REGIONAL AVIATION BASELINE STUDY
WORKING PAPER 3

Development and Evaluation of Scenarios

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Acronyms

BCA.....Benefit-Cost Analysis
EIS.....Environmental Impact Statement
FAA.....Federal Aviation Administration
HCT.....high-capacity transit
JBLM.....Joint Base Lewis-McChord
KCIA.....King County International/Boeing Field
NEPA.....National Environmental Policy Act
PSRC.....Puget Sound Regional Council
SAMP.....Sustainable Airport Master Plan
Sea-Tac.....Seattle-Tacoma International Airport
WSDOT.....Washington State Department of Transportation

1. Introduction

1.1 STUDY BACKGROUND AND PURPOSE

The central Puget Sound region plays a pivotal role in aviation in the Pacific Northwest. The region serves as the hub for the 5th largest airline by enplanements (Alaska Airlines), serves as the West Coast gateway for the nation's 2nd largest airline by enplanements (Delta Air Lines), contains the 8th busiest airport in the nation (Seattle-Tacoma International Airport [Sea-Tac]), and hosts major manufacturing and operations activities of the largest aerospace company in the world—the Boeing Company. The aviation system is a critical part of an ecosystem that supports high paying jobs, housing, and economic development.

The purpose of the Regional Aviation Baseline Study is to provide a clear picture of the different roles and purposes of each aviation activity at each of the region's airports, describe how these activities interact, and identify future needs in the central Puget Sound region (King, Pierce, Snohomish, and Kitsap Counties) to set the stage for future planning. This study is expected to provide a common baseline for policymakers about the region's aviation needs and options to consider for meeting those needs in the future. This study is the first phase of potentially more focused studies on specific areas of emphasis.

Recent rapid growth is likely to affect the quality and level of aviation service. State and regional leaders need solid and reliable information about the current usage and projected regional growth to adequately plan and provide for future aviation needs. The desired outcomes of the Regional Aviation Baseline Study follow:

- Identify the roles of each airport and the aviation activities within the region.
- Provide a regional perspective on how aviation activities at airports in the study area interact with each other, the community, and the broader economy.
- Obtain input from stakeholders about their needs and build a common understanding about aviation and airspace constraints.
- Identify future aviation needs within central Puget Sound region and set the stage for future planning.

The study will provide a regional understanding of the aviation system. In addition to data gathered about the system and from aviation stakeholders, the study will leverage data from current airport master planning efforts and other regional/statewide aviation studies.

1.2 STUDY PROCESS

Key phases for the study include the following:

- Airport and Aviation Activity Analysis Phase – During this phase, the study team examined existing conditions, regional demand forecasts, goals, objectives, and metrics for the system, and analyzed socioeconomic conditions, market trends, airspace flow, and multimodal connections. Working Paper 1 was the key deliverable.
- Future Aviation Issues Analysis Phase – During this phase, the study team analyzed the feasibility of airports in the region to accommodate demand. Working Paper 2 was the key deliverable along with a separate analysis of the regional airspace system.
- Scenarios Definition and Evaluation Phase – During this phase, the study team defined and evaluated scenarios for accommodating future aviation demand as well as the regional economic effects of the aviation industry. Working Paper 3 was the key deliverable.
- Final Report and Project Completion – During this phase, the study team will publish key findings in a report.

To support study transparency and ensure timely stakeholder input during each phase, the study team will consult stakeholders so that their perspectives can be considered in the development of findings and recommendations. As a part of this effort, a Technical Working Group—comprising representative airports, airlines and other major stakeholders in the aviation industry—was established. The group will meet at three points during the study to review draft technical papers. Puget Sound Regional Council's (PSRC) Executive Board is overseeing the study. Between these periods of more active communications, the PSRC will pursue opportunities to report on study findings and to reinforce key messages about the purpose and need for the study.

1.3 STUDY STATUS AND NEXT STEPS

Working Paper 1 was completed and shared with the Technical Working Group in June 2019. Comments were incorporated, and the final working paper was distributed to the Technical Working Group. That working paper established the baseline existing conditions, identified key relevant trends and issues, and included unconstrained forecasts for the various aviation sectors in the region.

Working Paper 2 completed and shared with the Technical Working Group in October 2019 analyzed the aviation needs of the region through 2050 and identified gaps in the current airports to meet the forecast needs. This paper, Working Paper 3, develops scenarios for addressing those gaps and establishes criteria for assessing their performance.

Working Paper 3 was reviewed by the Technical Working Group before it was finalized. The key findings were shared with the PSRC's Executive Board in July 2020. Input was obtained via a public survey and virtual meetings and open house in Fall 2020. The final study report, which will incorporate the technical analysis

as well as public feedback, will be developed over the winter. The final report will be presented to PSRC's Executive Board for adoption in the spring 2021.

1.4 ORGANIZATION OF WORKING PAPER 3

This working paper is organized into five chapters:

- Chapter 1 summarizes the study background and the purpose of the working paper.
- Chapter 2 reviews the regional aviation needs identified in Working Paper 2 and outlines potential scenarios to accommodate the future demand and the implications of each of those scenarios.
- Chapter 3 describes the criteria applied to regional airports to be considered for inclusion as part of a scenario.
- Chapter 4 reviews the results of the individual airport analysis.
- Chapter 5 summarizes the scenarios evaluation and outlines next steps.

2. Development of Scenarios

Based on Working Paper 2 analysis, the demand/capacity analysis determined that by 2050 a gap of 27 million passenger enplanements could exist. **Table 2-1** presents the same table from Working Paper 2 summarizing the commercial service passengers needs that the unconstrained forecast projects to reach over 55 million enplanements by the year 2050.

Table 2-1. Commercial Service Passenger Needs through 2050

CENTRAL PUGET SOUND REGION	FORECAST OF PASSENGER ENPLANEMENTS				
	2017	2022	2027	2037	2050
Passenger Enplanements (High Forecast)	22,450,500	25,400,000	31,100,000	38,000,000	55,600,000

Source: Working Paper 1, WSP, KPA, CDM
Note: Low forecast for 2050 is 49,300,0000 enplanements.

PAINE FIELD + SEA-TAC	2017	2022	2027	2050
Constrained to Near-Term Project SAMP Scenario[1,2]	23,050,000	25,655,000	28,600,000	28,600,000
Constrained to Long-Range SAMP Vision Scenario[1,3]	22,050,500	25,655,000	28,600,000	33,600,000

Source: SAMP 2016, Federal Aviation Administration TAF 2018

CENTRAL PUGET SOUND REGION	2017	2022	2027	2050
Constrained to Near-Term Project SAMP Scenario [1,2]	0	0	-2,500,000	-27,000,000
Constrained to Long-Range Vision SAMP Scenario [1,3]	0	0	-2,500,000	-22,000,000

Notes:
[1] Assumes Paine Field accommodates only 600,000 annual enplanements, per supplemental environmental assessment
[2] Based on Sea-Tac SAMP Near-Term Projects, accommodating up to 28 million annual enplaned passengers
[3] Based on Sea-Tac SAMP Long-Term Vision, possibly accommodating up to 33 million annual enplaned passengers

The 2019 Sustainable Airport Master Plan (SAMP) for Sea-Tac proposed facility expansion to accommodate growing passenger and cargo demand that requires significant financial investment and reconfiguration/relocation of existing facilities. The SAMP identifies a program of improvements referred to as "Near-Term Projects" to allow the airport to accommodate more than 28 million enplanements that is projected to occur at Sea-Tac around 2027. The SAMP also identifies a Long-Term Vision developed to accommodate facility requirements associated with forecast activity of approximately 33 million enplanements; however, due to airside capacity and financial constraints, any improvements outside of the Near-Term Projects would require further evaluation as part of a future airfield/airspace study.

Based on forecast aviation demand, additional airports would need to accommodate the additional future demand of the region, which is nearly double the current demand. This paper provides an overview of potential scenarios to accommodate that future demand. Each airport that was previously identified in the study area was analyzed to determine its ability to accommodate future commercial service needs. The construction of a new airport at a greenfield site was not analyzed nor an element of the Baseline Study. Technical criteria were developed to evaluate each airport to determine the airports that, with economic

investment and infrastructure development, could reasonably accommodate additional regional aviation passenger demand by 2050.

As PSRC, state, and local leaders consider next steps of exploring how to accommodate all or a portion of the projected passenger demand for the central Puget Sound region, it should be noted that other cities have multiple airports serving their constituents in various levels of passenger and cargo activity. Whether the central Puget Sound region decides to explore additional airports (regional or greenfield) in addition to Paine Field's growing passenger service that supplements Sea-Tac's offerings, several factors should be considered. In the United States, airports and communities do not decide what airline service will be provided. Airlines are private businesses and are market driven, and they decide what airports they will serve in order to be the most profitable. An airport in a large metropolitan area that has adequate facilities for this type of service does not mean an airline will provide service.

Airlines consider several factors, such as demand, the availability of aircraft, connectivity toto its hub, and potential competition when determining what routes to serve. Airlines are in the business to fill the aircraft seats and are less profitable when aircraft are not in the air. One of the choices related to choosing markets includes whether to serve a lesser-served route rather than a route where airlines could provide additional competition. The airlines closely analyze these choices, because the equipment used to serve them are a large investment. These decisions are made on a route-by-route basis and have much less to do with the facilities than other factors.

The Los Angeles metropolitan area had 56 million passenger enplanements travel out of its airports in 2018, which is what the Baseline Study forecasts for the central Puget Sound region in 2050. This multi-airport system offers some interesting lessons for the central Puget Sound region. Five airports serve the Los Angeles region: Los Angeles International Airport, Hollywood Burbank Airport, Long Beach Airport, Ontario International Airport, and John Wayne Airport.

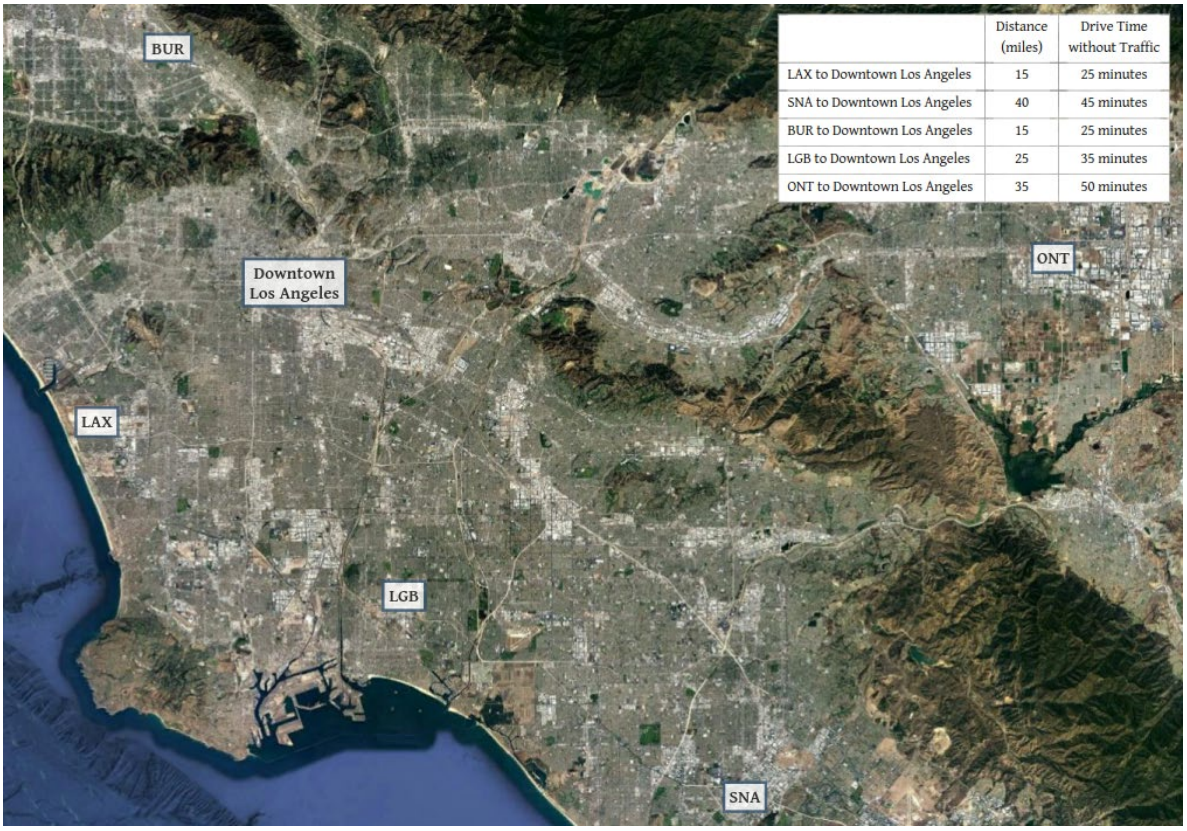
Los Angeles International Airport is the largest airport with four parallel runways (from 9,000 feet to 13,000 feet) and serves as a major connecting hub for 67 United States and international air carriers. While the regional airports provided important supplementary service and access to other parts of the region, Los Angeles International Airport serves the largest share of passengers (78 percent) and service options with 43 million enplanements in 2018 and 132 aircraft gates to 202 nonstop destinations.

Ontario International Airport has 26 gates and two parallel runways (12,000 feet and 10,000 feet). Yet even though it was served by nine airlines going to 25 destinations, Ontario International Airport had only 1.9 million passenger enplanements in 2018. Ontario International Airport has the space to add up to nine more gates if demand ever required it. While the airfield has capacity of about 300,000 annual aircraft operations; in 2018, only 100,000 total aircraft operations occurred, including air carrier, military, and general aviation. Ontario International Airport has excess capacity to accommodate millions of additional passengers. Therefore, policy leaders need to understand that particularly with aviation, "Build it and they will come" does not "fly" with the Federal Aviation Administration (FAA) or airlines.

On the other end of the spectrum, while Ontario International Airport is the second-largest airport in the Los Angeles region, John Wayne Airport is the second-busiest airport in the region, operating with just one commercial service runway that is only 5,700 feet in length, which is shorter than most commercial service runways. The airport also has a short (2,887 feet) parallel general-aviation runway. General-aviation operations account for 68 percent of the airport's activity. Similar to Ontario International Airport, the airfield capacity for John Wayne Airport is around 300,000 annual aircraft operations. Both airports are approximately 35 miles from downtown Los Angeles, with Ontario International Airport to the east and John Wayne Airport to the south. Yet in contrast to Ontario International Airport, John Wayne Airport serves nearly 5 million enplaned passengers with 20 gates and with seven airlines going to 24 domestic and international destinations. The airport is the closest airport to Disneyland and is convenient for passengers who live between Los Angeles and San Diego. As the population of Orange County grew, demand for airline service to the area grew, with commercial service beginning in 1952.

Figure 2-1 shows Los Angeles International Airport, Hollywood Burbank Airport, Long Beach Airport, Ontario International Airport, and John Wayne Airport locations in relation to downtown Los Angeles, along with drive times without traffic from each airport to the downtown area.

Figure 2-1. Los Angeles Vicinity Map



	Distance (miles)	Drive Time without Traffic
LAX to Downtown Los Angeles	15	25 minutes
SNA to Downtown Los Angeles	40	45 minutes
BUR to Downtown Los Angeles	15	25 minutes
LGB to Downtown Los Angeles	25	35 minutes
ONT to Downtown Los Angeles	35	50 minutes

Notes: LAX = Los Angeles International Airport; BUR = Hollywood Burbank Airport; LGB = Long Beach Airport; ONT = Ontario International Airport; SNA = John Wayne Airport

Ontario International Airport and John Wayne Airport bookend the success of regional airports in the Los Angeles region. Even without a much larger investment, Ontario International Airport serves many fewer

flights and customers than John Wayne Airport not because of airport facilities but due to airline market decisions. For the central Puget Sound region, the types of airports that could "fill the gap" beyond what Sea-Tac and Paine Field can achieve by 2050 would most likely be regional airport facilities versus providing significant international passenger service. Most multi-airport regions, like Los Angeles, can support only a single airport offering broad international destinations. These airports would be similar to existing Washington state airports: Bellingham International (10 nonstop destinations by three airlines) and Spokane International Airports (19 nonstop destinations by six airlines). Some of their airlines offer flights to Canadian airports, which means that Customs and Border Patrol are staffed there for passport control, etc. and thus are designated as international. Most of their flights are to large-hub airports (i.e., Sea-Tac, and Los Angeles, San Francisco, Denver, and Chicago International Airports) but also serve some point-to-point destinations (i.e., to San Jose, CA, and San Juan Islands).

Paine Field was originally envisioned to be a commercial service airport when it was built in 1936. It was diverted for military operations during World War II and when the county took over operations, Sea-Tac was already the region's primary airport, so Boeing established a production facility at Paine Field. Then 80 years after the airport opened, construction on the commercial service terminal began and multiple airlines expressed interest in providing commercial passenger service. Paine Field served its first 1 million passengers (500,000 enplanements) on February 26, 2020. It is served by two airlines, utilizing two gates opened in December 2019 with 18 daily nonstop flights to 10 destinations on one runway.

Even though the service opened recently, the commercial service offered at Paine Field is already a success in that the airport is utilizing 15 of its 24 maximum departures allowed per day, per the 2019 Record of Decision.[1] Thus, it is likely if the airport were approved to expand commercial service, more airlines, flights, and destinations would occur to meet the demand.

The type of airports that could accommodate the future needs and 2050 gap in capacity for the central Puget Sound region are similar to those serving the city of Los Angeles: from a major international connecting hub like Los Angeles International Airport to regional airports like Ontario International Airport and John Wayne Airport.

2.1 SCENARIO 1, "BASELINE": SEA-TAC IMPLEMENTS NEAR-TERM (2027) SAMP

Scenario 1 assumes Sea-Tac would implement its SAMP plan to its 2027 potential, and Paine Field would maintain its current passenger services (up to 600,000 annual passenger enplanements), which would result in a projected 2050 gap of 27 million enplanements and approximately 450,000 operations. This gap would be similar to the number of passengers at Sea-Tac in 2019 with its three runways.

Based on the information contained in the Draft Washington State Department of Transportation (WSDOT) 2020 Aviation Economic Impact Study, if this need is not accommodated in the region, the opportunity cost would be similar to the current economic contribution by Sea-Tac, which is over 150,000 jobs and nearly $22.5 billion total economic activity. In addition to the direct impacts, residents and businesses would be

[1] https://www.painefield.com/DocumentCenter/View/1022/Final-Environmental-Assessment-FONSI-ROD-February-2019-PDF

hindered in their ability to access commercial passenger and air cargo services to meet their needs, and it would make the region less competitive because drive-time coverages would decrease. On the other hand, while aircraft operations are forecast to increase, the amount of aircraft operations that could be accommodated with the implementation of the SAMP 2027 plan would be consistent for all scenarios; thus, scenarios that would accommodate more of the projected aircraft operations would also have more noise impacts and greenhouse gas emissions than Scenario 1. Simply stated, this scenario would have the least amount of added noise and greenhouse gas emissions because it would accommodate the fewest aircraft operations.

2.2 SCENARIO 2, "SEA-TAC IMPLEMENTS LONG-TERM (2037) VISION"

In this scenario, Sea-Tac would implement its 2037 Long-Term Vision, which would allow Sea-Tac to accommodate up to 33 million enplanements as compared to 28 million enplanements by implementing its Baseline 2027 plan only. This would allow Sea-Tac to accommodate up to 60 percent of the future demand in the central Puget Sound region. Overall, Scenario 2 would better meet the future need compared to the Baseline but would still leave a significant portion of the future regional commercial service aviation demand unmet.

This scenario would result in a future gap of 22 million enplaned passenger demand that would not be met and would result in economic loss and lost jobs to the region compared to Scenarios 3 and 4. However, this loss would be less (by about $4 billion) than the economic loss if only Scenario 1 were implemented. Because no additional airports in the region would accommodate the future demand, Scenario 2 would increase drive-time for passengers and businesses to a commercial service airport compared to Scenarios 3 and 4.

This scenario would increase greenhouse gas emissions and noise from aircraft operations compared with Scenario 1. However, the environmental impacts would be less than those of Scenarios 3 and 4.

2.3 SCENARIO 3, "LONG-TERM VISION + ACCOMMODATE 50 PERCENT OF PROJECTED GAP"

Analysis was conducted of an intermediate scenario that would accommodate 50 percent of the future forecast demand of the region. Because most airports in the region would have to adapt to allow for commercial service operations, and there would be associated environmental impacts, there are potential limitations on the amount of future demand the region could accommodate. Therefore, scenarios that meet 50 percent of the future gap were analyzed. The PSRC board posed the question, "Should the Region try to accommodate all this demand or not?". To this end, Scenario 3 explores the pros and cons of meeting 50 percent of the future 2050 gap of 22 million enplanements and approximately 450,000 operations, meaning approximately 11 million enplanements and 225,000 aircraft operations would need to be accommodated by 2050.

In order to accommodate this demand, significant development would need to occur at one or multiple airports, each with at least one air carrier–capable runway (at least 7,000 feet in length). This constrained scenario would generate an estimated increased economic benefit for the region of over $9 billion over the Long-Term Vision alone. However, it also assumes a loss of over $9 billion from the demand that is not met.

Overall, environmental impacts would increase but would be about half (compared to Scenario 1, "Baseline") than if 100 percent of the future gap were met. Development at regional airports would be required to meet this limited need. The need could be met at multiple airports or potentially one airport with parallel runways, and the trade-off of those scenarios are described in the following subsections.

2.3.1 Scenario 3-1, "One Airport Accommodates 50 Percent of Projected Gap"

For one airport in the region to handle 50 percent of the 2050 gap (11 million enplanements), two parallel runways of at least 7,000 feet would be required with a separation of at least 4,300 feet to allow for simultaneous independent arrivals under Instrument Flight Rules (i.e., poor weather conditions) operations.[2] The approximate number of annual aircraft operations that a two-parallel-runway airfield with a separation of 4,300 feet or greater could accommodate is 320,000, based on the FAA AC 150/5060-5 Airport Capacity and Delay, which is greater than 50 percent of the 2050 gap for aircraft operations (225,000). An example of this type of airport would be Fort Lauderdale-Hollywood International Airport, which serves 18 million enplaned passengers with 63 gates with its parallel runways.

Scenario 3-1 would concentrate both the benefits and impacts compared to scenarios where multiple airports would provide the additional service. Thus, the noise and environmental impacts—as well as the access to commercial service and jobs associated with expanded operations—would be focused around one airport rather than spread around the region.

2.3.2 Scenario 3-2, "Two Airports Accommodate 50 Percent of Projected Gap"

Two single-runway airports with runways of at least 7,000 feet in the region could accommodate 50 percent of the anticipated 2050 gap for the region, depending on the mix of general aviation versus commercial service operations occurring at the airport. A single runway could handle about 195,000 aircraft operations. Therefore, two single-runway airports could easily handle the annual aircraft operations estimated for accommodating 50 percent of the 2050 gap (roughly 7 million annual enplanements and 112,500 aircraft operations at each airport). The infrastructure needed to accommodate 7 million annual passenger enplanements would be slightly more than what John Wayne Airport near Los Angeles offers today.

Scenario 3-2 would spread the benefits and impacts to multiple airports in the region in order to provide the additional service. Thus, the noise and environmental impacts—as well as the access to commercial service and jobs associated with expanded operations—would be spread around the region. In addition,

[2] Note that the 4,300-foot runway separation is based on standard FAA design criteria and subject to change due to site characteristics.

two smaller airports would not be able to provide the concentration of service options and would be more expensive to operate than a single larger airport.

2.4 SCENARIO 4, "LONG-TERM VISION + ACCOMMODATE 100 PERCENT OF PROJECTED GAP"

The Puget Sound Regional Aviation Baseline Study's unconstrained forecast projects the region's future demand to reach 55 million enplanements and 450,000 aircraft operations by the year 2050. Scenario 4 assumes one or more airports would accommodate 100 percent of this demand by 2050.

This scenario would offer the greatest economic benefit of the scenarios or approximately equal to an additional Sea-Tac, which currently offers over 150,000 jobs and nearly $22.5 billion total economic activity, compared to the Scenario 1, "Baseline." In addition to the direct benefits, Scenario 4 would allow residents and businesses to access commercial passenger and air cargo services to meet their future needs and allow the region to remain competitive. On the other hand, there would be more noise impacts and greenhouse gas emissions than the other scenarios because aircraft operations and local vehicle trips would increase to meet demand.

2.4.1 Scenario 4-1, "One Airport Accommodates 100 Percent of Projected Gap"

Theoretically, a single airport in the region could accommodate 100 percent of the 2050 gap (27 million passenger enplanements) with three sufficiently spaced, 7,000- to 9,000-foot parallel runways (for 450,000 annual aircraft operations).

The future gap is similar to Sea-Tac's current operations, in which the airport is operating three parallel runways. John F. Kennedy International Airport and San Francisco International Airport both operate with two dual parallel runways, and in 2018 both handled over 450,000 operations; however, both airports are constrained and are operating at maximum capacity. Airports like George Bush Intercontinental/Houston and Charlotte International Airports (with triple, widely spaced parallel runways) would be the most efficient airfield layout.

Scenario 4-1 would limit the noise and environmental impacts associated with expanded operations to one additional airport in the region and the associated community(s), and only one airport would require resources to handle the future gap (including parking, road infrastructure, landside support facilities, terminal infrastructure, etc.). However, this scenario would concentrate noise impacts into a smaller geographic area versus spread over multiple areas, as in the multi-airport scenarios.

The approximate number of operations that a single, triple-parallel runway airfield with a separation of 4,300 feet or greater could accommodate is over 500,000 aircraft operations, based on the FAA AC 150/5060-5 Airport Capacity and Delay, more than the estimated 450,000 aircraft operations gap in 2050.

2.4.2 Scenario 4-2, "Two or Three Airports Accommodate 100 Percent of Projected Gap"

As stated in Scenario 4-1, three runways should be planned for to accommodate the 450,000 annual aircraft operations in 2050. Two airports in the region could accommodate 100 percent of the future gap, if at least one of the airports has parallel runways spaced at least 4,300 feet apart. Otherwise, three airports with a single runway would be necessary. The ability to meet the demand would also depend on the existing number of operations occurring at the airport and the ability of the surrounding airspace to accommodate this increase activity.

The next chapter reviews existing airports in the study area for the ability to fill the gap. Airports are screened for their potential to fulfill this role by meeting criteria that includes potential runway length, space for terminals, multimodal access, and airspace constraints, among other factors.

3. Evaluation Criteria Overview

Each of the 29 airports in the study area were evaluated for the potential to accommodate the future aviation demand and then rated with a simple color by each criterion. Each criterion has a green, yellow, or red rating to indicate the ability of an airport to meet the specified criterion with green meeting the criterion, yellow potentially meeting it with difficulty, and red not meeting it. For critical criteria, a red rating excludes the airport from further analysis as noted under the rating definitions for the vital criteria. This chapter discusses the criteria and specific thresholds for ratings by which the airports in the study airport will be evaluated and is presented in Chapter 4, "Airport Evaluation."

3.1 ABILITY TO ACCOMMODATE SINGLE OR PARALLEL RUNWAYS (7,000 OR 9,000 FEET)

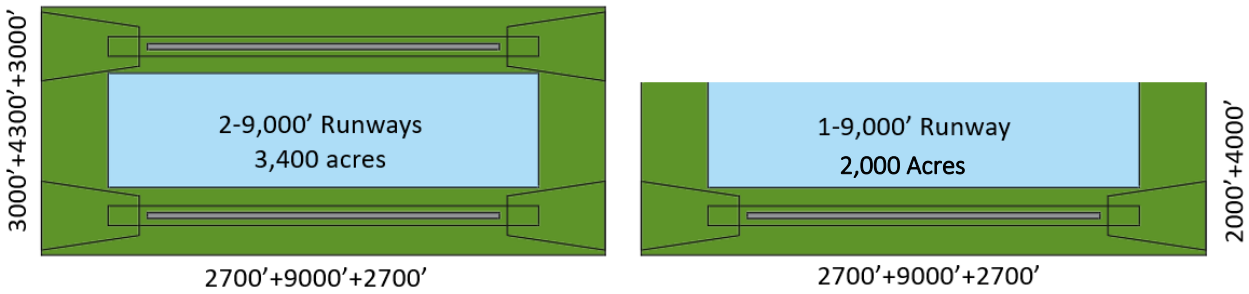
In order to accommodate the significant amount of commercial passenger service identified previously, a minimum runway length of 7,000 feet is needed and which would allow for regional service along the West Coast and the Midwest. A 9,000-foot runway is ideal and would allow for increased range of service, including the East Coast and Hawaii. Additionally, an airport that has or could accommodate a parallel runway would increase the number of aircraft operations a single airport could handle, therefore reducing the number or airports needed to meet the future gap. The ability of an airport to accommodate the necessary runway length was analyzed based on visual analysis using Google Earth and by reviewing the airports' Airport Layout Plans for a recommended extension or ease of including a longer or parallel runway. The criterion ratings are defined below:

- Green: the airport has a runway with 7,000 feet or 9,000 feet or could accommodate one or parallel runways with ease/minimal impact.
- Yellow: the airport has potential to accommodate a 7,000-foot or 9,000-foot runway(s), but there would be impacts to existing developed areas, major roadways, and/or railroads.
- Red: the airport cannot accommodate a 7,000-foot or 9,000-foot runway(s) due to constraints such as proximity to lakes, rivers, and mountains, extensive existing developed areas surrounding the airport, and/or impacts to major highways, roadways or railroads. A red rating excludes an airport from further analysis.

In addition to runway length, in order to accommodate commercial service and domestic [or narrow-body] belly cargo needs, space would be needed for the operations, which include belly cargo, aircraft catering trucks, terminal, etc. Other airports, with annual enplanements comparable to the future gap, were analyzed to determine the potential amount of space needed for an airport to have commercial service operations.

Figure 3-1 depicts the idealized airport layouts to meet the 2050 gap with one or multiple airports, depending on how many runways could be built at the airport site.

Figure 3-1. Ideal Airport Layouts



These layouts were then used to analyze the area surrounding the study area airports. The analysis was conducted using existing information in Working Paper #1, Chapter 2, Data Collection and Inventory and included a visual analysis on Google Earth. The criteria ratings are defined below:

- Green: adequate space available for commercial service and cargo needs with limited impacts to existing developed areas.
- Yellow: limited space available for commercial service and cargo needs with some impact to existing developed areas.
- Red: none or very limited space available for commercial service and cargo needs due to greater than 50 percent of existing development within 2,000-acre box or no space with adequate airfield access due to terrain (This rating excludes an airport from further analysis.)

3.2 EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS

Each of the potential airport sites were evaluated with respect to potential airspace constraints that could impede the full use of runways and to operate efficiently at maximum level of aircraft operations. The assumed time period evaluated is assumed to be post 2035 where advancement in technology could improve operational constraints; however, these potential improvements were not considered in the analysis at this time.

- Green: no existing airspace constraints or conflicts
- Yellow: limited existing airspace constraints or conflicts
- Red: significant existing airspace constraints or conflicts (This rating excludes an airport from further analysis.)

3.3 IMPACT TO SEA-TAC AIRCRAFT OPERATIONS

The impact to flight operations at a potential airport at the upper levels of capacity was also reviewed with respect to its impact to operations at Sea-Tac. If an airport's future flight operations affected the operational efficiency of Sea-Tac, then this was considered a negative. The rating criteria are shown below:

- Green: no impact to Sea-Tac efficiency/airspace
- Yellow: slight impact to Sea-Tac efficiency/airspace
- Red: significant impact to Sea-Tac efficiency/airspace (This rating excludes an airport from further analysis.)

3.4 FLOOD ZONE HAZARD

If an airport is in an area that is prone to flooding, expansion potential of the airport is limited because commercial service operations would likely be affected during significant rain events. The regional airports on current Federal Emergency Management Agency flood zone maps were evaluated if they were within the 100-year flood zone or flood zone hazard area. The rating criteria are shown below:

- Green: located in a low risk flood zone
- Yellow: located in a moderate risk flood zone
- Red: located in a high-risk flood zone

3.5 CURRENT AND FUTURE ROADWAY AND TRANSIT ACCESS

The characteristics of each airport's multimodal access influence each scenario even as planning for multimodal access is a derivative of scenario outcomes. Each airport was previously assessed[3] based on the benchmarks including proximity of an interstate highway or state highways, using 5 miles as a criterion, direct access to a 4-lane arterial road or highway, and access to high-capacity transit (HCT). In addition, the airports were evaluated for potential improvements to access where access is not available. Several factors and data sources were considered when assessing each airport. Those factors included roadway improvement feasibility (e.g., improving a state highway to a limited-access freeway that could be designated as an interstate), availability of developable land, need or demand for transit expansion, and existing highway and transit planning by federal, state, and local agencies. Each airport was assigned a rating for its current or potential access. The rating criteria are shown below:

- Green: current access meets benchmarks or high potential for future access
- Yellow: moderate potential for future access
- Red: no potential

[3] In Working Paper 2, "Airport Needs Analysis"

3.6 INCOMPATIBLE LAND USE WITHIN A MILE OF 7,000-FOOT OR 9,000-FOOT RUNWAY ENDS

Assuming a 7,000-foot or 9,000-foot runway(s), the area 1 mile from each existing runway end was evaluated for incompatible land use, which according to the FAA consists of residential areas, schools, and churches that are sensitive to high levels of aircraft noise. Compatible land uses around airport consist of industrial and commercial development. The analysis was conducted using existing information in the Working Paper 1, Chapter 2, Data Collection and Inventory and a visual analysis using Google Earth and review of the airports' Airport Layout Plans. The criteria ratings are defined below:

- Green: the airport has a runway meeting the 7,000-foot or 9,000-foot requirement or could accommodate one or parallel runways with minimal impact.
- Yellow: the airport could accommodate a 7,000-foot or 9,000-foot runway(s), but it would affect developed areas, major roadways, and/or railroads.
- Red: the airport cannot accommodate a 7,000-foot or 9,000-foot runway(s) due to constraints such as proximity to lakes and rivers, significant developed areas surrounding the airport, and/or impacts to major highways, roadways or railroads.

3.7 ABILITY TO ACCOMMODATE ADDITIONAL AIRCRAFT OPERATIONS

As aviation demands grow, the ability for an airport to accommodate increase aircraft operations will be required to allow growth of commercial service and cargo operations. Because existing airports are being evaluated, the current operations at the airport were taken into consideration to determine if the airport has the ability to handle the full projected gap between future demand and capacity in regional aircraft operations. The analysis was conducted using existing information in Working Paper 1, Chapter 2, Data Collection and Inventory, airport manager survey responses, and review of the Airport Layout Plans for current and future projected operations compared to the airfield capacity. The criteria ratings are shown below:

- Green: can accommodate full gap of 450,000 annual aircraft operations
- Yellow: can partially accommodate gap of 450,000 annual aircraft operations
- Red: can accommodate minimal additional aircraft operations

3.8 IMPACT TO AEROPSPACE MANUFACTURING

Because aerospace manufacturing is a significant industry and prevalent at several airports in the central Puget Sound region, there is a desire to limit impacts to existing or planned expansion for aerospace manufacturing at airports in the region. The analysis was conducted using existing information in Working Paper 1, Chapter 2, Data Collection and Inventory, airport manager survey responses, review of the Airport Layout Plans and a visual analysis using Google Earth. The criteria ratings are shown below:

- Green: no impact to aerospace manufacturing
- Yellow: limited impact to aerospace manufacturing requiring limited reduction in space allocated to future aerospace manufacturer expansion
- Red: significant impact to aerospace manufacturing requiring significant reduction in space allocated to aerospace manufacturer or relocation of aerospace manufacturer to surrounding airport

3.9 POPULATION AND EMPLOYMENT WITHIN 60 MINUTE DRIVE TIME

Each airport was analyzed for drive-time coverage of population and employment based on 2050 congestion projections. Each airport was combined individually with Sea-Tac and Paine Field to determine the ability of the multi-airport system to meet the original benchmarks for 80 percent of the population and 90 percent of employment to be within a 60-minute drive time to a commercial service airport. The criteria ratings are shown below:

- Green: meets benchmark and adds at least 10 percent or more net benefit to coverage
- Yellow: does not meet benchmark, but adds a 5 to 9 percent net benefit to coverage
- Red: does not meet benchmark and adds less than a 5 percent net benefit; however, this does not exclude an airport from further evaluation.

3.10 OWNERSHIP

Ownership of an airport is important because ownership determines available funding sources for capital improvements, maintenance, and operation. A privately owned airport could be open for public use; however, it is generally funded and maintained by its private owners since there is no guarantee that federal investment would be repaid if the sponsor becomes insolvent. A public airport is open to the public and owned by public entities (generally a city, county, state or authority). A publicly owned airport is eligible for, and ranks higher for, FAA Airport Improvement Program funding that provides grants to airports for planning, development, and noise compatibility mitigation. A military airport, while owned by a public entity, differs in that it is owned by the federal government, in particular the U.S. Department of Defense. It is not open to the public, unless it is designated as a joint civilian/military airport. Changing existing military airfields to public use requires an act of Congress and/or agreement by the U.S. Department of Defense, which can be very difficult and time consuming. The existing ownership rating criteria are shown below:

- Green: publicly owned
- Yellow: privately owned and military
- Red: None

Appendix A summarizes the consolidated results of this analysis.

4. Airport Evaluation

Each of the airports within the study area were assessed based on the first criteria described in Chapter 2—the ability to accommodate a 7,000-foot runway. Airports that met this first criterion were then evaluated against the remaining criteria. This chapter describes the results of this individual airport analysis.

4.1 RUNWAY LENGTH ANALYSIS

Each airport in the study area was assessed for its ability to accommodate a single 7,000-foot runway.

Table 4-1 shows the airports that were eliminated based on inability accommodate a runway of this length.

Seven airports were rated green because the airports have a runway that is at least 7,000 feet in length or has an ability to extend the runway with minimal impacts to surrounding development.

Six airports were rated yellow because there would be some potential impacts to surrounding existing development and roadways in order to accommodate a runway of at least 7,000 feet; however, there is potential because a runway extension is not limited due to lakes, rivers, or mountains or limited due to extensive development around the airport.

All seaplane bases were eliminated because they cannot accommodate a runway that can be utilized by commercial service and large cargo aircraft. Also, all state airports in the study area (including Bandera State, Lester State, Ranger Creek, and Skykomish State) were removed because surrounding terrain prevents them from accommodating a longer runway. Of the military airports, Gray Army Airfield of Joint Base Lewis-McChord was eliminated because the current runway is under 7,000 feet and development around the airfield would hinder expansion. The other airfield on the joint base, McChord Field, has a runway that meets the minimum criteria and was therefore considered in the next evaluation rounds. Auburn Municipal was determined not to have the ability to reasonably accommodate a runway extension, because of extensive development around the airport. Renton Municipal Airport was eliminated because it cannot accommodate a runway extension; the airport is surrounded by extensive development and Lake Washington. Darrington Municipal Airport and Swanson Airport were eliminated based on an inability for commercial operations to occur due to surrounding terrain. Table 4-1 summarizes the runway length analysis results.

Table 4-1. Runway Length Analysis

AIRPORTS (FAA CODE)	ABILITY TO ACCOMMODATE 7,000-FOOT RUNWAY
Arlington Municipal Airport (AWO)	Adequate potential space to accommodate at least 7,000-foot runway
King County International Airport-Boeing Field (BFI)	Existing runway at least 7,000 feet
Bremerton National Airport (PWT)	Adequate potential space to accommodate at least 7,000-foot runway
McChord Field (Joint Base Lewis-McChord) (TCM)	Existing runway at least 7,000 feet
Paine Field Airport (PAE)	Existing runway at least 7,000 feet
Tacoma Narrows Airport (TIW)	Adequate potential space to accommodate at least 7,000-foot runway
Vashon Municipal Airport (2S1)	Adequate potential space to accommodate at least 7,000-foot runway
Apex Airpark (8W5)	Dense development
First Air Field (W16)	Dense development
Harvey Field Airport (S43)	Dense development
Norman Grier Field Airport (S36)	Dense development
Pierce County Airport -Thun Field (PLU)	Dense development
Shady Acres Airport (3B8)	Dense development
Auburn Municipal Airport (S50)	Extensive development around airport
Darrington Municipal Airport (1S2)	Surrounded by mountains
Renton Municipal Airport (RNT)	Extensive development around airport Lake Washington North of Airport
Swanson Airport (2W3)	Surrounded by mountains
Bandera State Airport (4W0)	State airport surrounded by river and mountains
Lester State Ultralight Flightpark (15S)	State airport that is closed indefinitely
Ranger Creek Airport (21W)	State airport surrounded by river and mountains
Skykomish State Airport (S88)	State airport and surrounded by mountains
Gray Army Airfield (Joint Base Lewis-McChord) (GRF)	Military airport with dense development around the airfield
American Lake SPB (W37)	Seaplane base
Kenmore Air Harbor Inc SPB (S60)	Seaplane base
Kenmore Air Harbor SPB (W55)	Seaplane base
Port of Poulsbo Marina Moorage SPB (83Q)	Seaplane Base
Seattle Seaplanes SPB (0W0)	Seaplane Base
Will Rogers/Wiley Post Memorial SPB (W36)	Seaplane Base

4.2 ABILITY TO ACCOMMODATE COMMERCIAL SERVICE NEEDS

The 13 airports that were rated either green or yellow for ability to accommodate at least a 7,000-foot runway were then assessed for their ability to accommodate commercial passenger service and related narrow-body (domestic) belly cargo needs. International belly and freighter cargo are expected to be accommodated at Sea-Tac, KCIA, or possibly Paine Field due to longer runway requirements for wide-body aircraft used in international service. Because of the unique requirements of most air cargo operations, scenarios have focused on identifying airports that can meet additional passenger needs. Section 3.2 describes the evaluation parameters. An area of 2,000 acres is the minimum required area for a single-runway airport to accommodate commercial services. These airports were evaluated to determine if the existing development around the airport exceeds 50 percent, because expanding an airport to accommodate commercial air service would be difficult for airports surrounded by dense development. For each of these airports, the 2,000-acre area was overlaid on Google Earth and was analyzed visually to determine the amount of developed area.

Four airports—Boeing Field, Norman Grier Field, Pierce County, and Shady Acres—were eliminated for an inability to accommodate commercial service, because the area needed for expansion was more than 50 percent developed. It was determined that expanding these airports to accommodate commercial service needs was not reasonable; therefore, they were eliminated from further analysis. Table 4-2 summarizes the evaluation results. Appendix B depicts graphics visualizing this analysis for the airports.

Table 4-2. Ability to Accommodate Commercial Service

AIRPORTS (FAA CODE)	ABILITY TO ACCOMMODATE COMMERCIAL SERVICE
Arlington Municipal Airport (AWO)	Adequate potential space to accommodate commercial service needs
Bremerton National Airport (PWT)	Adequate potential space to accommodate commercial service needs
McChord Field (Joint Base Lewis-McChord) (TCM)	Adequate potential space to accommodate commercial service needs
Paine Field Airport (PAE)	Currently has commercial air service
Tacoma Narrows Airport (TIW)	Adequate potential space to accommodate commercial service needs
Vashon Municipal Airport (2S1)	Adequate potential space to accommodate commercial service needs
Apex Airpark (8W5)	Impacts to developed areas
First Air Field (W16)	Impacts to developed areas
Harvey Field Airport (S43)	Impacts to developed areas
King County International Airport-Boeing Field (BFI)	Greater than 50% development
Norman Grier Field Airport (S36)	Greater than 50% development
Pierce County Airport-Thun Field (PLU)	Greater than 50% development
Shady Acres Airport (3B8)	Greater than 50% development
Swanson Airport (2W3)	Greater than 50% development

4.3 EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS AND IMPACT TO EXISTING SEA-TAC AIRSPACE OPERATIONS

Each of the remaining potential airport sites were evaluated with respect to potential airspace constraints that could impede the development of the airport and to operate at the full build-out level of aircraft operations. The assumed time period is post 2035 where advancement in technology could improve operational constraints; however, these potential improvements were not considered in the analysis. Any airport with a red rating was removed from further consideration because this would significantly affect or eliminate an airport's ability to accommodate commercial service operations. Appendix C shows the location of each airport that was analyzed. Two airports—Arlington Municipal and Paine Field—have no current airspace constraints nor do they significantly affect Sea-Tac airspace operations.

There airports—Harvey Field, McChord Field, and Tacoma Narrows—were rated yellow for existing airspace conflicts and green rating related to impacts to Sea-Tac airspace. Harvey Field is 27 nautical miles north of Sea-Tac and 7 nautical miles east of Paine Field. The existing runway is near parallel to Sea-Tac and Paine Field. The development of this airport is ***not*** anticipated to be constrained by the existing airspace, but the greatest issue is the proximity to Paine Field airspace operations. Modern navigation technology could minimize conflicts between the two airports in the future.

McChord Field Airport is 19 nautical miles south-southwest of Sea-Tac. The existing McChord Field Airport runway is nearly parallel to Sea-Tac. Both airports operate in this airspace today, with McChord Field Airport operations being strictly military and at a much lower level of activity than is anticipated if it became a joint use military/commercial facility. If McChord Field Airport was developed as a major commercial airport with joint use, it would likely require the development of new independent flight procedures.

Development of a commercial airport at this site is ***not*** anticipated to have significant constraints on Sea-Tac operations. However, the impact to current and future potential military operations at McChord Field Airport is not part of this study and would be of concern to the military. The future military missions for the airport and the level of activity of military routes and airspaces near McChord Field are not defined. The development of a joint use facility would potentially require changes to how McChord Field Airport operates, including jump zone activities and local patterns, and those changes could affect McChord Field Airport's military mission. To separate aircraft from Sea-Tac operations, commercial traffic may be directed to operate on the east side of the airport, which is where military aircraft generally operate today and make separating from military activity and their ability to perform their missions more challenging.

Tacoma Narrows is 15 nautical miles southwest of Sea-Tac. The airport is under the primary west side arrival and departure paths for Sea-Tac. The existing runway is near parallel to Sea-Tac. The runway is oriented 7 degrees to the west from Sea-Tac, when operating in south flow. Traffic from Sea-Tac and KCIA to the north and military restricted areas to the south, McChord Field Airport military traffic to the south, and a military route in the area to the west creates conflicts due to the large volume of aircraft in a relatively small area of the airspace. Development of a commercial airport at this site would have moderate constraints on the operation of Sea-Tac with the biggest challenge being from conflicts of large volumes of

air traffic from multiple airports. Modern navigation technology could minimize conflicts between the two airports in the future.

Bremerton National Airport was rated yellow for both existing airspace constraints and for impact to Sea-Tac airspace operations. It is 19 nautical miles west of Sea-Tac and is west of the primary arrival and departure paths for Sea-Tac. The runway is not parallel to Sea-Tac, with approximately a 33-degree angle to the west in south flow. The development of this airport could be challenged or constrained by the existing airspace, with the greatest issue being the proximity to Sea-Tac traffic over the busy flight area of the sound when operating in south flow and the closer proximity to military operations. Development of a commercial airport at this site is not anticipated to have significant constraints on the operation of Sea-Tac with the biggest challenge being from activity over the sound to the north. Modern navigation technology could minimize conflicts between the two airports in the future.

An additional constraint is the close proximity of Bremerton National Airport to military operations south of the airport site, which is southwest of Sea-Tac. A new major airport at Bremerton National Airport could conflict with those military operators operating in this area, which could require redesign of the airspace. While a major airport at this location would have a number of airspace challenges, these should be manageable through airspace design and modern navigation.

Two airports—Apex Airpark and First Air Field—were rated red for existing airspace constraints and were eliminated from further analysis. Apex Airpark is 20 nautical miles northwest of Sea-Tac, is west of the primary arrival and departure paths for Sea-Tac, and its existing runway is parallel to Sea-Tac. The primary airspace constraint to the development of a commercial airport at this site is that there is a military restricted airspace directly to the north of the airport. If this restricted airspace remains, then use of this airport as a commercial service facility would be constrained by the current airspace.

First Air Field is 28 nautical miles north northeast of Sea-Tac and 12 nautical miles east of Paine Field. The airport is north of the primary arrival and departure paths for Sea-Tac. The existing runway is not parallel to Sea-Tac or Paine Field, with approximately a 90-degree angle to the runways at these airfields. The development of this airport could be challenged or constrained by the existing airspace, with the greatest issue the proximity to Paine Field with the existing runway orientation. Development of a commercial airport at this site is not anticipated to have significant constraints on the operation of Sea-Tac with the biggest challenge from conflicts with Paine Field.

Vashon Airport was rated red for existing airspace constraints and impact to Sea-Tac airspace and was therefore eliminated from further analysis. The airport is 7 nautical miles west of Sea-Tac and is under the west side primary arrival and departure paths for Sea-Tac. The runway is oriented 7 degrees to the west from Sea-Tac when operating in south flow. The development of this airport is anticipated to be constrained by the existing airspace, with the greatest issue the proximity to Sea-Tac operations where both airports would be operating at common lower altitudes in an already busy and congested airspace. Development of a commercial airport at this site is anticipated to have constraints on the operation of Sea-Tac with the biggest challenge being use of the same airspace by both Sea-Tac and the potential airport. A major commercial airport at Vashon Island would require significant changes to Sea-Tac operations on the west

side. An airport at this location would add a significant increase in traffic in an area already very busy with Sea-Tac, KCIA, and Renton Municipal Airport traffic. Modern navigation technology may be able to minimize some conflicts between the two airports, but a major airport at this location would be challenging to the airspace.

Table 4-3 summarizes the airspace analysis results.

Table 4-3. Airspace Analysis Evaluation

AIRPORTS (FAA CODE)	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
Apex Airpark (8W5)	RED	Green
Arlington Municipal Airport (AWO)	Green	Green
Bremerton National Airport (PWT)	Yellow	Yellow
First Air Field (W16)	RED	Yellow
Harvey Field Airport (S43)	Yellow	Green
McChord Field (Joint Base Lewis-McChord) (TCM)	Yellow	Green
Paine Field Airport (PAE)	Green	Green
Tacoma Narrows Airport (TIW)	Yellow	Green
Vashon Municipal Airport (2S1)	RED	RED

4.4 FLOOD HAZARD ZONE

The airports that were not eliminated due to previous criteria were analyzed to see whether they were located in a flood prone zone. Frequent flooding would negatively affect commercial service operations and require significant National Environmental Policy Act mitigation to expand as required. Any airport located in a flood prone zone was rated red and eliminated from further evaluation.

Harvey Field Airport has an airfield that is 22.8 feet above mean sea level and is just east of the Snohomish River. Based on the current Federal Emergency Management Agency Flood Zone Map, the airport is in a flood prone zone, Zone AE, which is identified as a high-risk flood area. Zone AE is within the 100-year flood limits. Appendix D provides a flood zone map for Harvey Field.

The remaining airports—Arlington Municipal, Bremerton National, McChord Field, Paine Field, and Tacoma Narrows—are in Zone X, which is an area with minimal flooding and outside the 500-year flood level. Table 4-4 summarizes the flood hazard analysis results.

Table 4-4. Flood Zone Hazard Analysis

AIRPORTS (FAA CODE)	FLOOD ZONE HAZARD ANALYSIS
Arlington Municipal Airport (AWO)	Green
Bremerton National Airport (PWT)	Green
Harvey Field Airport (S43)	Located in flood hazard zone
McChord Field (Joint Base Lewis-McChord) (TCM)	Green
Paine Field Airport (PAE)	Green
Tacoma Narrows Airport (TIW)	Green

4.5 FURTHER ANALYSIS OF REMAINING AIRPORTS

The remaining five airports—Arlington, Bremerton, Paine Field, McChord, and Tacoma Narrows—were analyzed based on the remaining criteria described in Chapter 2, to determine the feasibility of the airport to accommodate the future 2050 demand of the region.

4.5.1 Arlington Municipal Airport

4.5.1.1 Airport Layout Analysis

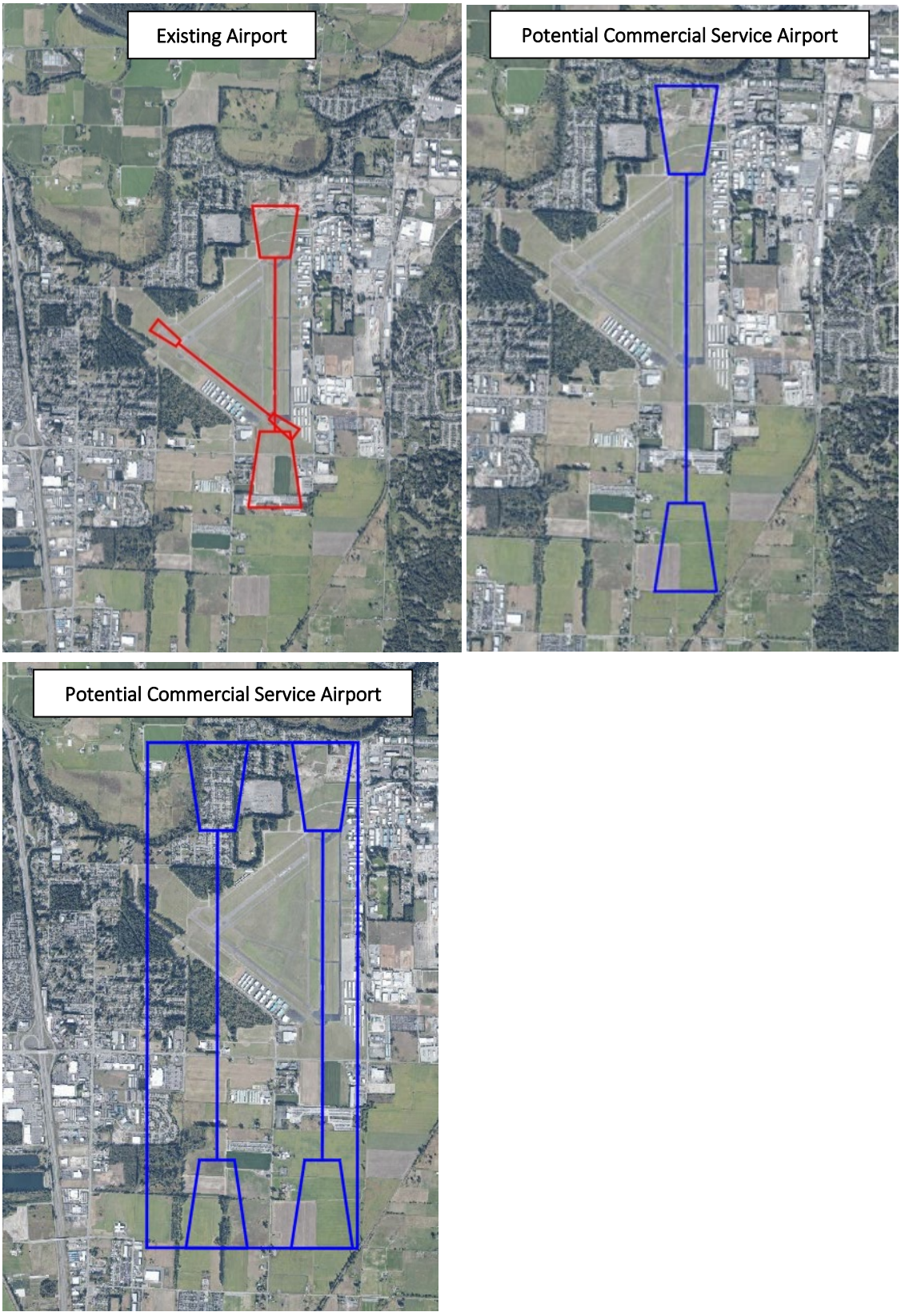
Arlington Municipal Airport is a publicly owned airport in northeastern Snohomish County. Arlington Municipal Airport has two existing runways that are 3,498 feet and 5,332 feet in length. Based on visual analysis, there is potential space for expansion to single or parallel 9,000-foot runways. The area needed to accommodate commercial service operations was determined based on analysis of commercial service airport size at airports with similar operations to the future forecast gap. Within this area, there is sufficient space to accommodate two 9,000-foot parallel runways, which would allow for transcontinental and Hawaii air service. There would be an impact to surrounding developed areas in order to accommodate parallel runways; however, it does not appear to be significant. Land use within 1 mile from the runway ends was evaluated for incompatible off-airport land uses. One church is east of the airfield, along with residential areas, which are considered an incompatible land use. Based on the current Airport Layout Plans, the airport could accommodate an additional 92,000 operations. **Figure 4-1** depicts Arlington Municipal Airport's general ability to accommodate the idealized parallel runway system necessary to meet a portion of the 2050 commercial service demand.

Table 4-5 summarizes the Arlington Municipal Airport's evaluation.

Table 4-5. Arlington Municipal Airport Evaluation

AIRPORT	7,000' RUNWAY	9,000' RUNWAY	PARALLEL RUNWAYS	OFF-AIRPORT LAND USE	COMMERCIAL SERVICE AND CARGO NEEDS	ADDITIONAL OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING
Arlington Municipal	Green	Green	Yellow	Yellow	Yellow	Yellow	Green

Figure 4-1. Arlington Municipal Airport Existing and Potential Commercial Service Layout



4.5.1.2 Population and Employment within a 60-minute Drive Time

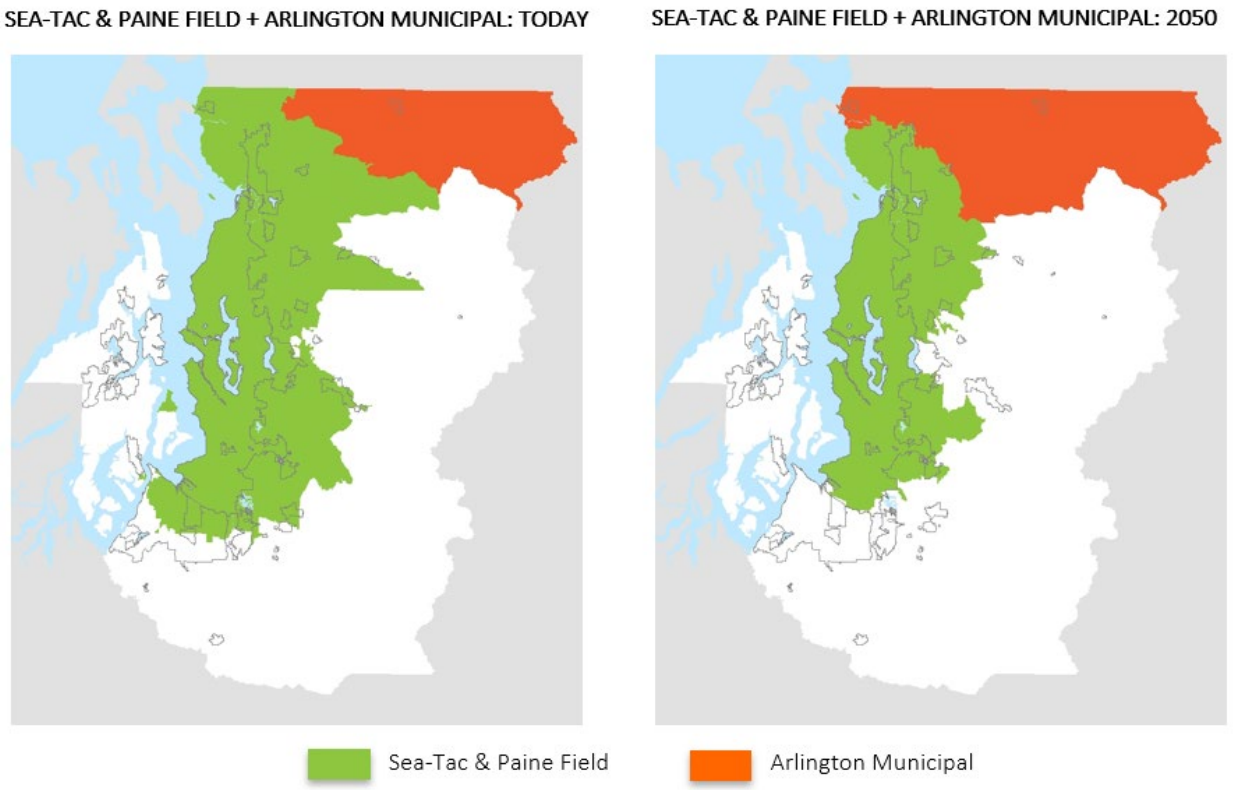
The population and employment within a 60-minute drive time was analyzed to determine the amount of coverage an additional airport would add in the future based on future congestion highway data, as depicted in **Figure 4-2**. Combined with Sea-Tac and Paine Field, the population coverage is 71 percent, an increase of only 1 percent from just Sea-Tac and Paine Field combined, and the employment coverage is 80 percent, which is no additional coverage from just Sea-Tac and Paine Field combined. The airport does not meet the benchmarks (80 percent for population and 90 percent for employment) for either criteria. **Table 4-6** summarizes the airport's drive-time evaluation

Table 4-6. Arlington Municipal Airport Population and Employment Drive-Time Coverage

AIRPORT NAME	POPULATION WITHIN 60-MINUTE DRIVE TIME*	POPULATION NET BENEFIT	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT NET BENEFIT
Arlington Municipal	71%	1%	80%	0%

*Includes Sea-Tac and Paine Field

Figure 4-2. Arlington Municipal Airport Existing and Future 60-Minute Drive-Time Coverage



4.5.1.3 Current and Future Roadway and Transit Access

The Arlington Municipal Airport benefits from close proximity and straightforward access to both the interstate and state highway systems. The airport is just 2 miles east of Interstate 5 (I-5), which is directly accessible from the airport via SR 531.

While the airport does not benefit from direct access to a 4-lane arterial road or highway, WSDOT has plans to widen SR 531 between 43rd Avenue NE and 67th Avenue NE. This project is in the preliminary design and environmental review phases, with construction expected to take place in 2023 and 2024. In addition, 59th Avenue NE could be widened to the east of the airport, because the airport owns the land on the west side of the road. This would require significant redevelopment of airport property, however, making it less feasible. The widening of SR 531 will provide the airport tenants and users with 4-lane arterial access.

There is no HCT service to Arlington Municipal Airport. Community Transit Routes 220 (Arlington to Smokey Point) and 230 (Darrington to Smokey Point) both stop at the northwest corner of the airport property in the 4700 block of 188th St NE. Hourly headway routes operate seven days a week. The nearest transit facility is Smokey Point Transit Center, approximately 1.3 miles away. The airport is not in the vicinity of planned expansion of SWIFT services (Community Transit's Bus Rapid Transit system), but there is potential to add a route providing service between the Smokey Point Transit Center, the airport, and downtown Arlington via SR 531 and 67th Avenue. **Table 4-7** summarizes the airport's future transit and roadway access evaluation.

Table 4-7. Arlington Municipal Airport Current and Future Transit and Roadway Access

AIRPORT NAME	INTERSTATE ACCESS		STATE HW ACCESS		4-LANE ARTERIAL STATUS		HIGH-CAPACITY TRANSIT	
	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access
Arlington Municipal	Yes	Green	Yes	Green	No	Green	No	Yellow

4.5.1.4 Airspace Analysis

Arlington Municipal Airport is 43 nautical miles north of Sea-Tac and 16 nautical miles north of Paine Field. The airport is north of the primary arrival and departure paths for Sea-Tac and one of Arlington Municipal Airport's existing runways is parallel to Sea-Tac and Paine Field. The development of this airport is not anticipated to be constrained by the existing airspace, with the greatest issue being the proximity to Paine Field and Whidbey Island military operations. Development of a commercial airport at this site is not anticipated to have significant constraints on the operation of Sea-Tac. **Table 4-8** summarizes the airspace ratings. **Appendix C** presents the location of Arlington Municipal Airport with respect to Sea-Tac, Paine Field and the other potential airport sites.

Table 4-8. Arlington Municipal Airport Airspace Analysis

AIRPORT NAME	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS?	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
Arlington Municipal	Green	Green

4.5.2 Bremerton National Airport

4.5.2.1 Airport Layout Analysis

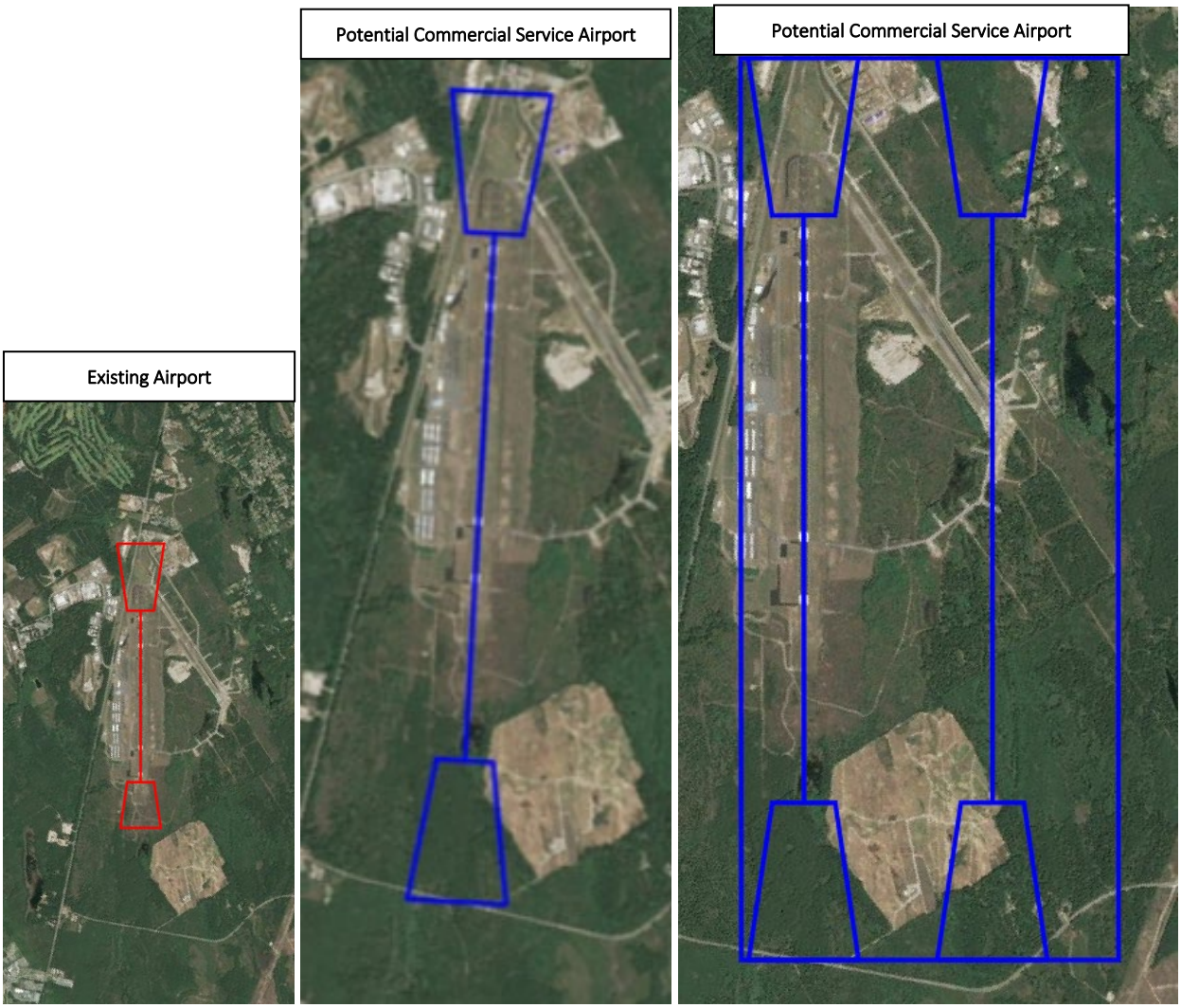
Bremerton National Airport is a publicly owned airport across Puget Sound from Seattle in Kitsap County. It has one existing runway that is 6,000 feet in length. Based on visual analysis, there is potential space to expand to single or parallel 9,000-foot runways. The area needed to accommodate commercial service operations was determined based on analysis of commercial service airport size at airports with similar operations to the future forecast gap. Within this area, there appears to be sufficient space to accommodate two 9,000-foot parallel runways, which would allow for transcontinental and Hawaii air service. Table 4-9 summarizes the airfield evaluation.

Table 4-9. Bremerton National Airport Airfield Evaluation

AIRPORT	7,000' RUNWAY	9,000' RUNWAY	PARALLEL RUNWAYS	OFF-AIRPORT LAND USE	COMMERCIAL SERVICE AND CARGO NEEDS	ADDITIONAL OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING
Bremerton National	Green	Green	Green	Green	Green	Yellow	Green

There would be some impacts to surrounding developed areas in order to accommodate parallel runways. Land use within 1 mile from the runway ends was evaluated to determine any potential incompatible off-airport land uses. There are no incompatible land uses based on visual analysis. Based on 66,000 operations and an airfield capacity of 230,000 operations in 2017, the airport has an additional 164,000 operations capacity. Figure 4-3 depicts the airport's general ability to accommodate the idealized parallel runway system necessary to meet a portion of the 2050 commercial service demand.

Figure 4-3. Bremerton National Airport Existing and Potential Commercial Service Layout



4.5.2.2 Population and Employment within a 60-minute Drive Time

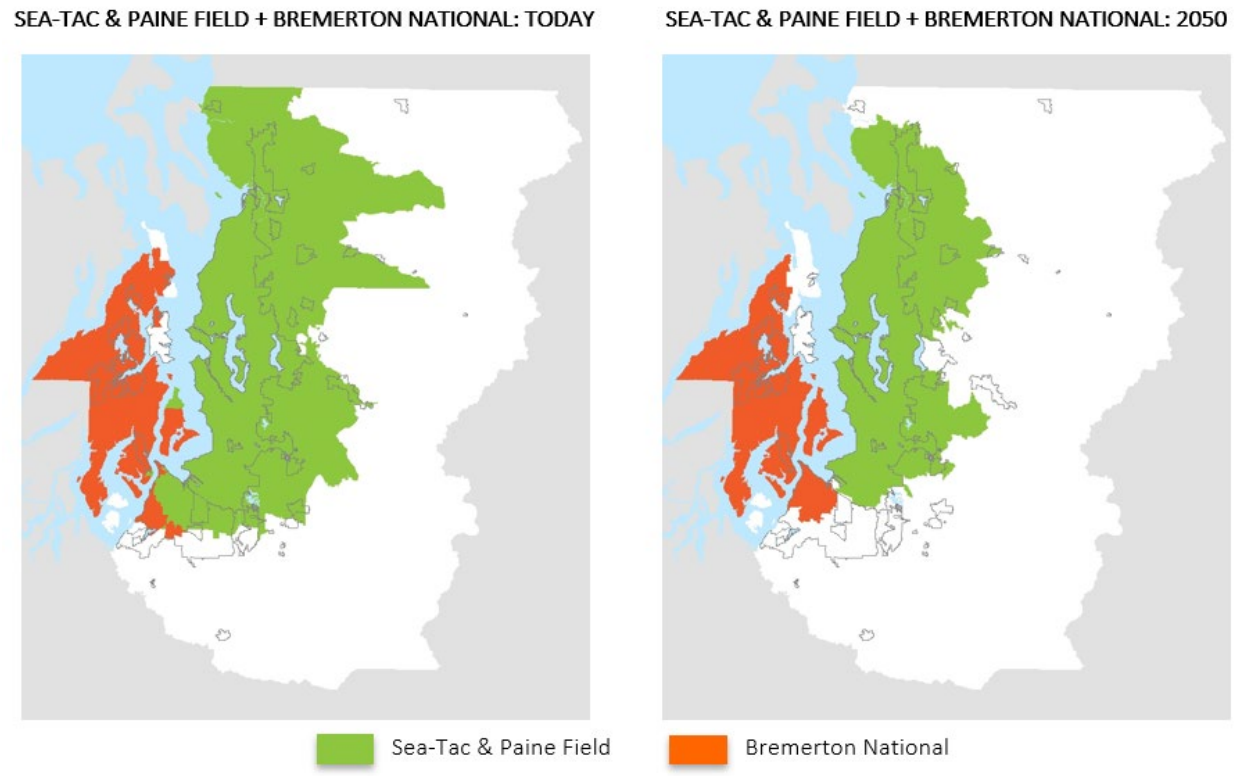
The population and employment within a 60-minute drive time was analyzed to determine the amount of coverage an additional airport would add in the future based on future congestion data. Table 4-10 summarizes Bremerton National Airport's drive-time evaluation. Combined with Sea-Tac and Paine Field, the population coverage is 84 percent and the employment coverage is 92 percent, with both criteria exceeding the respective benchmarks of 80 percent for population and 90 percent for employment, as depicted in Figure 4-4.

Table 4-10. Bremerton National Airport Population and Employment Drive-Time Coverage

AIRPORT NAME	POPULATION WITHIN 60-MINUTE DRIVE TIME*	POPULATION NET BENEFIT	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT NET BENEFIT
Bremerton National	Green (84%)	Green (14%)	Green (92%)	Green (12%)

*Includes Sea-Tac and Paine Field Airports

Figure 4-4. Bremerton National Airport Current and Future 60-Minute Drive-Time Coverage



4.5.2.3 Current and Future Roadway and Transit Access

Bremerton National Airport is on the Kitsap Peninsula, which is west of Seattle, across the Puget Sound and located in Kitsap County, WA, which is the least populated county in the study area. The airport is adjacent to SR 3, a designated National Highway System link with access control to adjacent property. Access to I-5 is 30 miles from the airport via SR 3 and SR 16, a limited-access facility described above. The designation of SR 16 between Gorst and Tacoma as an interstate is unlikely but feasible. SR 16 access is more than 5 miles from the Bremerton National Airport. WSDOT does not plan to upgrade SR 16 in the vicinity of the SR 3 access and there are presently no plans to provide a new limited-access highway in the vicinity of Bremerton National Airport.

Bremerton National Airport has excellent, direct access to the state highway network via SR 3, which runs nearly parallel to the runway just north of the airport. Bremerton National Airport lacks direct access to a 4-lane arterial road. Despite growing traffic volumes on SR 3 (and despite its designation as an National Highway System facility), WSDOT has no plans to widen SR 3 at this time. Kitsap County has plans to construct a new 4-lane arterial in the vicinity of the airport.

Bremerton National Airport is not served by HCT. The airport is in the Kitsap Transit SK Ride service area, which includes McCormick Woods, Sunnyslope, Olympic View Industrial Park, The Ridge, and McCormick Meadows. SK Ride is a shared-ride service operating within the service area by rider request only. There are no designated stops or routing. A proposed regional route along SR 3 is shown on the Kitsap Transit

long-range vision map. This route would connect Bremerton to the Puget Sound Industrial Park. The route could be implemented as or upgraded to HCT service levels.

In some cases, the lack of a nearby motorway (typically a freeway) designated as an interstate does not mean that there is no nearby access to a limited-access multi-lane divided highway with no at-grade intersections. Furthermore, SR 16 connects directly to I-5 in Tacoma and provides a motorway corridor to Bremerton, where access is available to nearby U. S. Navy facilities. In cases where interstate access does not exist within 5 miles but a motorway designated through the National Highway System meets the access criterion, an asterisk is provided in Table 4-11.

Table 4-11. Bremerton National Airport Current and Future Transit and Roadway Access

AIRPORT NAME	INTERSTATE ACCESS		STATE HW ACCESS		4-LANE ARTERIAL STATUS		HIGH-CAPACITY TRANSIT	
	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access
Bremerton National	No	Red*	Yes	Green	No	Yellow	No	Yellow

* Interstate access does not exist within 5 miles, but a motorway designated through the National Highway System provides access.

4.5.2.4 Airspace Analysis

Bremerton National Airport is19 nautical miles west of Sea-Tac. The airport is west of the primary arrival and departure paths for Sea-Tac. The runway is not parallel to Sea-Tac, with approximately a 33-degree angle to the west in south flow. The development of this airport may be challenged or constrained by the existing airspace, with the greatest issue being the proximity to Sea-Tac traffic over the busy flight area of the sound when operating in south flow and the closer proximity to military operations. Development of a commercial airport at this site is not anticipated to have significant constraints on the operation of Sea-Tac with the biggest challenge from activity over the sound to the north. Modern navigation technology may be able to minimize conflicts between the two airports in the future. Table 4-12 summarizes the airspace ratings. Appendix C presents the location of Bremerton National Airport with respect to Sea-Tac, Paine Field, and the other potential airport sites. The Seattle Terminal Area and location of the restricted airspace is also shown in this figure.

Table 4-12. Bremerton National Airport Airspace Analysis

AIRPORT NAME	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS?	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
Bremerton National	Green	Yellow

4.5.3 Paine Field

4.5.3.1 Airport Layout Analysis

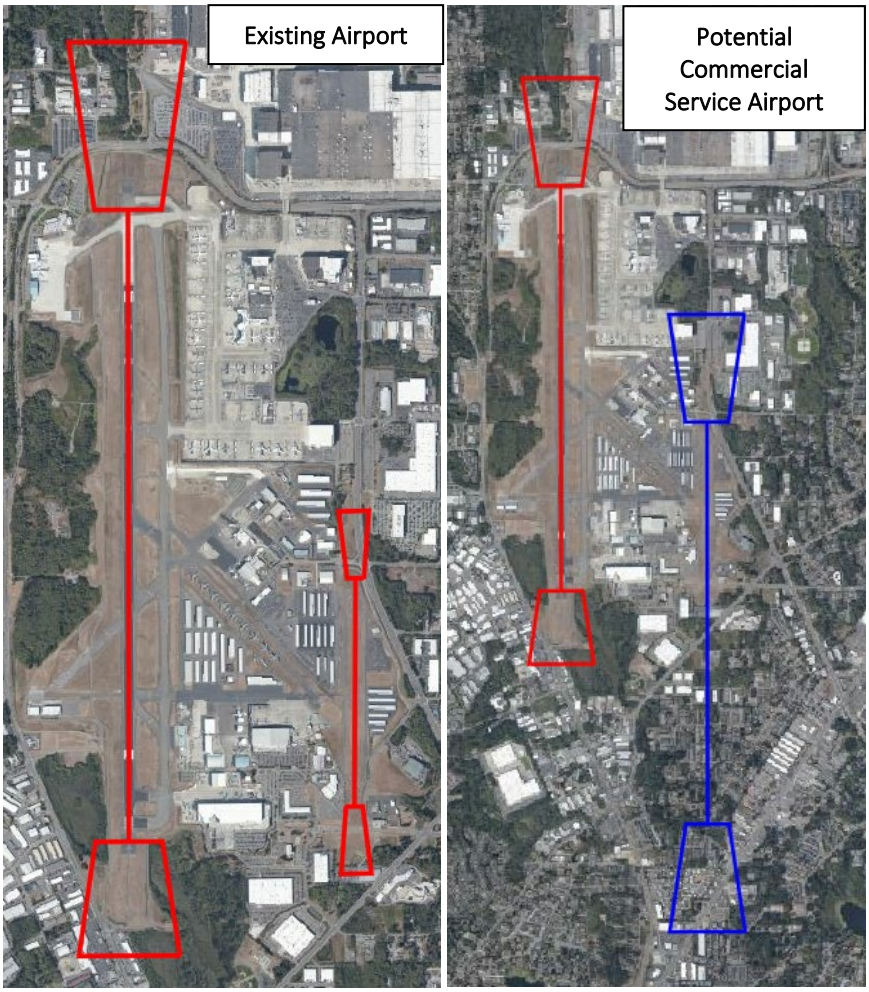
Paine Field is a publicly owned airport in Snohomish County north of Seattle. It has three existing runways that are 3,004; 4,504; and 9,010 feet in length. The parallels are depicted as red (**Figure 4-5**). Extending the 3,004-foot parallel runway to a 9,000-foot runway (blue) would impact the Boeing manufacturing facilities to the north and developed areas to the south. There is a 9,000-foot runway, but further expansion is not feasible due to the impact to Boeing manufacturing operations and dense development surrounding the airport. **Table 4-13** summarizes the airfield evaluation.

Table 4-13. Paine Field Airfield Evaluation

AIRPORT	7,000' RUNWAY	9,000' RUNWAY	PARALLEL RUNWAYS	OFF-AIRPORT LAND USE	COMMERCIAL SERVICE AND CARGO NEEDS	ADDITIONAL OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING
Paine Field	Green	Green	Red	Red	Green	Yellow	Red

Land use within 1 mile from the runway ends was evaluated to determine potential incompatible off-airport land uses. Currently, there are multiple churches, a school, and residential areas within a mile of the runway ends, which are considered incompatible land uses. **Figure 4-5** depicts the airport's general ability to accommodate the idealized parallel runway system necessary to meet a portion of the 2050 commercial service demand

Figure 4-5. Paine Field Existing and Potential Commercial Service Layout



4.5.3.2 Population and Employment within a 60-minute Drive Time

The population and employment within a 60-minute drive time was analyzed to determine the amount of coverage an additional airport would add in the future based on future congestion data. Combined with Sea-Tac, Paine Field provides a population coverage of 70 percent and an employment coverage of 80 percent. Neither criteria meet the respective benchmarks of 80 percent for population and 90 percent for employment, as summarized in Table 4-14.

Table 4-14. Paine Field Population and Employment Drive-Time Coverage

AIRPORT NAME	POPULATION WITHIN 60-MINUTE DRIVE TIME*	POPULATION NET BENEFIT	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT NET BENEFIT
Paine Field	Red (70%)	Red (0%)	Red (80%)	Red (0%)

*Includes Sea-Tac

4.5.3.3 *Current and Future Roadway and Transit Access*

Paine Field is already very accessible via interstate highways, state highways, 4-lane arterial roadways, and HCT. The airport is accessible from I-5 via SR 526 (itself a limited-access, 4-lane highway) and via the 4-lane Airport Road. As it loops around the airport, SR 526 becomes SR 525, which is not limited access but maintains 4 lanes and eventually connects directly with I-405 at I-5. The airport is also close to the 4-lane SR 99, which intersects with Airport Road. Paine Field is served by HCT service by Community Transit's SWIFT Green Line, as summarized in **Table 4-15**. However, the access road to the current passenger terminal is limited with little opportunity to expand without impacts existing aviation development.

Table 4-15. Paine Field Current and Future Transit and Roadway Access

AIRPORT NAME	INTERSTATE ACCESS		STATE HW ACCESS		4-LANE ARTERIAL STATUS		HIGH-CAPACITY TRANSIT	
	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access
Paine Field	Yes	Green	Yes	Green	Yes	Green	Yes	Green

4.5.3.4 *Airspace Analysis*

Paine Field is 27 nautical miles north of Sea-Tac. The airport is north of the primary arrival and departure paths for Sea-Tac. The existing runways are near parallel to Sea-Tac. The development of this airport is not anticipated to be constrained by the existing airspace, with the greatest issues occurring in weather conditions where the two airports are in opposite flow. Developing a commercial airport at this site is not anticipated to have significant constraints on Sea-Tac operations. **Table 4-16** summarizes the airspace ratings. **Appendix C** presents the location of Paine Field, with respect to Sea-Tac and the other potential airport sites. The Seattle Terminal Area and location of the restricted airspace is also shown in this figure.

Table 4-16. Paine Field Airspace Analysis

AIRPORT NAME	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS?	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
Paine Field	Green	Green

4.5.4 Tacoma Narrows Airport

4.5.4.1 Airport Layout Analysis

Tacoma Narrows Airport is a publicly owned airport located across the Tacoma Narrows Bridge from Tacoma and is surrounded by water on three sides. The airport has one existing runway that is 5,002 feet. Based on visual analysis, there is potential space for expansion to a single or parallel 9,000-foot runways. It is potentially limited due to surrounding water. The area needed to accommodate commercial service operations was determined based on analysis of commercial service airport size at airports with similar operations to the future forecast gap. **Table 4-17** summarizes the airfield evaluation.

Table 4-17. Tacoma Narrows Airport Airfield Evaluation

AIRPORT	7,000' RUNWAY	9,000' RUNWAY	PARALLEL RUNWAYS	OFF-AIRPORT LAND USE	COMMERCIAL SERVICE AND CARGO NEEDS	ADDITIONAL OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING
Tacoma Narrows	Green	Green	Yellow	Green	Green	Yellow	Green

With some impact to surrounding development, the airport could accommodate a single or parallel 9,000-foot runways within the area needed for commercial service operations. Land use within 1 mile from the runway ends was evaluated to determine potential incompatible off-airport land uses. Currently, there are no incompatible land uses. **Figure 4-6** depicts the airport's general ability to accommodate the idealized parallel runway system necessary to meet a portion of the 2050 commercial service demand.

Figure 4-6. Tacoma Narrows Airport Existing and Potential Commercial Service Layout

4.5.4.2 Population and Employment within a 60-minute Drive Time

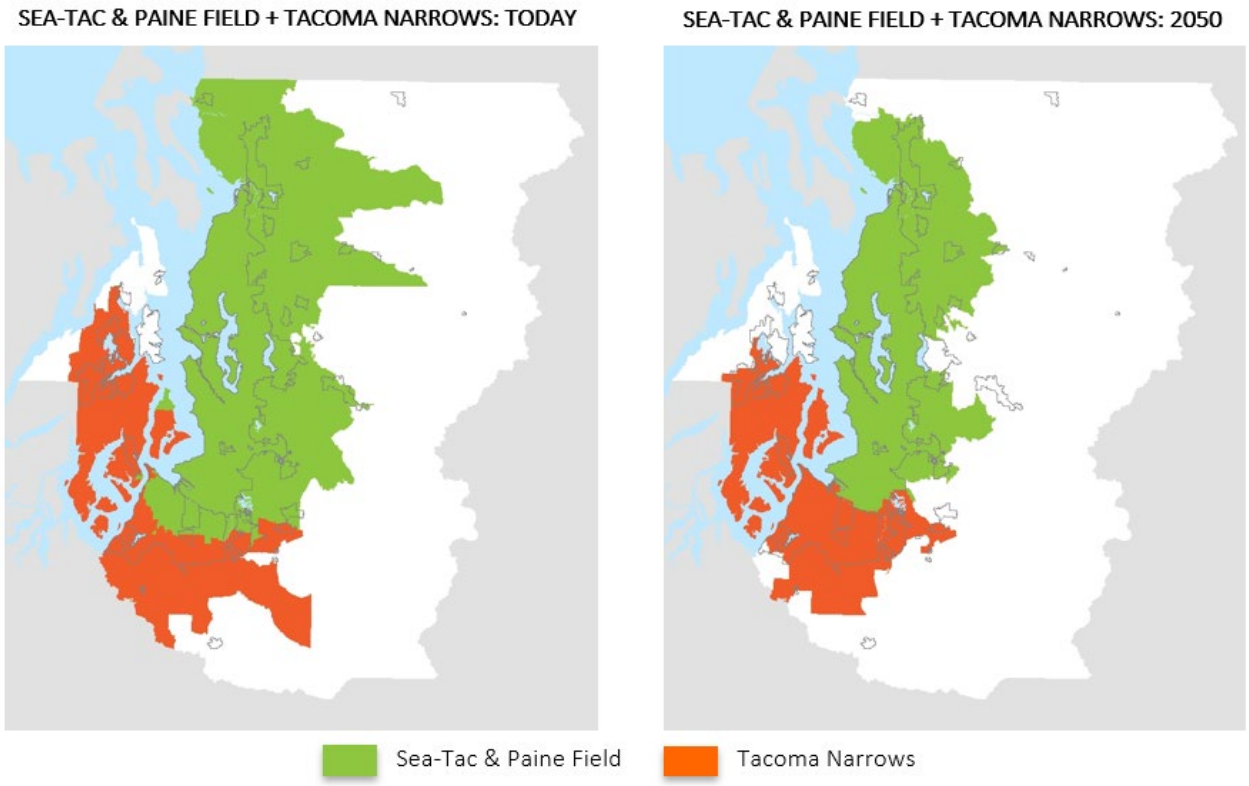
The population and employment within a 60-minute drive time was analyzed to determine the amount of coverage an additional airport would add in the future based on future congestion data. Combined with Sea-Tac and Paine Field, the population coverage is 92 percent (an increase of 22 percent from Sea-Tac and Paine Field alone) and the employment coverage is 95 percent (an increase of 15 percent from Sea-Tac and Paine Field), as summarized in **Table 4-18**. Both criteria exceed the respective benchmarks of 80 percent for population and 90 percent for employment, as depicted in **Figure 4-7**.

Table 4-18. Tacoma Narrows Airport Population and Employment Drive-Time Coverage

AIRPORT NAME	POPULATION WITHIN 60-MINUTE DRIVE TIME*	POPULATION NET BENEFIT	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT NET BENEFIT
Tacoma Narrows	Green (92%)	Green (22%)	Green (85%)	Green (15%)

*Includes Sea-Tac and Paine Field

Figure 4-7. Tacoma Narrows Airport Current and Future 60-Minute Drive-Time Coverage



4.5.4.3 Current and Future Roadway and Transit Access

The airport does not have interstate highway access within 5 miles. The closest interstate is I-5, just 7 miles to the southeast via the limited-access SR 16, which includes the Tacoma Narrows Bridge. This nearby connection to I-5 makes SR 16 the best candidate for providing interstate access to the airport. It is unlikely, however not infeasible, that this highway would be upgraded to an interstate due to its prominence in connecting Tacoma and Bremerton. Medium to highly dense residential development in the airport's vicinity, in addition to various water bodies, make the construction of new interstate highways very unlikely. Furthermore, US DOT has no plans to construct an interstate highway in the vicinity of the airport.

The airport also has excellent access from the state highway network on SR 16, which is a limited-access route from I-5 in Tacoma to Gorst farther north, a span of approximately 30 miles.

Despite excellent access from a limited-access highway, the airport lacks direct access from a 4-lane arterial road. Widening 26th Avenue NW to 4 lanes is feasible due to the potential availability of airport property to the west and undeveloped land to the east. Another potential candidate is Stone Drive NW, which runs along the northern edge of the airport. However, part of this road already runs through a tunnel underneath the threshold of Runway 17, drastically increasing the cost of the widening. Pierce County does not have plans to construct a 4-lane arterial in the vicinity of the airport.

The airport is not served by HCT. Pierce Transit Routes 100 (Gig Harbor) and 102 (Gig Harbor-Tacoma Express) and Sound Transit Express Bus Route 595 (Gig Harbor-Seattle) are accessible within a mile of the airport. The Pierce Transit routes operate on hourly headways seven days a week. The Sound Transit Express Route operates northbound trips in the morning peak and southbound trips in the afternoon peak. There are also multiple park-and-ride lots nearby that are served by the existing routes. It would be possible to modify one or more of the existing routes to serve the airport with HCT.

In some cases, the lack of a nearby motorway (typically a freeway) designated as an interstate does not mean that there is no nearby access to a limited-access multi-lane divided highway with no at-grade intersections. In the case of Tacoma Narrows Airport, for example, SR 16 is a fully access-controlled multi-lane divided highway that serves a network function identical to that of an interstate. In cases where interstate access does not exist within 5 miles but a motorway designated through the National Highway System meets the access criterion, an asterisk is provided in Table 4-19.

Table 4-19. Tacoma Narrows Airport Current and Future Transit and Roadway Access

AIRPORT NAME	INTERSTATE ACCESS		STATE HW ACCESS		4-LANE ARTERIAL STATUS		HIGH-CAPACITY TRANSIT	
	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access	Current Access	Potential for Access
Tacoma Narrows	No	Yellow*	Yes	Green	No	Yellow	No	Green

*Interstate access does not exist within 5 miles, but a motorway designated through the National Highway System meets the locality criteria.

4.5.4.4 Airspace Analysis

Tacoma Narrows Airport is15 nautical miles southwest of Sea-Tac. The airport is under the primary west side arrival and departure paths for Sea-Tac. The existing runway is near parallel to Sea-Tac. The runway is oriented 7 degrees to the west from Sea-Tac, when operating in south flow. Traffic from Sea-Tac and KCIA to the north, military restricted use to the south, McChord Airfield military traffic to the south, and a military route in the area to the west create conflicts due to the large volume of aircraft in a relatively small area of the airspace. Development of a commercial airport at this site is anticipated to have moderate constraints on the operation of Sea-Tac with the biggest challenge being from the large volume of traffic from multiple airports. Modern navigation technology could minimize conflicts between the two airports in the future.

Table 4-20 summarizes the airspace ratings. Appendix C presents the location of Tacoma Narrows Airport, with respect to Sea-Tac, Paine Field, and the other potential airport sites. The Seattle Terminal Area and location of the restricted airspace is also shown in this figure.

Table 4-20. Tacoma Narrows Airport Airspace Analysis

AIRPORT NAME	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS?	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
Tacoma Narrows	Yellow	Green

4.5.5 McChord Field Airport

4.5.5.1 Airport Layout Analysis

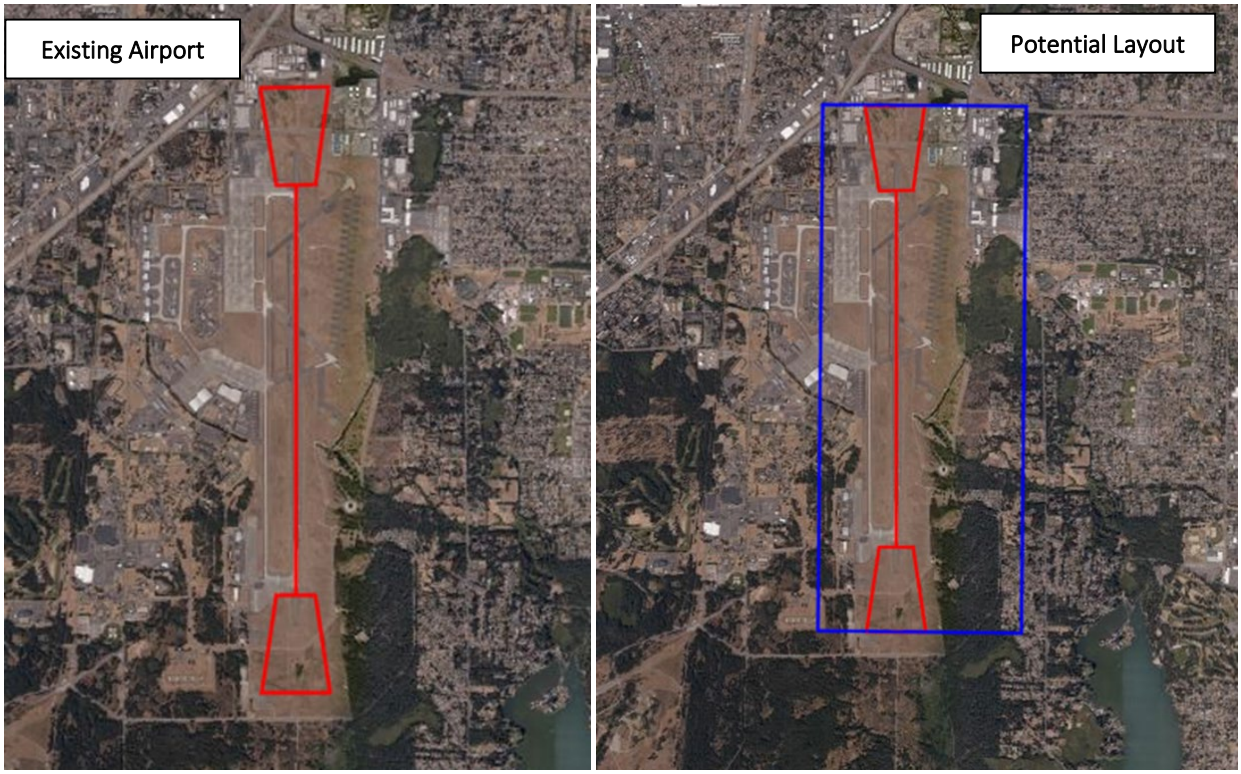
McChord Field, part of McChord Air Force Base (AFB), is a military airfield south of Tacoma in Pierce County. It has one existing runway that is 10,108 feet. Due to the military development surrounding the runway, there is not sufficient space to add an adequately spaced parallel runway. The area needed to accommodate commercial service operations was determined based on analysis of commercial service airport size at airports with similar operations to the future forecasted gap. **Table 4-21** summarizes the airfield evaluation.

Table 4-21. McChord Airfield Evaluation

AIRPORT	7,000' RUNWAY	9,000' RUNWAY	PARALLEL RUNWAYS	OFF-AIRPORT LAND USE	COMMERCIAL SERVICE AND CARGO NEEDS	ADDITIONAL OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING
McChord Field	Green	Green	Red	Green	Green	Yellow	Green

With some impact to surrounding development, the airport could accommodate a single or parallel 9,000-foot runways within the area for commercial service operations. Land use within one mile from the runway ends was evaluated to determine potential incompatible off-airport land uses. Currently, there are no incompatible land uses. **Figure 4-8** depicts the airport's general ability to accommodate the idealized parallel runway system necessary to meet a portion of the 2050 commercial service demand.

Figure 4-8. McChord Airfield Existing and Potential Layout



4.5.5.2 Population and Employment within a 60-minute Drive Time

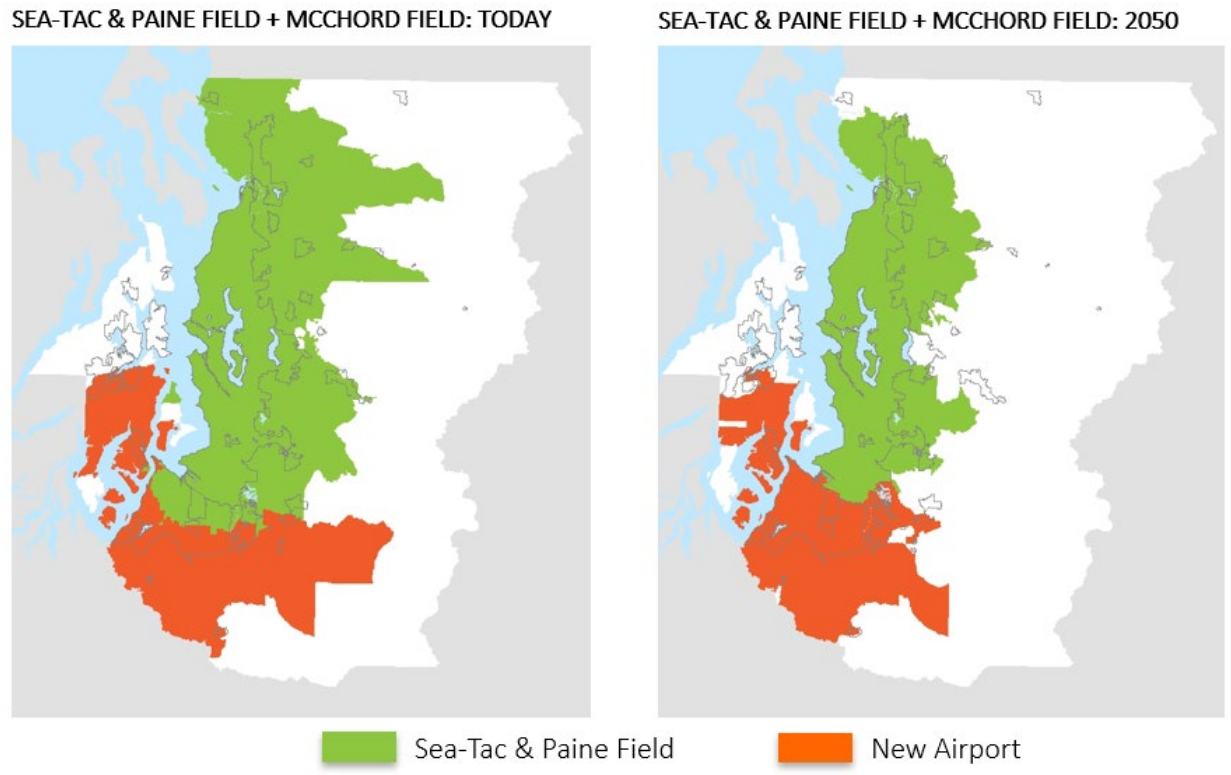
Another criterion that was evaluated was the population and employment within a 60-minute drive. Combined with Sea-Tac and Paine Field, the population coverage is 90 percent, an increase of 20 percent from Sea-Tac and Paine Field alone, and the employment coverage is 93 percent, which is an increase of 13 percent from Sea-Tac and Paine Field (**Table 4-22** and **Figure 4-9**). Both criteria meet the respective benchmarks of 80 percent for population and 90 percent for employment.

Table 4-22. McChord Field Population and Employment Drive Time Coverage

AIRPORT NAME	POPULATION WITHIN 60-MINUTE DRIVE TIME*	POPULATION NET BENEFIT	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT NET BENEFIT
McChord Field	Green (90%)	Green (20%)	Green (93%)	Green (13%)

*Includes Sea-Tac and Paine Field Airports

Figure 4-9. McChord Airfield Current and Future 60-Minute Drive-Time Coverage



4.5.5.3 Current and Future Roadway and Transit Access

While the proximity of the airport to both the interstate and state highway networks is excellent, low-capacity, low-speed streets inhibit efficient access to the field, which is wholly contained within the boundary of Joint Base Lewis-McChord (JBLM) and approximately 1 mile from the northwestern boundary of the base. Additionally, access to JBLM is controlled by the United States Government and flight operations at the airfield require the permission of the United States Air Force. Direct arterial access to I-5 is provided within 2 miles of the airport's western gates.

The portion of the base from which the airport is directly accessible is served by a 4-lane arterial road, Bridgeport Way SW, which designated as Col Jackson Blvd within JBLM. To the north, 112th Street S features a center turn lane in most sections and further capacity enhancements are highly feasible. The northeast corner of the base is adjacent to S Steele Street (a 4-lane undivided arterial) and SR 512, a regional freeway designated as part of the NHS. However, base access is not currently provided to either of these two facilities. Were a commercial terminal built to the east of the airport, the 4-lane section of Steele Street could be extended to the south to serve new terminal.

McChord Field is not currently served by HCT (Table 4-23). The configuration of the roadways on the AFB makes the direct provision of transit services difficult without redevelopment. Access could potentially be provided via Pacific Highway S and S Tacoma Way or SR 512 and S Steele Street. Pierce Transit is planning a bus rapid transit corridor along Pacific Avenue (SR 7) between downtown Tacoma and Spanaway. This corridor is approximately 2.8 miles east of the airport. It is unlikely this planned corridor would be extended to McChord Field due to the lack of ridership and the impracticality of providing access to trip generators on the base from the east side of the airfield.

Table 4-23. McChord Field Current and Future Transit and Roadway Access

AIRPORT NAME	INTERSTATE ACCESS		STATE HW ACCESS		4-LANE ARTERIAL STATUS		HIGH-CAPACITY TRANSIT	
	CURRENT ACCESS	POTENTIAL FOR ACCESS	CURRENT ACCESS	POTENTIAL FOR ACCESS	CURRENT ACCESS	POTENTIAL FOR ACCESS	CURRENT ACCESS	POTENTIAL FOR ACCESS
McChord Field	Yes	Green	Yes	Green	Yes	Green	No	Yellow

4.5.5.4 Airspace Analysis

McCord Field is located 19 NM south southwest of Sea-Tac. The airport is south of the primary arrival and departure paths for Sea-Tac or where these aircraft are at a high altitude. The existing runway is near parallel to Sea-Tac. The development of this airport is not anticipated to be constrained by the existing airspace, with the greatest issue being the proximity to other military operations. Development of a commercial airport at this site is not anticipated to have significant constraints on the operation of Sea-Tac. The location of McChord Field, with respect to Sea-Tac, Paine Field and the other potential airport sites is presented in Appendix Figure C-1. The Seattle Terminal Area and location of the restricted airspace is also shown in this figure.

Table 4-24. McChord Field Airspace Analysis

AIRPORT NAME	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS?	IMPACT TO SEA-TAC AIRSPACE OPERATIONS
McChord Field	Green	Green

4.6 OWNERSHIP

Airports that were not eliminated due to previous criteria were evaluated based on ownership, because ownership of an airport is important for funding. A publicly owned airport is eligible for federal grants for development at the airport. Four of the remain airports are publicly owned: Arlington Municipal, Bremerton National, Paine Field, and Tacoma Narrows. Private airports are privately owned, and the owners maintain the airport, which can lead to complications in funding significant improvements, such as expansion to accommodate commercial service. Because McChord Field is a federally owned military airport, Department of Defense agreement and Congressional approval would be needed prior to commercial service operations. Lacking support of these entities, further consideration of the commercial use at McChord Field was not recommended at this time. Thus, the airport ownership analysis was rated red. Table 4-25 summarizes the ownership challenges.

Table 4-25. Airport Ownership Analysis

AIRPORTS (FAA CODE)	AIRPORT OWNERSHIP ANALYSIS
Arlington Municipal Airport (AWO)	Publicly owned
Bremerton National Airport (PWT)	Publicly owned
McChord Field (Joint Base Lewis-McChord) (TCM)	Federally owned
Paine Field Airport (PAE)	Publicly owned
Tacoma Narrows Airport (TIW)	Publicly owned

4.7 EVALUATION CONCLUSION

Overall, after evaluating each remaining airport, Arlington Municipal, Bremerton National, Paine Field, and Tacoma Narrows could expand and accommodate commercial service and therefore could help meet the growing demand of the region through 2050. The following summarizes the results of the analysis:

- Arlington Municipal Airport, while it does not add to the population and drive-time coverages for the region, does have expansion capabilities to potentially accommodate commercial service to help meet the future gap in the region through 2050.
- Bremerton National Airport has potential to expand to accommodate commercial service operations as well. There is potential for the airport to accommodate a single or parallel 9,000-foot runways with limited impacts to developed areas. It also exceeds the benchmarks for population and employment drive-time coverages.
- Paine Field, which offers limited commercial service, is operating in the northern area of the Puget Sound region. It is limited in the number of additional commercial service operations that can occur each day (24 departures) based on the environmental analysis (2018 Environmental Assessment) conducted when the airport began accommodating commercial service operations. However, with additional planning and environmental review, it could accommodate more.
- Tacoma Narrows Airport could expand to meet the commercial service operational needs for some of the 2050 gap and would also meet the benchmark for population and employment drive-time coverage.

5. Summary and Next Steps

The Baseline Study evaluated several scenarios as to how the region could address accommodating the projected 2050 demand for passengers and cargo. The scenarios range from "Baseline", which assumes Sea-Tac only builds its Near-Term Vision (with Paine Field providing some regional passenger service and together accommodating around 28 million annual passenger enplanements but leaving a gap of 27 million unserved enplanements or meeting 51 percent of the 2050 demand) to the last scenario where Sea-Tac, Paine Field, and other airports (1 or 2 or 3 existing airports) expand to accommodate the 55 million projected passenger enplanements or 100 percent of the demand. Table 5-1 presents a summary of the four scenarios.

Table 5-1. Projected Demand Accommodating Scenarios

SCENARIOS FOR YEAR 2050 PASSENGER ENPLANEMENT DEMAND (55M)	2050 PASSENGER DEMAND/ CAPACITY MET	PERCENTAGE OF 2050 DEMAND MET	RESULTING ANNUAL PASSENGER ENPLANEMENT GAP	ESTIMATED ANNUAL LOST IN ECONOMIC IMPACT	ESTIMATED LOST IN JOBS TO THE REGION
Scenario 1, "Baseline": Sea-Tac Implements Near-Term (2027) Vision	28,000,000	51%	27,000,000	~$22 billion	~150,000
Scenario 2, "Sea-Tac Implements Long-Term (2037) Vision"	33,000,000	60%	22,000,000	~$18 billion	~122,000
Scenario 3, "Long-Term Vision + Accommodate 50% of the Projected Gap"	44,000,000	80%	13,500,000	~$9 billion	~61,000
Scenario 4, "Long-Term Vision + Accommodate 100% of Projected Gap"	55,000,000	100%	0	$0	0

Note: The 2019 WSDOT Airport Economic Impact Study estimated Sea-Tac to contribute 151,400 jobs, $7 billion in labor income, and $22 billion in business revenues.

Achieving these levels of passenger demand would be challenging and require significant funding, so the converse should also be considered. Scenario 1, "Baseline," which accommodates 28 million enplaned passengers by 2050, would result in a lost economic opportunity of approximately $22 billion in annual business revenues and approximately 150,000 jobs. So, if the region cannot or chooses not to accommodate all or half of the projected 55 million enplanement demand, the potential economic impact and jobs will be affected accordingly as estimated in Table 5-1.

Table 5-2 summarizes "Pros and Challenges" of these demand scenarios from a very high level. If 100 percent of the demand could be accommodated—basically doubling what Sea-Tac could achieve with its Near-Term Vision—both the economic and the environmental impacts could double, based on aircraft operations, vehicles traveling to airports, etc. doubling as well. This is a conservative estimate, assuming the worst case, that aircraft engines are not improved (no reduction in noise, no improvement in fuel

efficiency or new non-hydrocarbon fuels) and there is no "cleaner" way to transport passengers to the airports.

Table 5-2. Scenario Pros and Cons Compared to "Baseline" Scenario

SCENARIOS FOR YEAR 2050 PASSENGER ENPLANEMENT DEMAND (55M)	PROS	CHALLENGES
Scenario 1, "Baseline": Sea-Tac Implements Near-Term (2027) Vision	▪ No increase in potential 2050-level noise and aircraft carbon impacts, single-occupancy vehicle trips to airports.(1)	▪ No increase in airport economic impact $ and jobs by 2050. ▪ Reduces business and consumer choices compared to other scenarios.
Scenario 2, "Sea-Tac Implements Long-Term 2037 Vision"	▪ Generally, increases potential 2050-level noise and aircraft carbon impacts, single-occupancy vehicle trips to airports by ~18%.(2) ▪ Increases business and consumer choices compared to Baseline but less than other scenarios.	▪ Generally, increases potential 2050 airport economic impact $ and jobs by ~18%.
Scenario 3, "Long-Term Vision + Accommodate 50% of the Projected Gap"	▪ Generally, increases potential 2050-level noise and aircraft carbon impacts, single-occupancy vehicle trips to airports by ~60%.(2) ▪ Increases business and consumer choices compared to Baseline and Long-Term-Vision Scenarios.	▪ Generally, increases potential 2050 airport economic impact $ and jobs by ~60%.
Scenario 4, "Baseline + Accommodating 100% of Projected Gap"	▪ Generally, increases 2020 potential airport economic impact $ and jobs by ~100%.(3) ▪ Provides the most business and consumer choices compared to other scenarios.	▪ Generally, increases potential 2020-level noise and aircraft carbon impacts and single-occupancy vehicle trips to airports by ~100%.(4)

(1) Assumes worst-case no improvements in current aircraft/engine efficiency, noise emissions and fuel types.
(2) Assumes percentage of demand increase roughly relates to the percentage increase/decrease of impacts and benefits.
(3) Assumes doubling of existing airport passengers is related to doubling the 2019 economic impact in dollar output and job creation.
(4) Assumes doubling the existing airport passengers in the future would double the noise and carbon impacts.

As shown in Table 5-2, the scenarios have trade-offs. Scenarios that would increase economic impact and jobs would also increase noise and carbon dioxide emissions. Conversely, limiting noise and carbon dioxide emissions at airports by not accommodating passenger demand would directly affect the economy and jobs, and passenger access would increase beyond a 60-minute drive time. In addition to the direct economic impact of not meeting forecast demand, businesses and passengers would not be able to access the level of air service that they need (as discussed in Chapter 2).

5.1 POTENTIAL SUPPLEMENTAL AIRPORTS

The region's existing airports were reviewed for their potential to play a role in meeting the additional demand for commercial passenger service in Chapter 4. None of the airports individually had the potential to meet all or even 50 percent of the demand. However, as detailed in Chapter 4, Arlington Municipal, Bremerton National, and Tacoma Narrows Airports could expand and accommodate some of the commercial service needs and therefore could help meet the growing demand of the region through 2050. If the region were to build one additional major commercial airport to accommodate the full demand, that would likely need to be a greenfield site. The siting of a greenfield site was outside of the scope of this study. Further analysis would be needed to understand if there is a viable location to site a greenfield airport that would meet the criteria.

As stated in Section 2, airlines decide where, when, how often, and what aircraft to serve airports, not FAA, airports, or the community. The challenge for policymakers and the region's airports will be to convince an airline to serve another airport(s), other than Sea-Tac and Paine Field, even if runways, terminals, etc. are built. The business deal for the airlines must be convincing to move an expensive aircraft from a known revenue-producing route to an additional airport(s) in the central Puget Sound region and be profitable.

5.2 NEXT STEPS

Expanding existing airports or building a "greenfield" airport to accommodate future commercial service operations involves many steps to obtain FAA approval and funding consideration.

5.2.1 Existing Airports

For existing airports that want to change their primary role from serving general aviation to commercial service operations, the following steps (and estimated timelines) outline the major items to accomplish this:

- Statewide Airport System Plan (WSDOT) is updated and recommends change in role. (~2 years)
- FAA Airport Master Plan would be conducted and approved by FAA and WSDOT, including commitment by at least one airline that would serve the airport(s). Airline aircraft types and destinations would justify the runway length that could be built initially and how many gates terminal would require, etc. (~2 years)
- FAA would decide the National Environmental Policy Act requirements for expanding an airport, either an Environmental Assessment or Environmental Impact Statement, which would result in a Finding of No Significant Impact or Record of Decision, respectively. (~2 to 4 years, assuming no litigation)
- FAA Benefit-Cost Analysis would be required since millions of federal dollars would be required to fund the necessary airport capital improvements, but only those eligible for FAA funding (runway, taxiway and aprons, but not non-revenue producing projects, like vehicle parking and exclusive-use terminal functions). (~1 year)
- Federal and state funding grants, financing, engineering, land acquisition, construction, commissioning, etc. (10+ years)

5.2.2 New Airport

Generally, the search for a new airport site is started if it is determined that existing airport(s) cannot be expanded to meet the long-term future demand. In the United States, the cost of constructing a new airport is generally prohibitive without FAA funding participation, and it is extremely rare for commercial service airports to be built without FAA funding assistance. Because federal funding will be needed, the focus is on describing the FAA's process for establishing the need for a new airport, selecting a site, and implementing a new airport. The general steps that apply to developing new airport projects with FAA funding assistance follow:

- Airport Master Planning (~2 years)
- Site Selection Study (~2 to 3 years)
- Airline Support (variable)
- Detailed Site Planning and Feasibility (~2 to 3 years)
- Environmental Review (EIS 2 to 4 years, assuming no litigation)
- Benefit-Cost Analysis (~1 year)
- Land Acquisition (variable)
- Environmental/Construction Permitting (variable)
- Engineering Design (~2 years)
- Construction (~5 years)

Appendix E provides more details on each of these steps for constructing a new airport in the United States.

Appendix A – Airport Analysis Matrix

Ability to accommodate 7,000' Runway	Ability to accommodate 9,000' Runway	Existing Incompatible off-airport land use within 1 mile of runway ends	Potential to accommodate CS and Cargo (belly) (on airport/adjacent off airport)*	Accommodate additional airfield demand in 2050? (ASV aircraft operations)	Accommodate Parallel Runways?	Existing Incompatible off-airport land use within 1 mile of runway ends (parallel runways)	Impact to Existing Aerospace Manufacturing	2050 Population within 60 minute Drive Time	2050 Employment within 60 minute Drive Time	Potential/Future Transit Access	Current/Potential Roadway Access	Existing Airspace Constraints or Conflicts?	Impact to SEA-TAC airspace operations
Criteria Ratings:													
GREEN: Can accommodate based on visual analysis or ALP (extension shown on ALP or adequate space for runway extension)	GREEN: Can accommodate based on visual analysis or ALP (extension shown on ALP or adequate space for runway extension)	GREEN: No impacts based on Inventory chapter by visual analysis or ALP (RPZs have no incompatible uses, no residential areas surrounding airport)	GREEN: Yes, space available based on airport manager survey or visual analysis*	GREEN: Yes, based on future demand compared with Annual Service Volume (ASV) in Master Plan	GREEN: Can accommodate based on visual analysis or ALP (shown on ALP or adequate space for runway extension)	GREEN: No, based on Inventory chapter, by visual analysis or ALP (RPZs have not incompatible uses, no/minimal residential areas surrounding airport)	GREEN: No impact	GREEN: Including Sea-Tac capture area, airports meets benchmark^	GREEN: Including Sea-Tac capture area, airports meets benchmark^	GREEN: Currently has transit access or planned transit access	GREEN: Currently, meets all of the following criteria: interstate within 5 miles, state route within 2 miles, and direct 4 lane arterial access	GREEN: No existing constraints or conflicts based on airspace analysis	GREEN: No, does not impact SEA-TAC airspace based on airspace analysis
YELLOW: Potentially accommodate with significant modification and investment based on visual analysis (large residential areas, major roadways)	YELLOW: Potentially accommodate with significant modification and investment based on visual analysis (large residential areas, major roadways)	YELLOW: Partial impacts, based on Inventory Chapter by visual analysis or ALP (some but not all RPZ are compliant, minimal residential areas surrounding airport)	YELLOW: Limited space available based on airport manager survey or visual analysis (limited reorganization of current facilities required)*	YELLOW: Partially, based on future demand compared with ASV in Master Plan	YELLOW: Potentially accommodate with significant modification and investment based on visual analysis (large residential areas, major roadways)	YELLOW: Partial, based on Inventory Chapter by visual analysis or ALP (some but not all RPZ are compliant, minimal residential areas surrounding airport)	YELLOW: Limited Impact (slightly reduce space)	YELLOW: Including Sea-Tac capture area, airports coverage increases but does not meet benchmark^	YELLOW: Including Sea-Tac capture area, airports coverage increases but does not meet benchmark^	YELLOW: Potential for transit access based on visual analysis but not currently planned	YELLOW: Currently, only meets two of the following three criteria: interstate within 5 miles, state route within 2 miles, and direct 4 lane arterial access	YELLOW: Limited constraints or conflicts based on existing airspace analysis	YELLOW: Slight impact to SEA-TAC airspace based on existing airspace analysis
RED: Cannot accommodate based on visual analysis (water, major highway, significant residential areas, significant development)	RED: Cannot accommodate based on visual analysis (water, major highway, significant residential areas, significant development)	RED: Yes impacts, based on inventory analysis by visual analysis or ALP (RPZs are not compliant, significant residential areas surrounding airport)	RED: No space available based on airport manager survey or visual analysis (airport property built out or no space with adequate airfield access)*	RED: No, based on future demand compared with ASV in Master Plan	RED: Cannot accommodate based on visual analysis (water, major highway, significant residential areas/existing development)	RED: Yes, based on inventory analysis by visual analysis or ALP (RPZs are not compliant, significant residential areas surrounding airport)	RED: Yes, major impact (would have to relocate to another airport or significantly reduce space)	RED: Including Sea-Tac capture area, airports does not meet benchmark^	RED: Including Sea-Tac capture area, airports does not meet benchmark^	RED: Unable to accommodate or significant modifications needed to accommodate based on visual analysis	RED: Currently, only meets one or none of the following criteria: interstate within 5 miles, state route within 2 miles, and direct 4 lane arterial access	RED: Significant constraints or conflicts based on existing airspace analysis	RED: Significant impact to SEA-TAC airspace based on existing airspace analysis

*Maps were created with average acreage and terminal gate requirements to determine potential ability to accommodate commercial service needs
^Only analyzed airports that have been identified as practical alternatives

AIRPORTS	ABILITY TO ACCOMMODATE 7,000' RUNWAY	ABILITY TO ACCOMMODATE 9,000' RUNWAY	ABILITY TO ACCOMMODATE PARALLEL RUNWAYS	ABILITY TO ACCOMMODATE COMMERCIAL SERVICE AND CARGO (BELLY) NEEDS	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS	IMPACT TO SEA-TAC AIRSPACE OPERATIONS	FLOOD HAZARD ZONE	POTENTIAL TRANSIT ACCESS	POTENTIAL ROADWAY ACCESS (INTERSTATE)	POTENTIAL ROADWAY ACCESS (STATE HW)	POTENTIAL ROADWAY ACCESS (4 LANE)	EXISTING INCOMPATIBLE LAND USE	CURRENT ABILITY TO ACCOMMODATE ADDITIONAL AIRFIELD OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING	POPULATION WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	OWNERSHIP
Arlington Municipal Airport (AWO)	GREEN	GREEN	YELLOW	GREEN	GREEN	GREEN	GREEN	YELLOW	GREEN	GREEN	GREEN	YELLOW	YELLOW	GREEN	RED	RED	GREEN
Bremerton National Airport (PWT)	GREEN	GREEN	GREEN	GREEN	YELLOW	YELLOW	GREEN	YELLOW	RED	GREEN	GREEN	GREEN	YELLOW	GREEN	GREEN	GREEN	GREEN
Paine Field Airport (PAE)	GREEN	GREEN	RED	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	GREEN	RED	RED	YELLOW	RED	RED	GREEN
Tacoma Narrows Airport (TIW)	GREEN	GREEN	YELLOW	GREEN	YELLOW	GREEN	GREEN	GREEN	YELLOW	GREEN	YELLOW	YELLOW	YELLOW	GREEN	GREEN	GREEN	GREEN
McChord Field (Joint Base Lewis-McChord) (TCM)	GREEN	GREEN	RED	GREEN	YELLOW	GREEN	GREEN	YELLOW	GREEN	GREEN	GREEN	YELLOW	YELLOW	GREEN	GREEN	GREEN	RED
Harvey Field Airport (S43)	YELLOW	YELLOW	YELLOW	YELLOW	YELLOW	GREEN	RED										
Vashon Municipal Airport (2S1)	GREEN	GREEN	GREEN	GREEN	RED	RED											
Apex Airpark (8W5)	YELLOW	YELLOW	YELLOW	YELLOW	RED	GREEN											
First Air Field (W16)	YELLOW	YELLOW	YELLOW	YELLOW	RED	YELLOW											
King County International Airport-Boeing Field (BFI)	GREEN	GREEN	RED	RED													
Norman Grier Field Airport (S36)	YELLOW	YELLOW	YELLOW	RED													
Pierce County Airport-Thun Field (PLU)	YELLOW	YELLOW	YELLOW	RED													
Shady Acres Airport (3B8)	YELLOW	YELLOW	YELLOW	RED													
American Lake SPB (W37)	RED	RED	RED														
Auburn Municipal Airport (S50)	RED	RED	RED														
Bandera State Airport (4W0)	RED	RED	RED														
Darrington Municipal Airport (1S2)	RED	RED	RED														
Gray Army Airfield (Joint Base Lewis-McChord) (GRF)	RED	RED	RED														
Kenmore Air Harbor Inc SPB (S60)	RED	RED	RED														
Kenmore Air Harbor SPB (W55)	RED	RED	RED														
Lester State Ultralight Flightpark (15S)	RED	RED	RED														
Port of Poulsbo Marina Moorage SPB (83Q)	RED	RED	RED														

AIRPORTS	ABILITY TO ACCOMMODATE 7,000' RUNWAY	ABILITY TO ACCOMMODATE 9,000' RUNWAY	ABILITY TO ACCOMMODATE PARALLEL RUNWAYS	ABILITY TO ACCOMMODATE COMMERCIAL SERVICE AND CARGO (BELLY) NEEDS	EXISTING AIRSPACE CONSTRAINTS OR CONFLICTS	IMPACT TO SEA-TAC AIRSPACE OPERATIONS	FLOOD HAZARD ZONE	POTENTIAL TRANSIT ACCESS	POTENTIAL ROADWAY ACCESS (INTERSTATE)	POTENTIAL ROADWAY ACCESS (STATE HW)	POTENTIAL ROADWAY ACCESS (4 LANE)	EXISTING INCOMPATIBLE LAND USE	CURRENT ABILITY TO ACCOMMODATE ADDITIONAL AIRFIELD OPERATIONS	IMPACT TO AEROSPACE MANUFACTURING	POPULATION WITHIN 60-MINUTE DRIVE TIME	EMPLOYMENT WITHIN 60-MINUTE DRIVE TIME	OWNERSHIP
Ranger Creek State Airport (21W)	RED	RED	RED														
Renton Municipal Airport (RNT)	RED	RED	RED														
Seattle Seaplanes SPB (0W0)	RED	RED	RED														
Skykomish State Airport (S88)	RED	RED	RED														
Swanson Airport (2W3)	RED	RED	RED														
Will Rogers/Wiley Post Memorial SPB (W36)	RED	RED	RED														

Appendix B – Ability to Accommodate Commercial Service and Belly Cargo Needs

The following figures were used to analyze an airport's ability to accommodate commercial service and belly cargo needs. Red shows the current runway conditions. Orange corresponds to a 7,000-foot runway, and blue corresponds to a 9,000-foot runway. A 2,000-acre box is the minimum needed space for a single-runway airport.

Figure B-1. Apex Airpark Developed Area Analysis (<50% Developed)

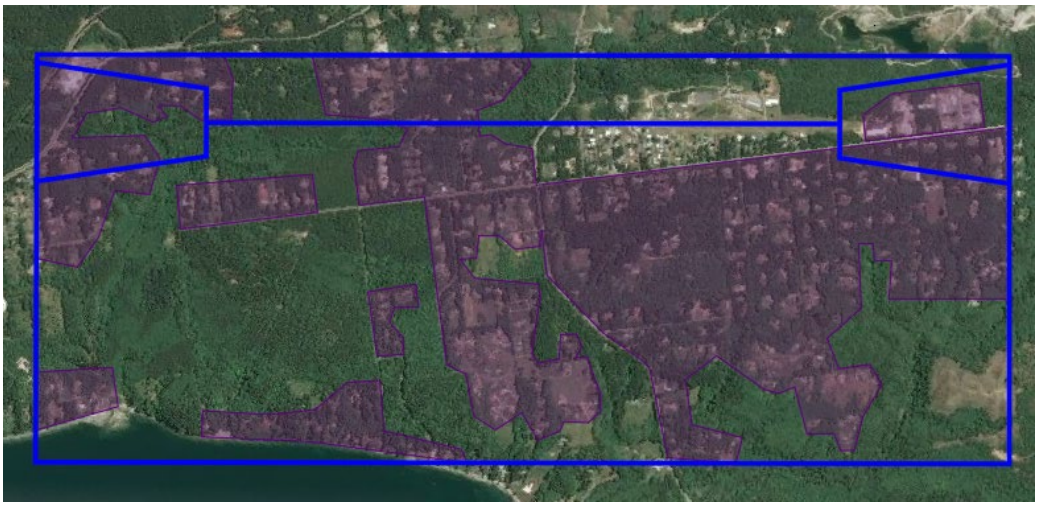


Figure B-2. Arlington Municipal Airport Developed Area Analysis (<50% Developed)

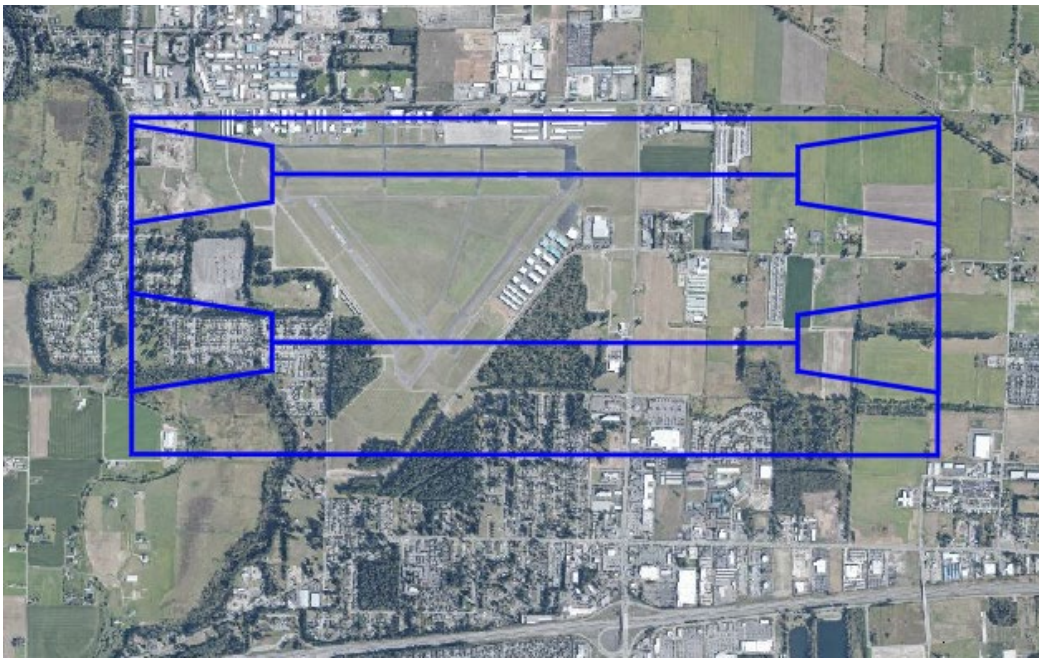


Figure B-3. Bremerton Municipal Airport Developed Area Analysis (<50% Developed)

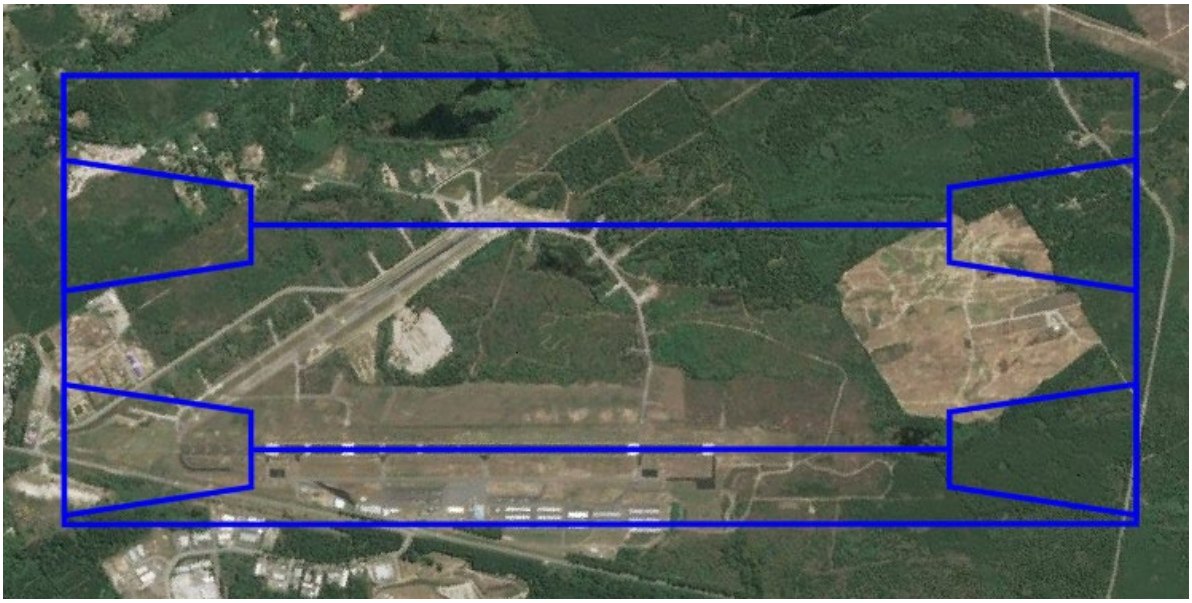


Figure B-4. First Air Field Developed Area Analysis (38% Developed)

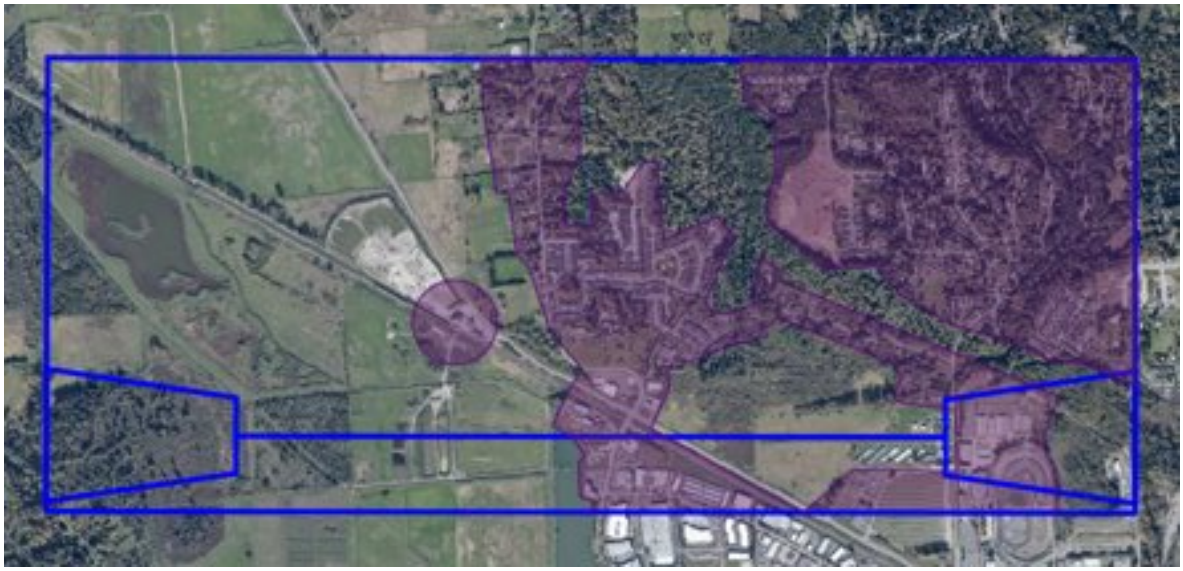


Figure B-5. Harvey Field Airport Developed Area Analysis (15% Developed Area)

Figure B-6. King County International Airport-Boeing Field Developed Area Analysis (>50% Developed)

Figure B-7. McChord Field Developed Area Analysis (<50% Developed)

Figure B-8. Norman Grier Field Developed Area Analysis (77% Developed)

Figure B-9. Paine Field Airport Developed Area Analysis (<50% Developed)

Figure B-10. Pierce County Airport Developed Area Analysis (>50% Developed)

Figure B-11. Shady Acres Developed Area Analysis (73% Developed)

Figure B-12. Swanson Airport Developed Area Analysis (>50% Developed)

Figure B-13. Tacoma Narrows Airport Developed Area Analysis (<50% Developed)

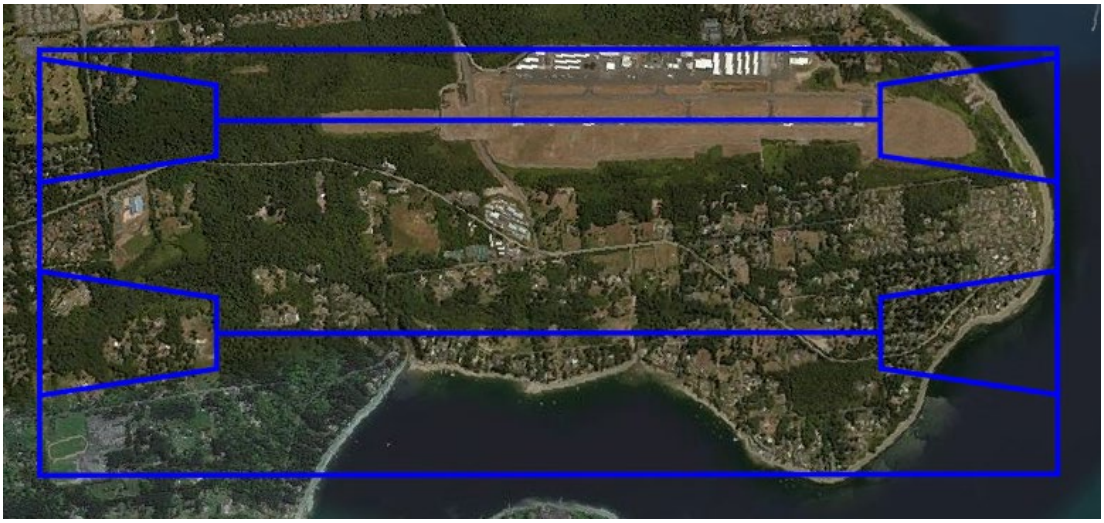
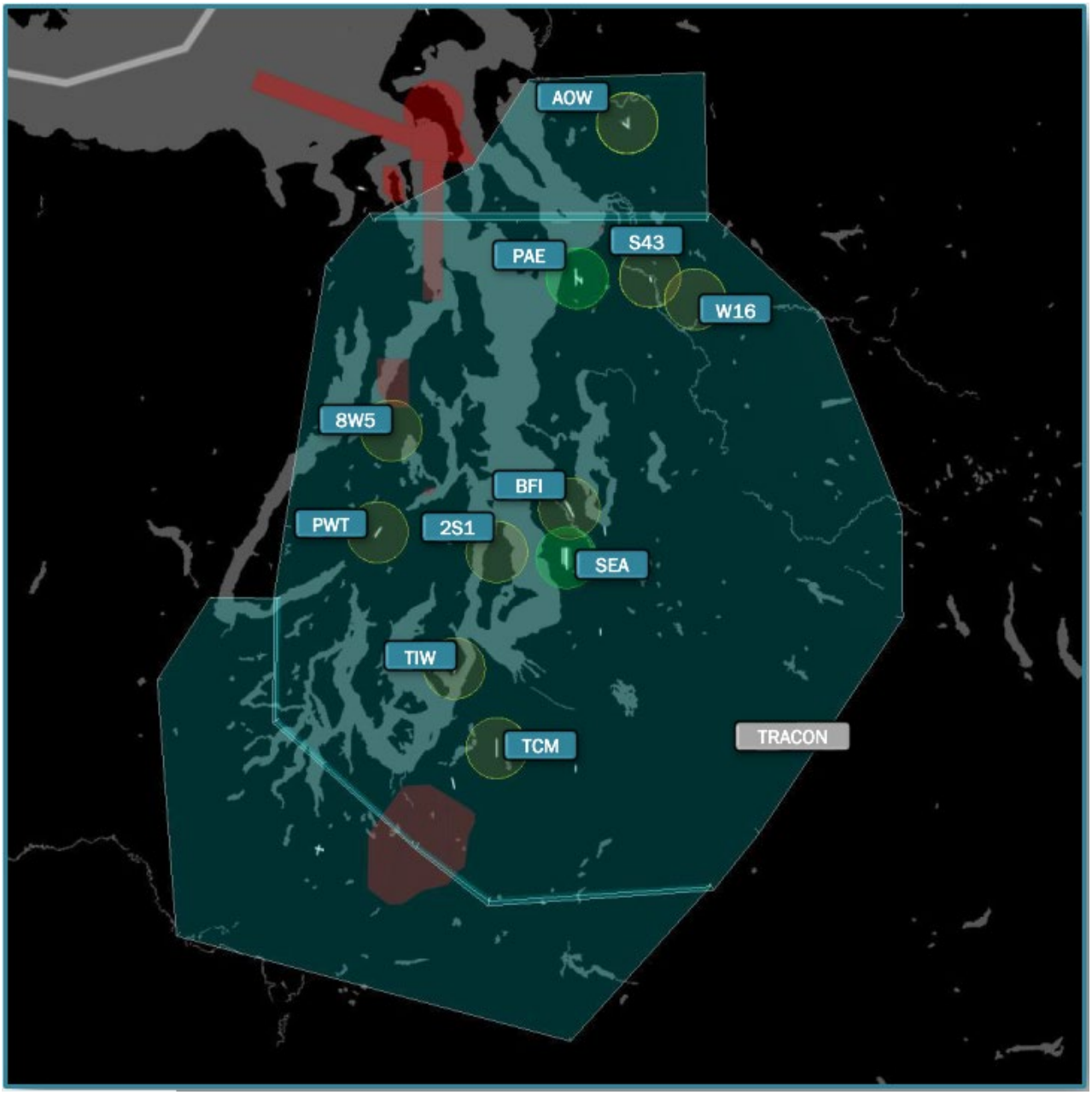


Figure B-14. Vashon Airport Developed Area Analysis (<50% Developed)

Appendix C – Airspace Analysis

Figure C-1. Airspace Analysis



Appendix D – Flood Zone Analysis

Figure D-1. Harvey Field Federal Emergency Management Agency Flood Zone Map

Appendix E – New Airport Development Process

Generally, the search for a new airport site is started if it is determined that the existing airport cannot be expanded to meet the long-term future demand. In the United States, the cost of constructing a new airport is generally prohibitive without FAA funding participation, and no commercial service airports have been built without FAA funding assistance. Since federal funding will be needed, this technical memorandum therefore focuses on describing the FAA's process for establishing the need for a new airport, selecting a site, and implementing a new airport. The following general steps apply to developing new airport projects with FAA funding assistance:

AIRPORT MASTER PLANNING

The FAA-guided process to determine how to best plan for accommodating future airport needs is called "airport master planning." This process serves to forecast future aviation demand and associated airport needs and whether or when those needs can no longer be met at the existing airport site. Generally, the FAA considers 20 years the longest reasonable planning horizon. Once an airport has completed an approved FAA master plan, the planned projects from these studies are eligible for funding from the FAA's Airport Improvement Program. All planned eligible projects are subject to additional environmental and financial approvals. Planned airport projects can range from expansions of tenant areas, to airport access road improvements, to large projects such as a new passenger terminal or runway extensions, and property acquisition.

SITE SELECTION STUDY

If it is established in an FAA-accepted master plan that an existing airport cannot be expanded to meet long-term aviation needs, the next step is to start a new airport site selection effort. A site selection study process would start with the definition of the overall requirements of the future airport facilities that the site would have to be able to accommodate. Initial criteria that can be used to identify and evaluate different potential sites and to determine if each can function as an airport and meets the needs of the community and users include driving and transit access time for the passengers and a minimum land area.

Given the large land requirement for a new airport, it is possible no sites can be identified that are both large enough and offer reasonable access travel time for the passengers. It is therefore important to analyze where passengers originate in the region and are destined to travel to in the future.

Once preliminary sites have been identified, an evaluation would be conducted to screen out those with the most obvious shortcomings. Initial screening factors typically include topography and geotechnical considerations, natural and built obstructions, airspace, accessibility, environmental impacts, and development costs. If any sites are eliminated from further consideration, thorough documentation of the objective reasons for that decision is essential for the project to successfully undergo subsequent environmental processing.

The remaining potential sites would then undergo a detailed comparison using comprehensive evaluation criteria. While the criteria may vary, the following would be considered at a minimum:

- Operational capability – The site should provide the operational capability necessary to serve the defined role of the airport and the needs of its users.
- Capacity potential – If the new airport is needed to provide additional capacity, the capability of the site in providing long-term capacity growth is important.
- Ground access – An important factor is the ability of the users to get to and from the airport easily and in a timely manner.
- Development costs – Simple order-of-magnitude cost estimates are useful in determining the financial feasibility of building a new airport.
- Environmental consequences – The potential environmental impacts, including noise, associated with a new site may be critical to gaining approval.
- Planning – Consistency with area-wide planning.

AIRLINE SUPPORT

At some point early during the planning process, it is critical to obtain airline support as they are key airport tenants and would share in the direct and indirect cost of the new airport development. They would help pay for the new airport through terminal rentals and airfield charges (landing fees). Airlines, as for-profit business enterprises, would only be interested in relocating if they supported the need for a new airport, the proposed development plan, and the general lease terms. In the United Sates, airlines cannot be made to relocate to another airport.

DETAILED SITE PLANNING AND FEASIBILITY

The detailed site-specific airport planning in the form of a master plan would occur after the recommended site would have received preliminary approval by the FAA. Such preliminary site information would include local updated wind data, an aviation activity forecast, identification of the critical aircraft, required runway dimensions, type of instrument approach capability needed, total acreage, and minimum dimensions required of the site. Upon approval of detailed site planning, the airport would be included in the National Plan of Integrated Airports by the FAA, which makes it eligible to continue as a project and FAA funding.

ENVIRONMENTAL REVIEW

The site ultimately selected and planned in more detail will be subject to environmental review and approval under the National Environmental Protection Act (NEPA), which in the case of a new commercial service airport, entails an Environmental Impact Statement (EIS). This process will scrutinize the need for the new airport, evaluate the sites studied in the selection process (including those that were dismissed), and compare them against a no-build scenario. Local support for the project is important, and without it, the EIS would most likely not be successfully completed and the project would stall. All projects associated with the proposed new airport will be considered in the impact evaluation, including impacts caused by the

construction of the airport, its access road, transit access, and airspace. The alternatives analysis serves to select the alternative that meets the long-term need with the least environmental impact. As such, it will consider options to expand the existing airport to the extent possible. The FAA, rather than a city or a state agency, leads the NEPA process, which currently requires approximately 36 months to complete, if no complications arise. The NEPA process focuses on project justification, avoiding impacts, minimizing those that cannot be avoided, and lastly, mitigating remaining impacts. After unavoidable impacts are identified and planned to be minimized, commitments will be made on specific environmental mitigation measures. A successful EIS results in an FAA Record of Decision that allows the project to proceed.

BENEFIT-COST ANALYSIS (BCA)

The planning and construction of a new airport is eligible for FAA funding, if it was accepted by the FAA in the planning process described above. For the project to proceed beyond the planning stage with FAA funding participation, BCA is required. This process will compare the economic benefits of the new airport to the construction costs and must find that the benefits exceed the cost (have a BCA ratio greater than 1.00).

LAND ACQUISITION

Next, land acquisition proceeds and may include condemnation of property, assuming the sponsor of the new airport initiative has eminent domain rights in the jurisdiction of the new site. While land acquisition may be started sooner in the anticipation of obtaining the required approvals, land acquisition costs are significant and only those acquisition costs incurred after the EIS Record of Decision are eligible for FAA funding. Given the amount of property that is required for a new airport, land acquisition can take years. Land acquisition costs could be partially offset with the eventual proceeds from the sale of the existing airport property.

ENVIRONMENTAL/CONSTRUCTION PERMITTING

Separate from the NEPA process, development projects also require various environmental and construction permits from local and state agencies. These are requested by the airport sponsor, usually during the latter stages of NEPA or during the engineering design. Generally, major construction on a large new site has unavoidable environmental impacts that will need to be mitigated and become part of the cost of the project. In addition, FAA Form 7460, Notice of Proposed Construction or Alteration, and FAA Form 7480, Notice of Construction, Alteration, or Deactivation of Airports, which both serve to among other things, identify any airspace hazards to navigation, must be submitted and approved by FAA.

ENGINEERING DESIGN

This step involves converting the plan for the new airport into detailed engineering design that can be used for construction. In the interest of time, design, which would normally take several years, can be started while land acquisition is underway.

CONSTRUCTION

Construction of a new airport includes site work, implementing environmental mitigation measures, and construction of the airport and associated facilities, including access roadway and transit facilities, runways and taxiways, terminals, parking, support facilities, and other facilities. Ultimately, the facility would be commissioned and employees of the airport, airlines, and relocating tenants would be moved to the new facility.