 4 into Staging Lot for Ride-Share/Valet
- Reserve/Construct Rental Car Facilities

Exhibit 5.3-1 – Landside Recommendations



Source: Landrum & Brown

5.4 Support Facilities Recommendations

Support facilities serve specific functions at PAE that are located in proximity to the function to which they are supposed to support. Some criteria considered when evaluating support facilities range from meeting demand, expansion flexibility, airfield circulation, impact on existing infrastructure, accessibility, potential costs to Snohomish County, and environmental issues. The types of facilities they are to serve include: air cargo, aircraft deicing, aircraft fuel, aircraft maintenance/repair overhaul (MRO), aircraft rescue and firefighting (ARFF), airport support, flight catering, general aviation (GA), ground service equipment (GSE), police/security, and urban air mobility. **Table 5.4-1** summarizes the key recommendations. Alongside the key recommendations there are also alternatives provided for several facilities including for: deicing, airport administration, and airport maintenance.

Table 4.3-1 – Summary of Support Facility Recommendations

Facility	New or Additional Space Required – PAL 3	Proposed Development Sites
Air Cargo	N/A	Land South of Current Site
Aircraft Deicing	One Centralized Deicing Pad	4 Positions in Terminal Area
Aircraft Fuel	N/A	Aerospace/Commercial Land Reservation
Aircraft Maintenance (MRO)	N/A	MRO Land Reservation
Aircraft Rescue and Firefighting (ARFF)	N/A	ARFF Land Reservation
Airport Administration	26,558 ft^2	Employment Resource Center (ERC) and C-2 and C-3 Buildings
Airport Maintenance	84,286 ft^2	Buildings 219 and 221 and Air National Guard Site
Flight Catering	20,954 ft^2	Building C-2
General Aviation (GA)	400,000 ft^2	North, East, West, and South Ramps; and Buildings C-43 and C-47
Ground Support Equipment (GSE) Maintenance Area	12,912 ft^2	Hangar C-1
Urban Air Mobility (UAM)	Up to 132,680 ft^2	Alternative 1 – Westside of Corporate Aviation Alternative 2 – Rooftop of Parking Garage Alternative 3 – East Parcel

Note: Not all sites are needed to meet the forecast requirements, however PAE should reserve all sites to allow for flexibility in future development.
Source: Landrum & Brown

6 Development Plan

The following represents the phasing of the initial recommended Master Plan projects, an assessment of financial feasibility, and the final recommended implementation plan based on the financial analysis. Each project shown was assigned a phase that was determined by using the PALs 1, 2, and 3. Projects are implemented in a phasing plan to account for projected needs along with anticipated passenger demand and financial considerations. It is also possible for some projects to be in multiple phases.

6.1 Phasing Plan

Airport projects are undertaken only when the demand for them – along with the funding – warrants it. The next several tables and graphs show when to phase projects based on the PAL benchmarks established.

6.1.1 PAL 1

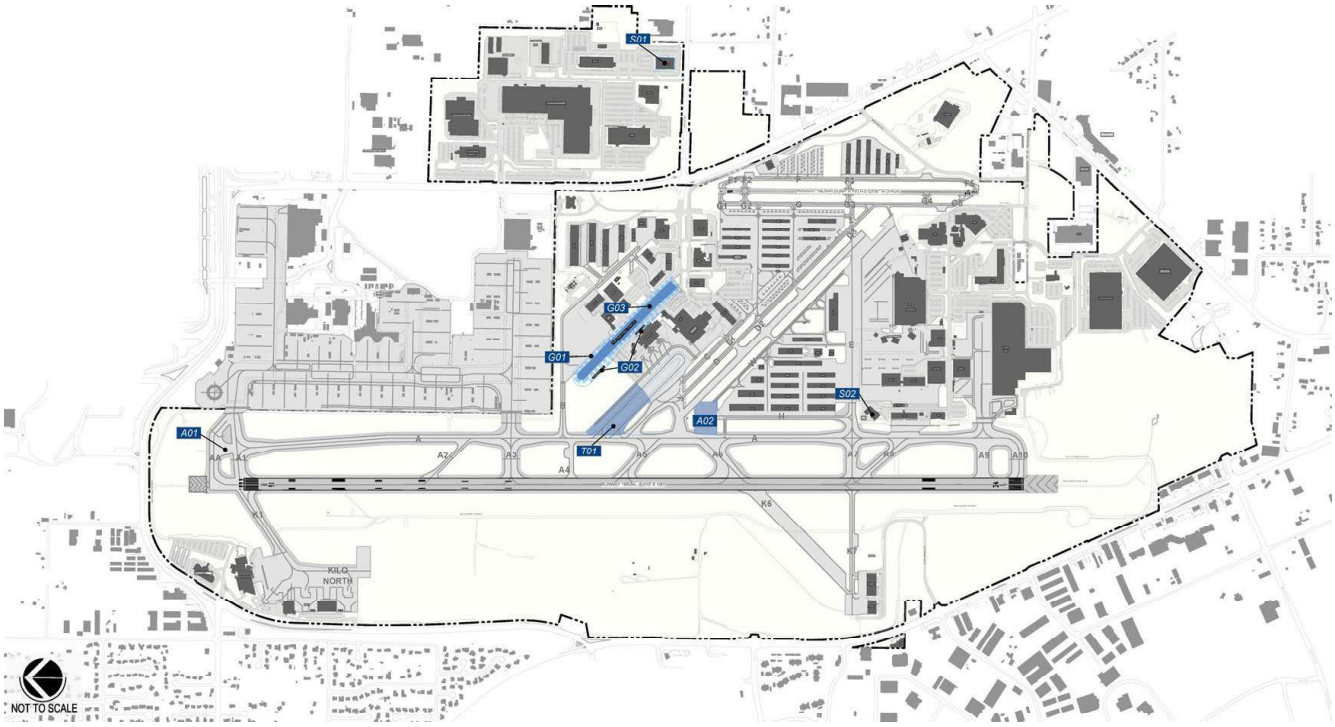
The first phase of the Master Plan has several recommended projects that can be seen in **Table 6.1-1.** Much of the focus of PAL 1 projects are developing the terminal airside to allow for an expanded terminal at a later phase. See **Exhibit 6.1-1** to visually see where these projects are located.

Table 6.1-1 – PAL 1 Recommended Projects

#	PAL 1 Project List
Airfield	
A01	Implement Airport Preferred Alternative to Resolve Hot Spot 2
A02	Construct Remote Pad (ADG-V)
Terminal	
T01**	Reconfigure Terminal Area Taxilanes
Ground Transportation	
G01	Expand Terminal Loop Road - 100 St. SW
G02*	Expand Terminal Curb
G03*	Expand Premier Surface Lot
Support Facilities	
S01	Relocate Airport Administration to 9901 24th Pl W (Former Boeing ERC Bldg.)
S02	ARFF Expansion

*These projects are funded by third parties and will not include in the financial analysis.
** Project funding underdetermined

Exhibit 6.1-1 – PAL 1 Program



Source: Landrum & Brown

6.1.2 PAL 2

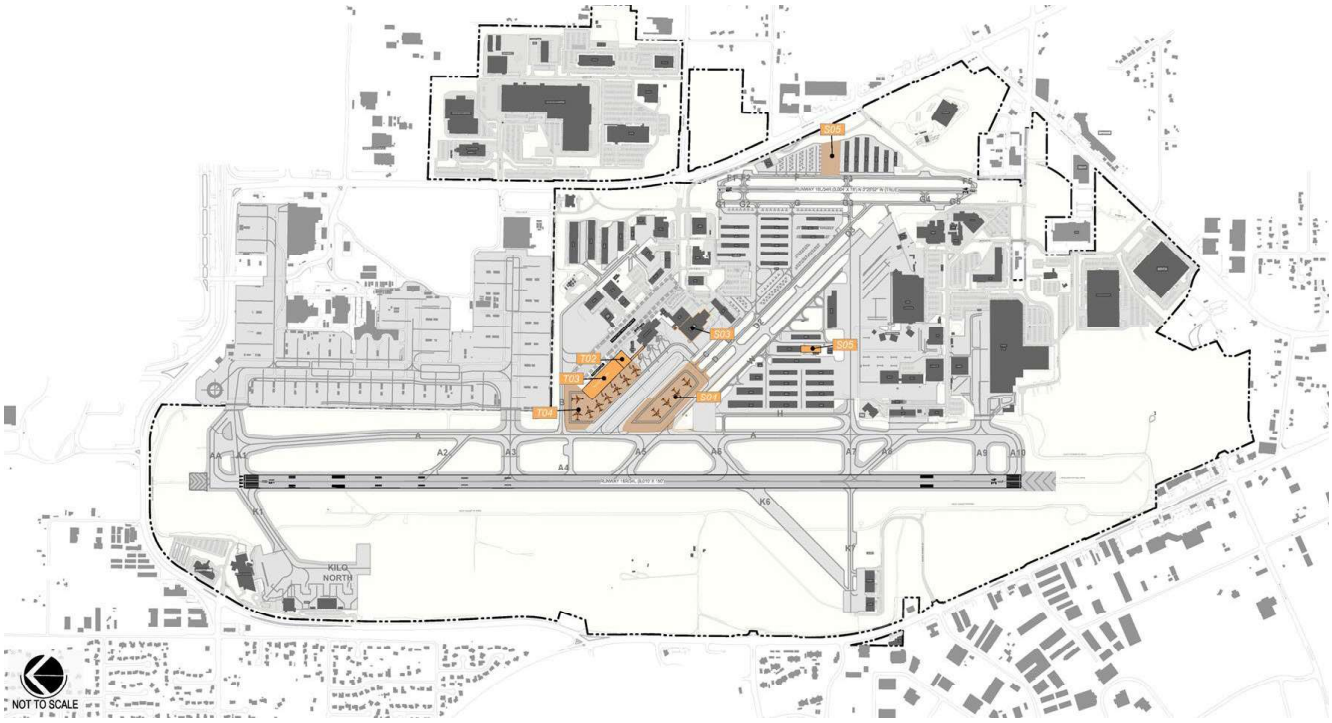
PAL 2's project list can be found in **Table 6.1-2** and is visually shown in **Exhibit 6.1-2**. In this phase there is the construction of two new high-speed exits, terminal area expansion, and GSE expansion. Notably absent, there is no recommended group transportation projects in PAL 2.

Table 6.1-2 – PAL 2 Recommended Projects

#	PAL 2 Project List
Airfield	
-	None
Terminal	
T02*	Expand Passenger Terminal Building to the North (+1 Contact Gate)
T03*	Expand Passenger Terminal Building to the North (+3 Contact Gates)
T04*	Construct Apron to Accommodate Four Additional Remote Gates
Ground Transportation	
-	None
Support Facilities	
S03*	Expand Ground Service Equipment (GSE) Staging
S04*	Relocate and Develop Aircraft Deicing Facilities
S05*	Reserve Land for Additional GA Facilities (no additional actions are required until a business case can be undertaken)
-	Expand Police/Security Facilities (not depicted)

*These projects are funded by third parties and will not be included in the financial analysis.
Source: Landrum & Brown

Exhibit 6.1-2 – PAL 2 Program



Source: Landrum & Brown

6.1.3 PAL 3

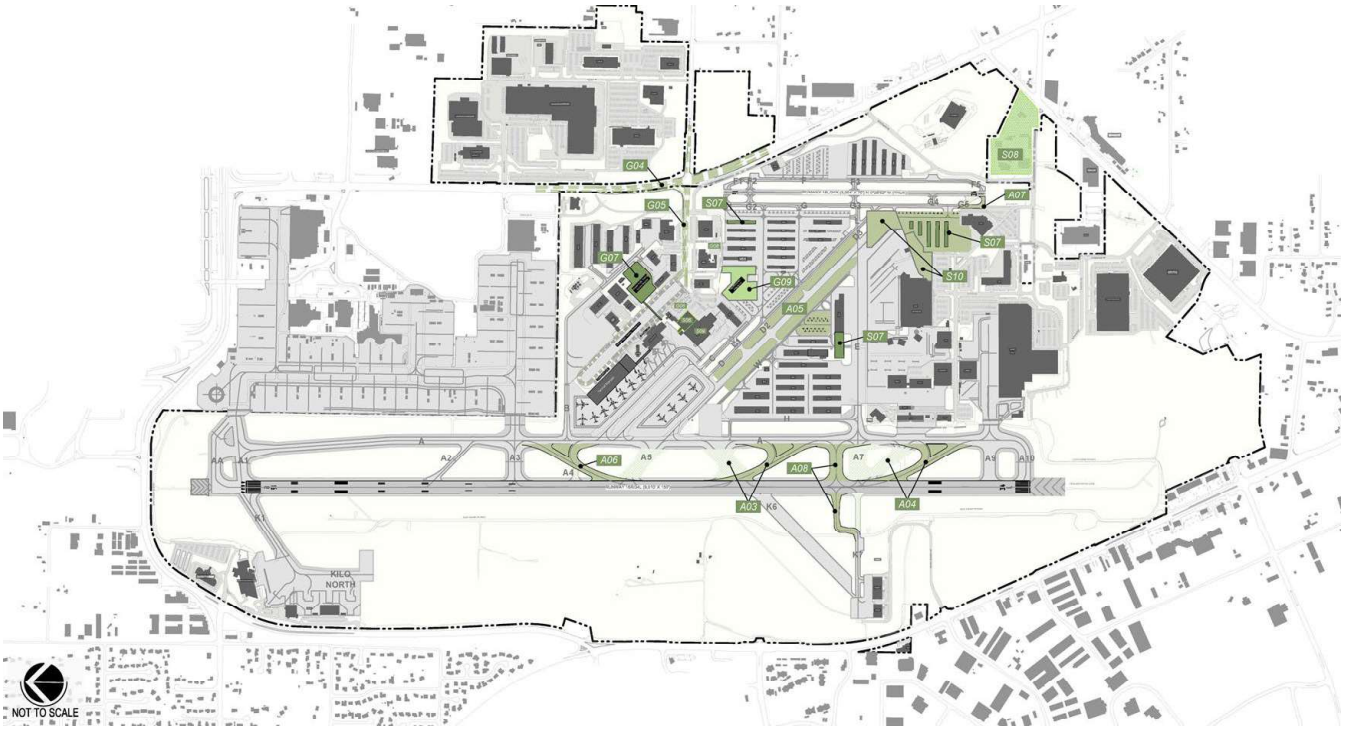
The ultimate phase – PAL 3 – has several focus areas. The airfield program largely focuses on improving safety and capacity of the airfield system. Ground transportation focuses on upgrading airport access and entrance roads, the terminal loop, and parking facilities at PAE. Regarding support facilities PAL identified an ideal location for flight catering facilities and expanding other existing facilities. Finally, there are no terminal projects considered in this final phase. See **Table 6.1-3** for specific projects and **Exhibit 6.1-3** for where they are found at PAE.

Table 6.1-3 – PAL 3 Recommended Projects

#	PAL 3 Project List
Airfield	
A03	Provide High-Speed Exit for Runway 16R Arrivals (removes Taxiway A6)
A04	Removes High-Speed Exit for Runway 16R (removes Taxiway A8)
A05	Develop Flexible Ramp in Decommissioned Runway Site
A06	Provide High-Speed Exit for Runway 34L (removes Taxiway A4/A5)
A07	Reconfigure Intersection - Taxiway G5 and Runway 34R End
A08	Relocate Taxiway A7 and K7
Terminal	
-	None
Ground Transportation	
G04	Expand Terminal Loop Road - 100th St. SW
G05	Expand Signalized Intersection - Airport Road and 100th St. SW Intersection
G06*	Expand Entrance Road - 100th St. SW
G07*	Construction Multi-level Parking Structure
G08	Reprogram Access and Construct Back-of-House Road (associated fence, gate)
G09*	Convert Economy Lot 4 into Staging Lot for Ride-Share/Valet/Shuttles
Support Facilities	
S06*	Develop Flight Catering Facilities
S07*	Reserve Land for Additional GA Facilities (no additional actions are required until a business case can be undertaken)
S08	Expand Airport Maintenance (to Air National Guard Site)
S09*	Expand Ground Service Equipment (GSE) Staging
S10*	Expand Aircraft Maintenance
-	Expand Police/Security Facilities (Not Depicted)

*These projects are funded by third parties and will not include in the financial analysis.
** Project funding underdetermined
Source: Landrum & Brown

Exhibit 6.1-3 – PAL 3 Program



Source: Landrum & Brown

6.2 Financial Analysis

A financial plan has been conducted for the Master Plan. **Table 6.2-1** below displays the summary of PAE's Master Plan Capital Improvement Program. It shows how much funding should be allocated for each phase and to what specific project types. The funding is assumed to come from sources including: FAA Grants, third party/private funds, and local airport funds (such as bond funds, airport cash, etc.). To summarize, most funding is to be allocated to PAL 2, and a majority of the funding overall will go to airfield related projects.

Table 6.2-1 – Summary of Master Plan Capital Improvement Program (2023$ in thousands)

Projects	PAL 1	PAL 2	PAL 3	Total
Airfield	$12.9	$90.5	$59.0	$162.4
Terminal Area	$20.4	$24.9	$0.0	$45.3
Ground Transportation	$5.5	$0.0	$26.8	$32.3
Support Facilities	$5.9	$0.0	$6.0	$11.9
Pavement Management	$7.0	$9.2	$8.4	$24.7
Equipment	$5.9	$5.0	$9.7	$20.6
Total	**$57.6**	**$129.6**	**$109.9**	**$297.1**

Source: Landrum & Brown
Note: Totals may not equal due to rounding

7 Environmental Overview

The purpose of considering environmental factors in airport master planning is to help the airport sponsor evaluate airport development alternatives and to provide information that will help expedite subsequent environmental processing.[1]

The recommended projects include improvements to the airfield, terminal, ground transportation, and support facilities. Based on the locations, nature, and extent of the proposed improvements, the primary environmental concerns from Master Plan recommendations are related to increases in Pollution-Generating Impervious Surfaces (PGIS) and stormwater management, and to a lesser degree development that could impact water bodies, wetlands, or other critical environmental areas. Activities with the potential to adversely harm the environment may include projects that create or replace PGIS that could deliver contaminants. The recommended improvements are not anticipated to result in any disproportionate impacts to environmental justice populations, or adverse impacts related to biological resources, climate, coastal resources, land use and zoning, natural resources or energy supply, transportation, aesthetics (visual resources), earth, or geology.

Key Takeaways from how PAL 1 projects could have potential environmental concerns:

- Additional PGIS, especially because of the Terminal Loop Road and parking expansion.
- The Terminal Loop Road expansion could result in air emission increases.

Key Takeaways from how PAL 2 projects could have potential environmental concerns:

- Additional PGIS, particularly with the terminal expansion and surrounding apron, and the centralized deicing facility development.
- Runoff from deicing activities would result in a need to coordinate with the City of Everett sewer system.

Key Takeaways from how PAL 3 projects could have potential environmental concerns:

- Continued PGIS (like PAL 1 and 2).
- Additional air emissions because of increased vehicle traffic as a result of the 100th St. SW improvements.
- The 100st St. SW improvements are also near steep slope & wetland buffer areas.
- If PAE maintenance facilities expand on-site, the proposed area for development is next to a freshwater stream - associated with wetlands – and would require mitigation for vegetation and tree removal.

Other Key Takeaways:

- No residential/noise-sensitive land uses are within the Future (2030 & 2040) Noise Exposure Contours.
- PAE would benefit from conducting a water & recycling characterization study to reduce waste.

[1] U.S. Department of Transportation (USDOT), Federal Aviation Administration (FAA) Advisory Circular (AC) 150/5070-6B, *Change 1*; May 1, 2007