



WASP

Washington Aviation System Plan
AIRPORT SITE SELECTION STUDY

Screening Process, Methodology, and Results

Final

August 2022



1. Introduction

Prior tasks of the Airport Site Selection Study component of the Washington Aviation System Plan (WASP) documented initial site selection components including the goals of the site selection study, facility templates, and screening criteria, as well as market analysis of the demand in the Puget Sound Region.

This chapter documents the method used to identify potential greenfield airport site locations, the evaluation and initial screening process, the methodology used to screen the five criterion categories and results of this screening, ending with a summary of the screening evaluation results.

2. Identification of Sites

The first step regarding actual site analysis was to examine, analyze, and project the potential of existing airports to meet anticipated commercial service passenger and cargo demand, as well as new airport sites (referred to as greenfield sites). As part of the study's efforts, potential greenfield site locations were identified that could serve the unaccommodated passenger demand, with less focus on cargo as there are additional factors that impact the viability of an airport to serve cargo compared to passenger demand.

The study's initial effort to identify potential greenfield sites was to review past studies completed by various agencies over the past 30 years. The following studies were reviewed and provided insight into establishing potential greenfield site locations, including identifying potential sites or providing information on what characteristics would allow for a potential future airport site:

- 1992 Puget Sound Regional Council (PSRC) Flight Plan Report
- 2009 Long-Term Air Transportation Study (LATS)/Washington Aviation System Plan
- 2017 Washington Aviation System Plan (WASP) Update
- 2018 Joint Transportation Committee (JTC) Air Cargo Movement Study
- 2021 Puget Sound Regional Council (PSRC) Aviation Baseline Study

A combination of factors was considered to establish the geographic limits of potential greenfield site locations. The market analysis discussed in **Chapter 2** established a general geographic boundary for a greenfield site within approximately 100 miles from downtown Seattle as the estimated population center for the region. This boundary provides a more comprehensive set of site options than has previously been examined.

All potential sites were located west of the Cascade Mountain Range due to travel time considerations, access during inclement weather, and proximity to the unaccommodated passenger demand. No greenfield sites were identified on the Olympic Peninsula or in Grays Harbor County due to challenges with terrain and proximity to the unaccommodated passenger demand. Additionally, no greenfield sites were identified in Whatcom County due to terrain

challenges and the existing Bellingham International Airport (BLM) which currently provides commercial passenger service.

Based on these geographic limits, six counties in Western Washington were found to have potential for the identification of sites. The following counties were identified from north to south: Skagit County, Snohomish County, King County, Pierce County, Thurston County, and Lewis County. This provided a reasonable geographic area from which to identify greenfield site locations that could serve the commercial passenger demand for Western Washington.

With the geographic boundaries determined, the previous study options were considered to assist in the identification and selection of new potential greenfield sites. These included locations identified in Pierce and Thurston counties that may either be the same site or a new site that is in reasonable proximity to previous studies. As these sites had previously been considered and evaluated as potential options, it was determined that each had value to be reevaluated based on the current conditions and constraints.

Once previous greenfield sites were identified, the remaining counties in the region were reviewed for additional potential sites. This was conducted through a combination of evaluations including via satellite imagery (Google Earth), review of USGS topographical information, consideration of the existing Interstate Highway and State Highway systems, documentation of the existing Class 1 Railroad infrastructure, and identification of areas with limited populations and developed land areas. These initial identification efforts were coordinated with WSDOT and consulting staff who have knowledge of Western Washington geography and were able to use the information to select potential locations. While this effort did not include selecting a precise location for a new greenfield airport facility, the proximate area was identified as a candidate site.

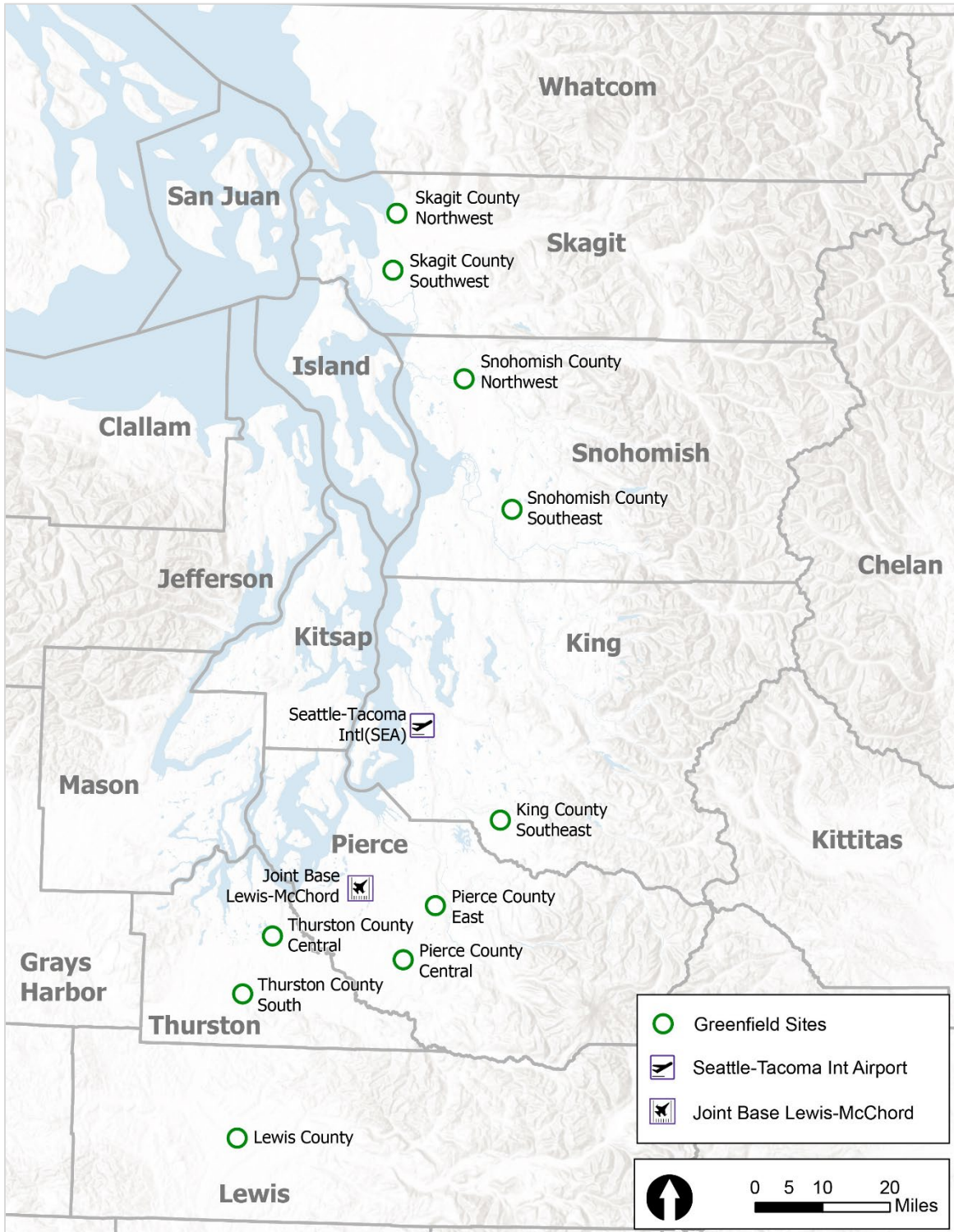
A total of ten (10) potential greenfield sites were identified using the process described above and are listed below, ordered from north to south in terms of their geographic location:

- Skagit County Northwest
- Skagit County Southwest
- Snohomish County Northwest
- Snohomish County Southeast
- King County Southeast
- Pierce County East
- Pierce County Central
- Thurston County Central
- Thurston County South
- Lewis County

The potential greenfield site locations are presented in **Figure 1**. It is recognized that the Commercial Aviation Coordinating Commission (CACC) is unable to recommend a site in King County, however, the WASP's identification of a King County site was informed through technical analysis.

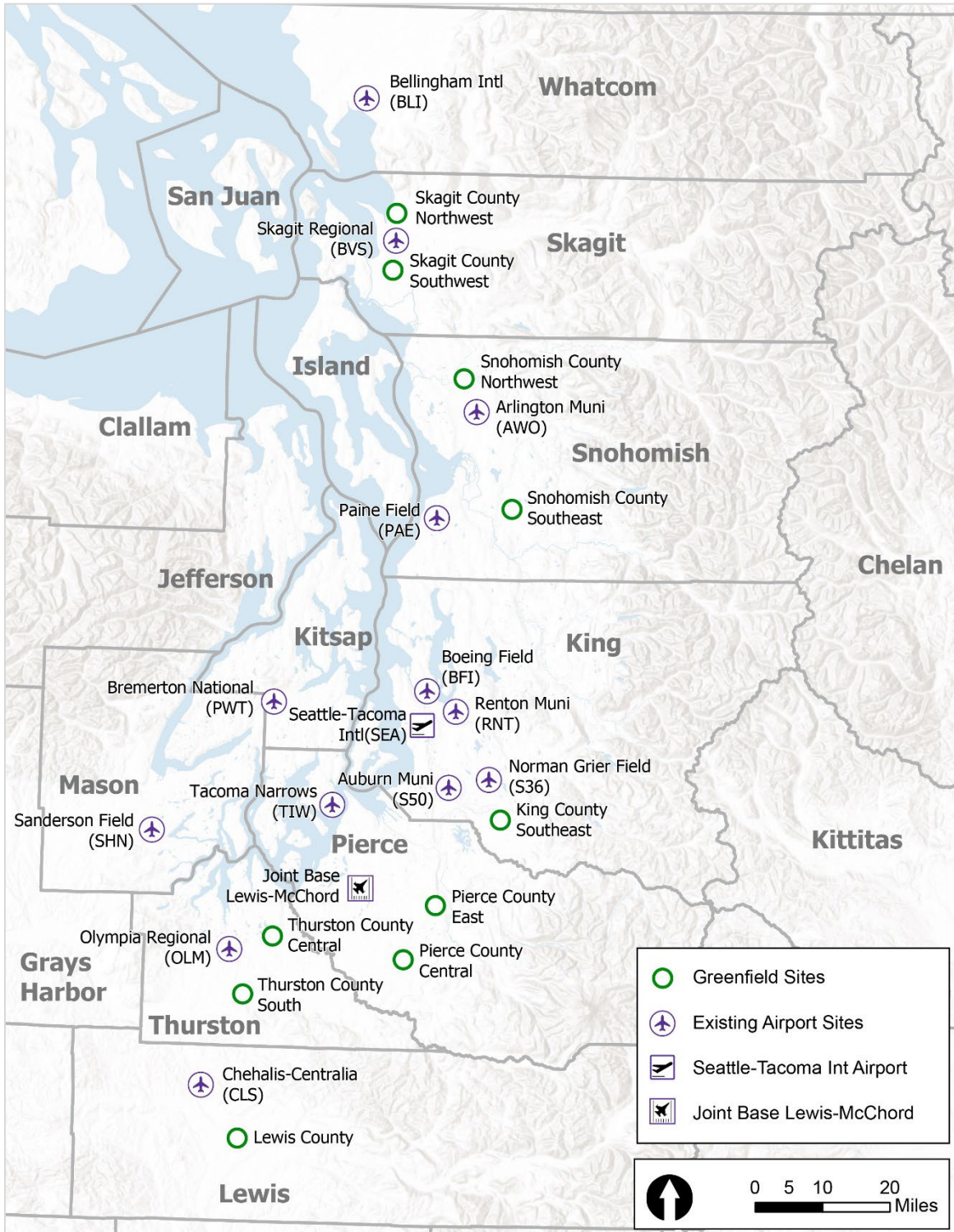
The greenfield site locations were compared to the 12 existing airports located in the same geographic limits to see if there were any overlaps with existing facilities or gaps in potential sites. The potential greenfield site locations and existing airport locations considered in this analysis are presented in **Figure 2**. As mentioned in **Chapter 1**, Seattle-Tacoma International Airport (SEA) and Joint Base Lewis-McChord (JBLM) were not considered in this analysis due to the significant challenges associated with establishing additional commercial passenger and cargo service at each facility. It should also be noted that Skagit Regional Airport (BVS) is presented in **Figure 2** but is not analyzed as a site for potential airport development due to its proximity to both the Skagit County Northwest and Skagit County Southwest greenfield sites.

Figure 1: Potential Greenfield Site Locations



Source: Kimley-Horn

Figure 2: Potential Greenfield Site and Existing Airport Locations

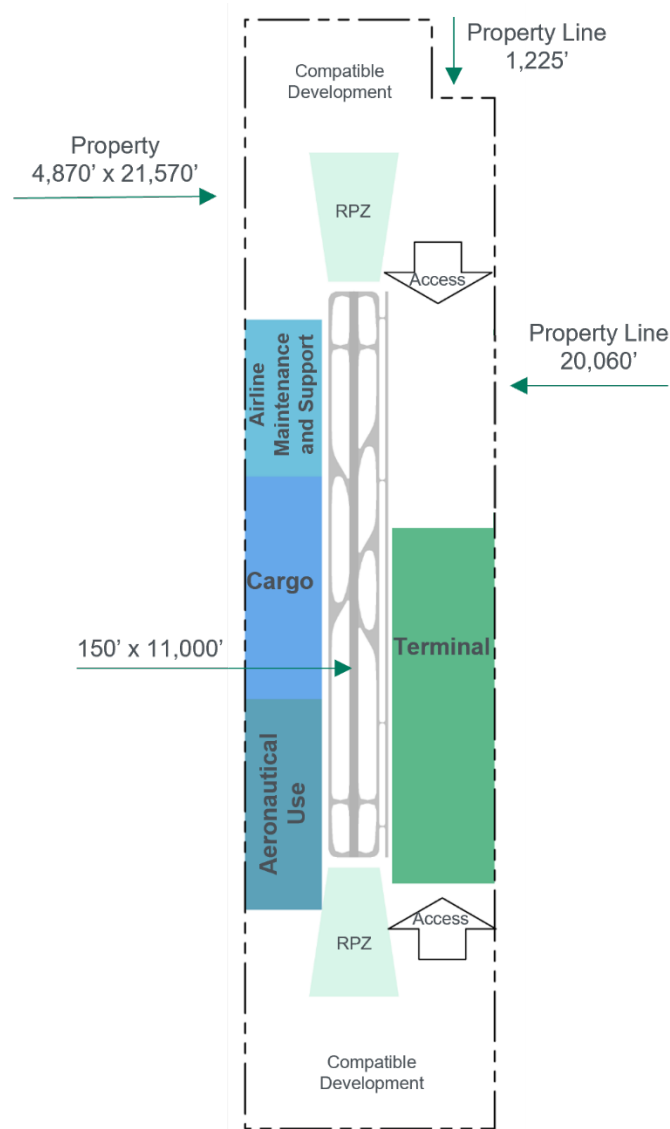


3. Evaluation and Initial Screening Process

After identifying existing and potential greenfield site locations, the facility templates presented in **Chapter 1** were applied to all locations for purposes of evaluation and screening. A total of three airport facility templates were developed to support different levels of commercial passenger service. The airport facility templates were classified as short term (Layout 1), long term (Layout 2), and extended term (Layout 3) that vary in size from 2,400 acres (Layout 1) to 4,670 acres (Layout 3). These layouts were developed to meet current Federal Aviation Administration (FAA) requirements related to airport development and were reviewed and approved by the FAA for general conformance and use in the analysis. FAA has clearly stated that additional detailed planning would be necessary and justification would be required for FAA approvals before any airport design and/or development could occur at any site.

The Layout 1 – Short Term option includes a single runway that is capable of serving the domestic commercial passenger needs and the heavy/cargo international needs with a length of 11,000 feet. This template includes areas identified for the terminal, cargo, operations/maintenance, airline support, the supporting taxiway systems, and adjacent compatible development. The Layout 1 template is illustrated in **Figure 3**.

Figure 3: Layout 1 – Short Term Template



Source: Kimley-Horn

Table 1 presents the annual aircraft operations and million annual passengers (MAP) the Layout 1 airport template is estimated to accommodate.

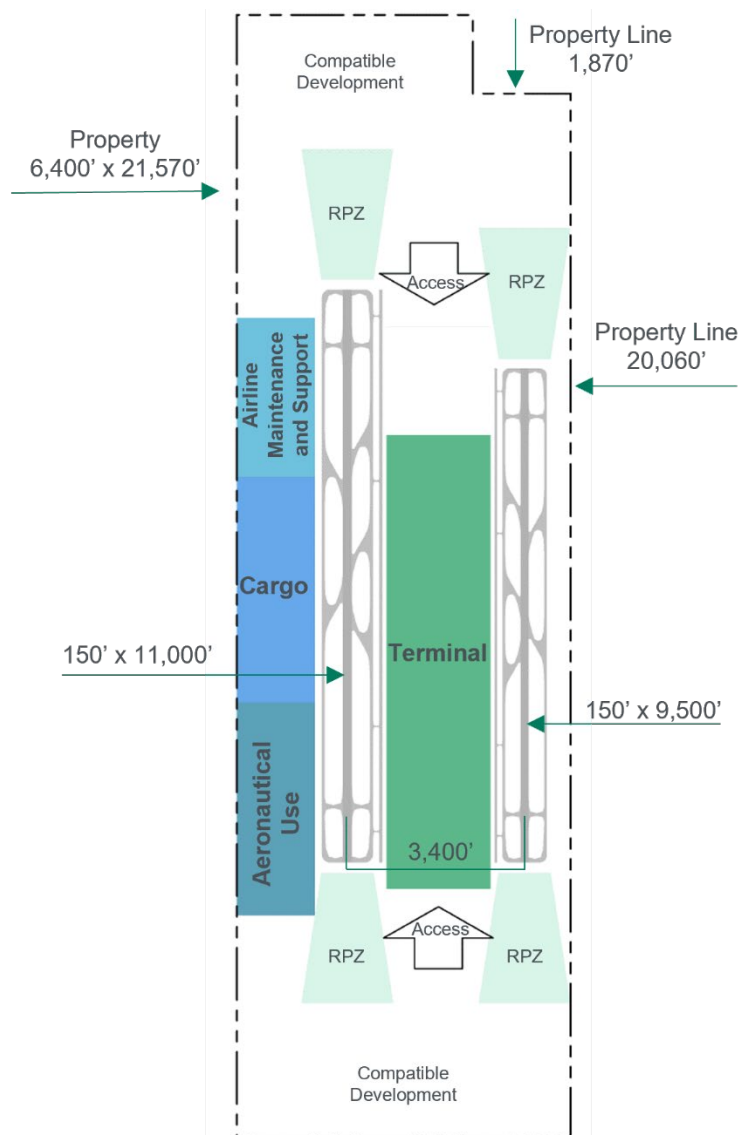
Table 1: Layout 1 – Short Term Operations and Passenger Traffic

Category	Range
Annual Operations	195,000 to 230,000
Passenger Traffic	21 to 25 MAP

Source: Kimley-Horn

The Layout 2 – Long Term option is estimated to occupy 3,100 acres of land and includes dual parallel runways separated by 3,400 feet. The primary runway is planned to be 11,000 feet long and the secondary is planned to be 9,500 feet long. These recommended runway lengths will make the primary runway capable of serving domestic commercial passenger aircraft and the heavy/cargo international aircraft while the second runway will be capable of serving the domestic commercial passenger needs. The runway separation allows for dual simultaneous instrument flight rule (IFR) operations from both runways. This template includes areas identified for the terminal, cargo, operations/maintenance, airline support, the supporting taxiway systems, and adjacent compatible development. The Layout 2 template is illustrated in **Figure 4**.

Figure 4: Layout 2 – Long Term Template



Source: Kimley-Horn

The annual operations and MAP estimated to be accommodated by the Layout 2 template are presented in **Table 2**.

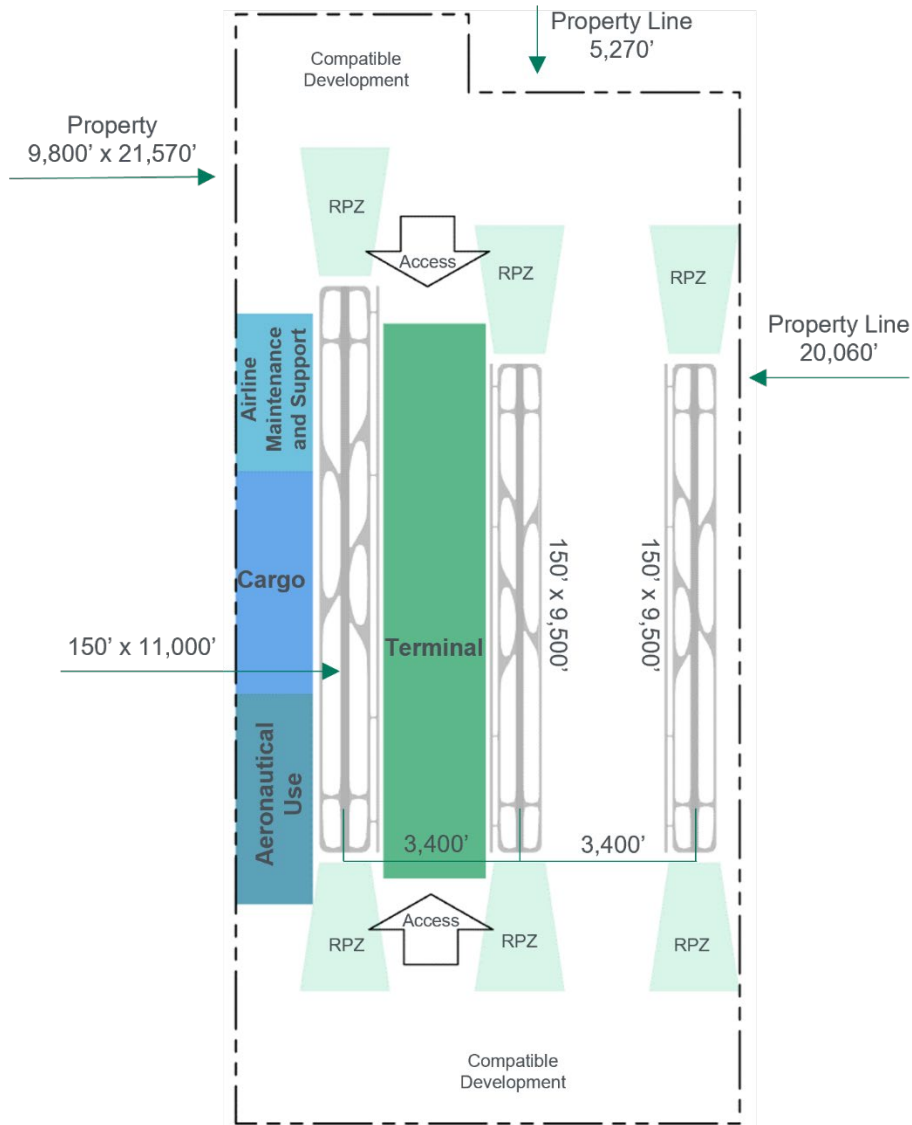
Table 2: Layout 2 – Long Term Operations and Passenger Traffic

Category	Range
Annual Operations	305,000 to 370,000
Passenger Traffic	33 to 41 MAP

Source: Kimley-Horn

The Layout 3 – Extended Term template has an estimated footprint of 4,670 acres, the largest of the templates. Layout 3 includes three parallel runways, with separation of 3,400 feet between all runways. The primary 11,000-foot-long runway is expected to be capable of serving domestic commercial passenger needs and the heavy/cargo international aircraft while the secondary and tertiary 9,500-foot-long runways will be capable of serving domestic commercial passenger aircraft. Similar to Layout 2, the runway separation allows for triple simultaneous IFR operations from all three runways. This template includes areas identified for the terminal, cargo, operations/maintenance, airline support, the supporting taxiway systems, and adjacent compatible development. The Layout 3 template is presented in **Figure 5**.

Figure 5: Layout 3 – Extended Term Template



Source: Kimley-Horn

Table 3 presents the annual aircraft operations and MAP that the Layout 3 airport template is estimated to accommodate.

Table 3: Layout 3 – Extended Term Operations and Passenger Traffic

Category	Range
Annual Operations	455,000 to 645,000
Passenger Traffic	50 to 71 MAP

Source: Kimley-Horn

Each of the facility templates (Layouts 1, 2, and 3) were applied individually to all existing airport sites to conduct the initial screening analysis. These templates were laid over the existing facilities and adjusted slightly to meet a “best fit”, usually by aligning the proposed 11,000-foot-long cargo runway with the existing airport’s primary runway. Some adjustments for the template locations were made to avoid significant features such as Interstate Highways, Class 1 Railroads, coastlines, and other similar features, if possible.

For all greenfield sites, a six-mile diameter area was established and placed in the approximate representative location identified. Each of the facility templates, Layouts 1, 2, and 3, were placed in the approximate middle of each six-mile diameter circle, then adjusted within the six-mile diameter circle to find a “best fit” location. These locations were adjusted in order to avoid significant features such as population centers, Interstate Highways, Class 1 Railroads, coastlines, known environmental features, and other similar features. This process was not iterative, meaning that sites were not adjusted after the analysis was conducted to find a “better fit” location. The approximate representative locations of the 10 greenfield sites are presented in **Figure 6** through **Figure 15**.

Figure 6: Skagit County Northwest Representative Location



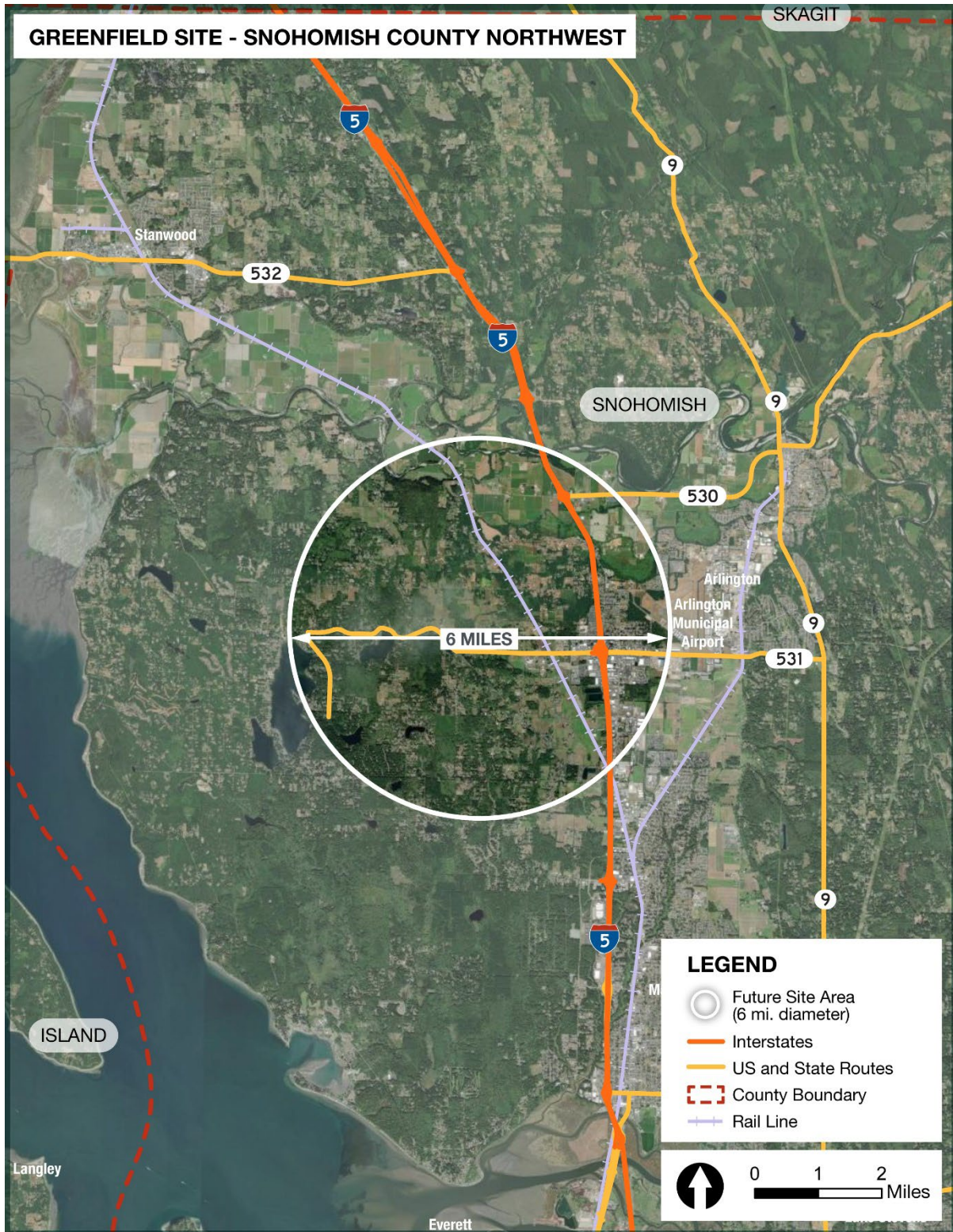
Source: Kimley-Horn

Figure 7: Skagit County Southwest Representative Location



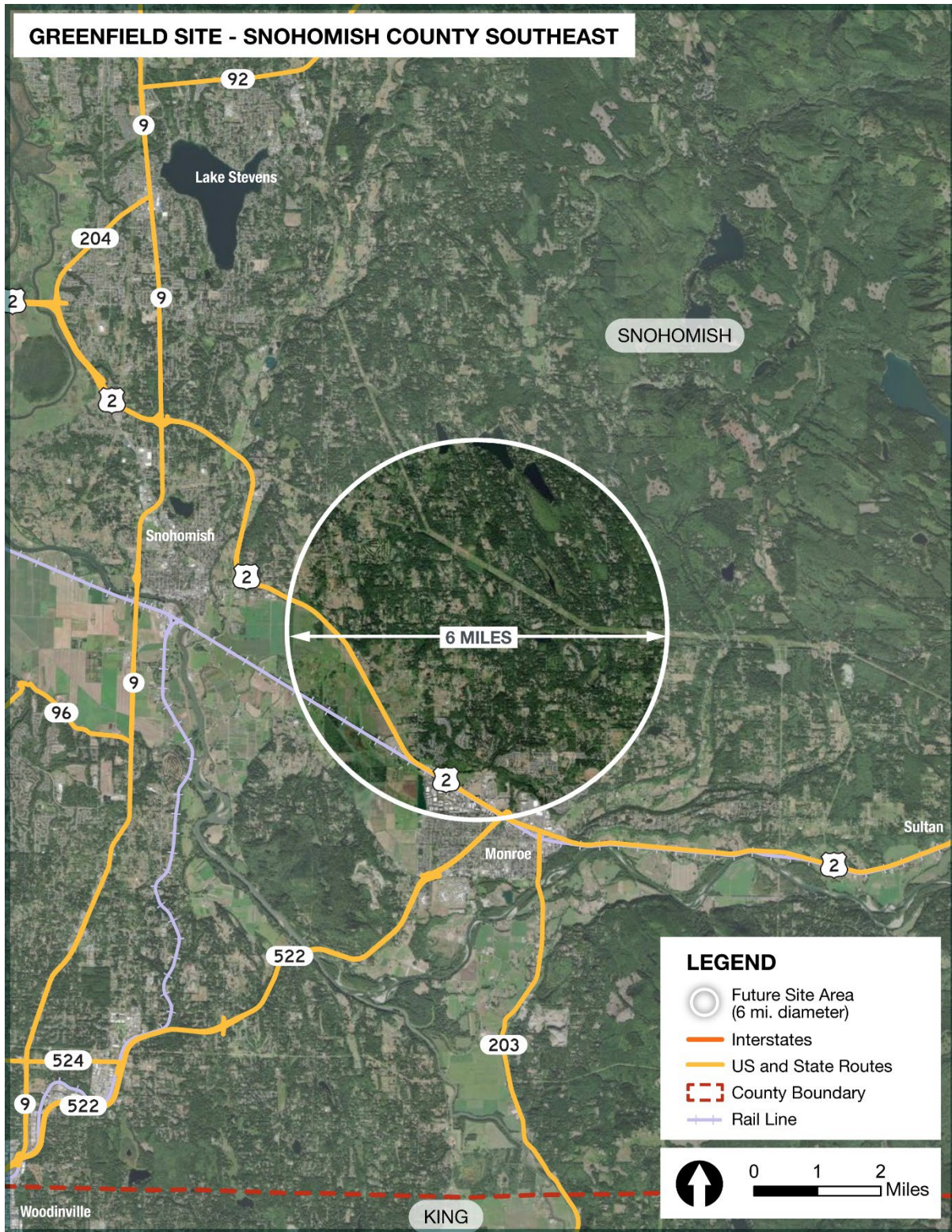
Source: Kimley-Horn

Figure 8: Snohomish County Northwest Representative Location



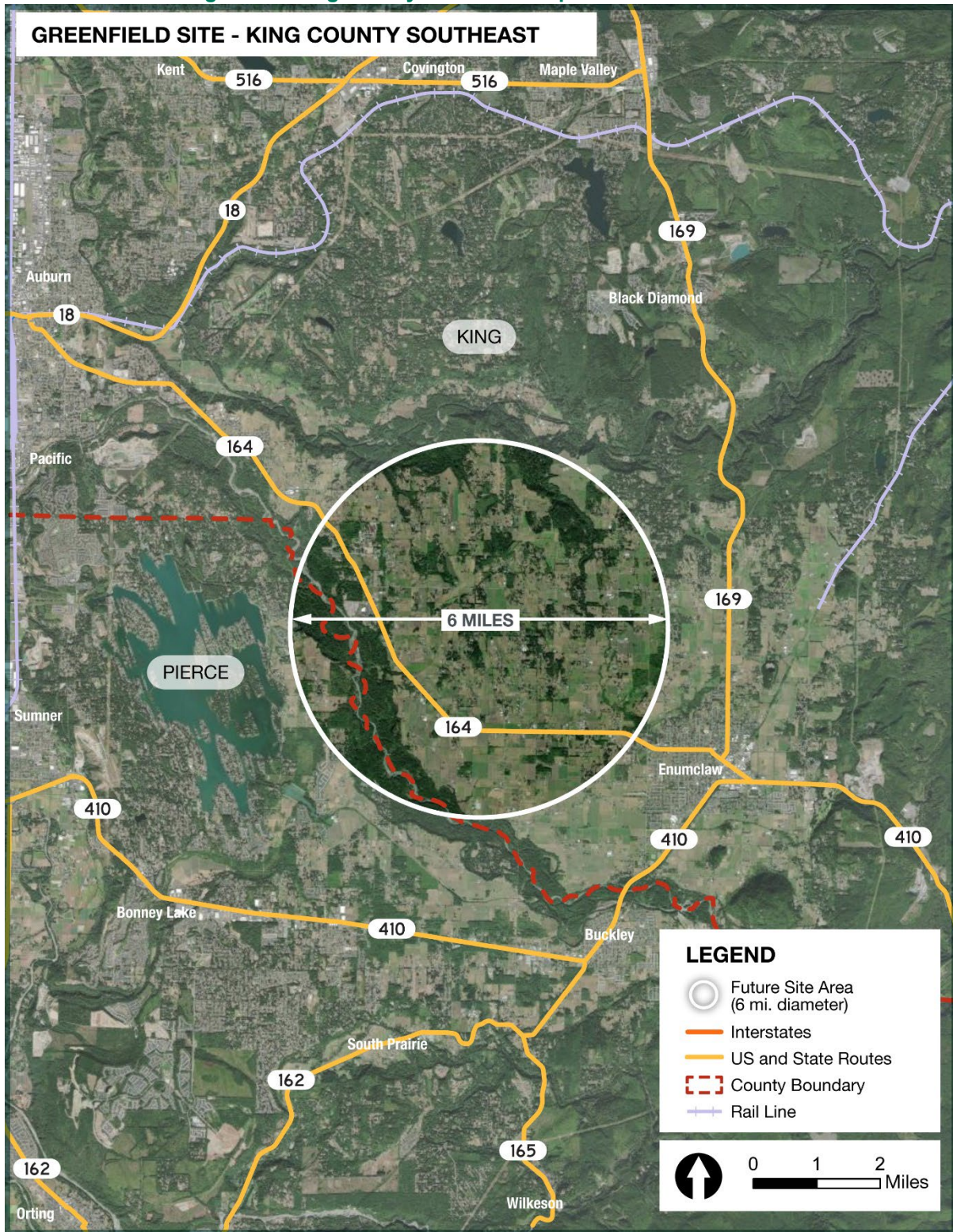
Source: Kimley-Horn

Figure 9: Snohomish County Southeast Representative Location



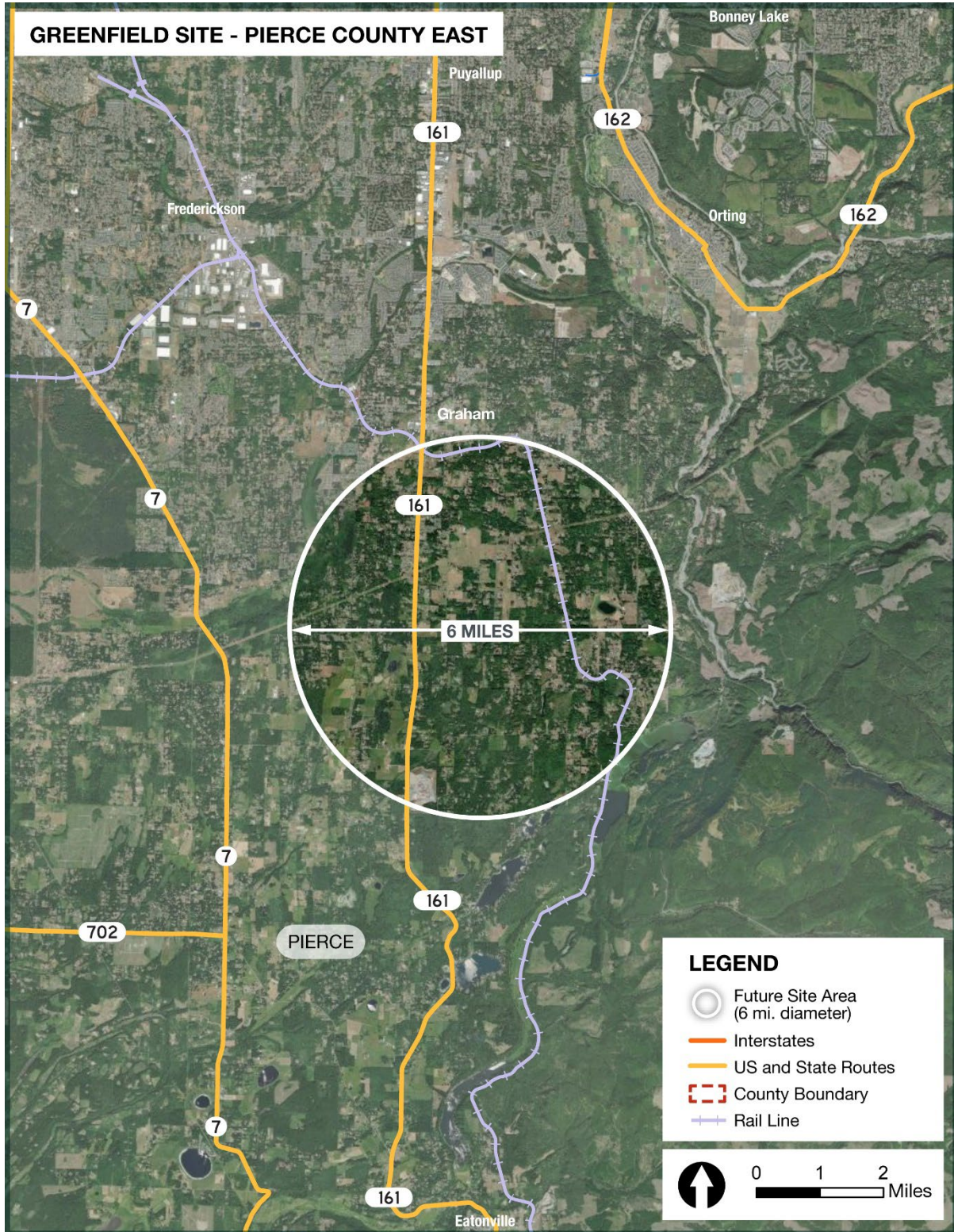
Source: Kimley-Horn

Figure 10: King County Southeast Representative Location



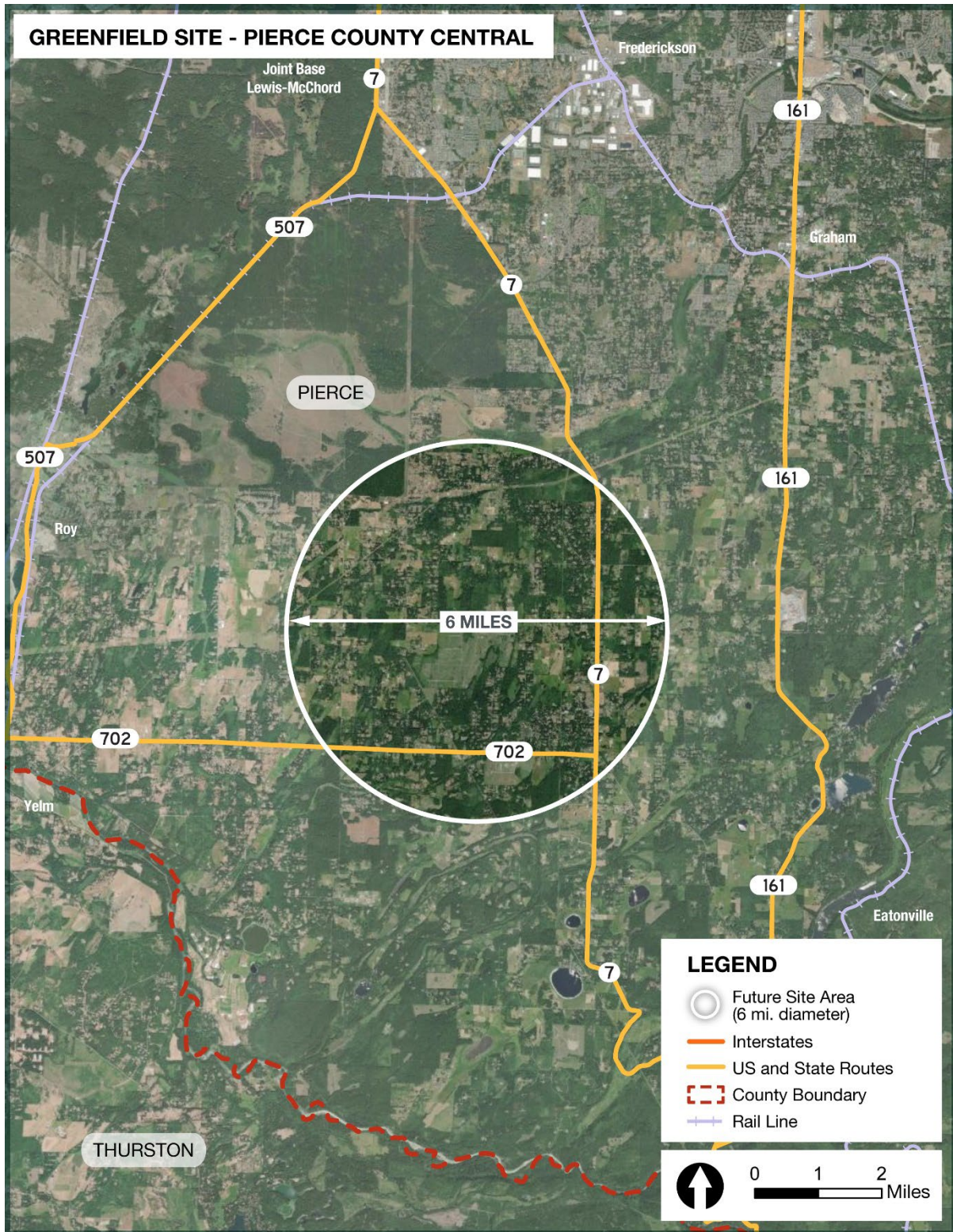
Source: Kimley-Horn

Figure 11: Pierce County East Representative Location



Source: Kimley-Horn

Figure 12: Pierce County Central Representative Location



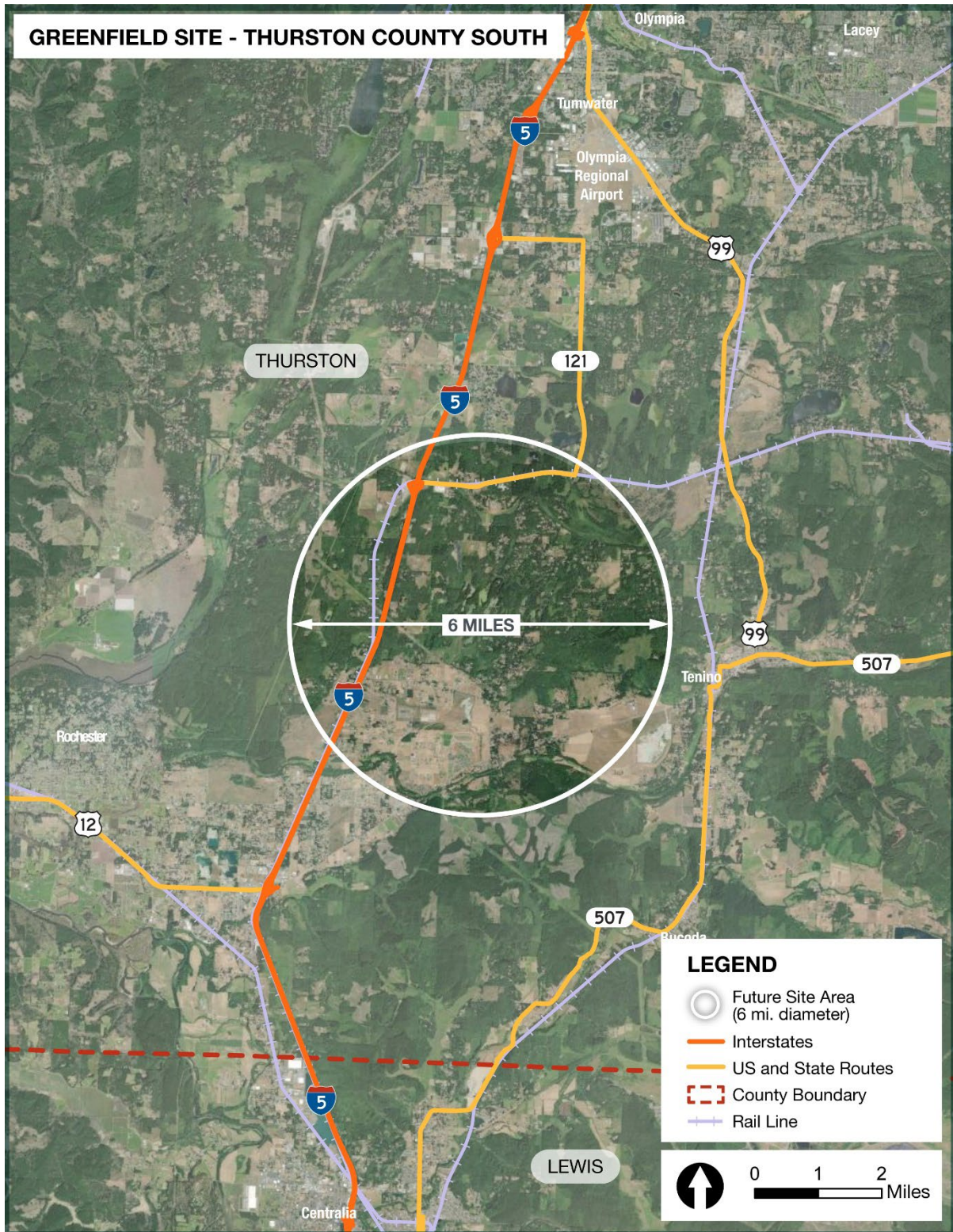
Source: Kimley-Horn

Figure 13: Thurston County Central Representative Location



Source: Kimley-Horn

Figure 14: Thurston County South Representative Location



Source: Kimley-Horn

Figure 15: Lewis County Representative Location



Source: Kimley-Horn

It is important to note that the primary objective of this initial analysis and screening is to compare existing and greenfield site locations for their ability to serve the future passenger and cargo demand. Once the list of sites is shortlisted, additional analysis and refinement is possible. Future phases of the WASP will evaluate existing airports' future system roles and ability to support General Aviation, Commercial Passenger Service, and/or Cargo Services.

4. Screening Methodology and Results

The following sections describe the methodology used to screen potential greenfield sites and existing airports along with a presentation of the results. The results are presented by criterion, with multiple evaluation elements and measures within each criterion. The five criterion categories include:

- Operational Capability and Capacity Potential
- Ground Access
- Development Costs
- Potential Environmental Impacts
- Market Factors

Within each criterion, the evaluation elements and measures are described, including the sources of data, the scoring methodology employed, and the results from the analysis. As previously discussed, each site was analyzed for its ability to accommodate Layout 1, Layout 2, and Layout 3. The results for each layout are presented after the discussion of all criteria in **Table 28** (Layout 1), **Table 29** (Layout 2), and **Table 30** (Layout 3).

4.1. Criterion: Operational Capability and Capacity Potential

In selecting a location for an airport, it is critical to consider whether the site is capable of safely and efficiently accommodating aircraft operations based on the projected demand. The operational capability relates primarily to the runway system; however, the site would also need to accommodate terminal and ancillary facilities within the overall land envelope. The site's capacity potential is an essential aspect of its effectiveness in serving regional demand. As such, several elements were evaluated for greenfield or existing airport sites in terms of their operational capacity and related capacity potential including:

- Minimum area available
- Part 77 and military airspace Constraints
- Terrain development impacts
- Wind coverage

The evaluations of the above elements in the operational capability and capacity potential criterion were completed utilizing the three individual layout templates established in **Chapter 1**. For greenfield sites, these templates were visually sited using aerial imagery to best fit within the potential representative areas, limiting visible impacts such as roadways, waterways, and

other features, their locations are considered preliminary. Templates for existing airports were placed with the 11,000-foot-long cargo runway located over the existing primary runway and flipping the template so the additional runways and facilities best fit within the existing area. The placement of facilities within each template was not modified for existing airports to provide an equal comparison between all sites (greenfield and existing). In reality, subsequent runways, terminal, and ancillary facilities would be located on either side of that runway depending on existing development on each airport. Further analysis of subsequent criteria will yield additional information that may inform a more precise layout of both greenfield and existing sites in future analyses once a shortlist of sites is identified.

4.1.1. Minimum Area Available

Perhaps the most fundamental consideration when siting an airport is determining whether there is adequate land area available to develop an airfield and associated facilities. This evaluation uses GIS data obtained from the Washington Geospatial Open Data Portal to identify potential obstacles that would obstruct development of an airport in each layout. Major obstacles considered in this analysis include interstates, active rail lines, rivers, and shorelines. Arterial roads are considered obstacles but are less significant due to the relatively lower complexity associated with relocation compared to interstates and other major obstacles. **Table 4** presents the scoring for the Minimum Area Analysis. Sites receive green scores if no major obstacles were present within the bounds of the entire template for each layout. Sites with only arterial roads within the boundaries receive yellow scores, while sites with any other obstacle receive a red score. **Section 4.1.1.1** evaluates sites specific to their ability to accommodate the runways lengths in the three layouts.

Table 4: Minimum Area Available Scoring

Range	Score
No Obstacles Present	Green
Arterial Road Present	Yellow
Major Obstacles Present	Red

Source: Kimley-Horn

Layout 1 Results

Eight of the 10 greenfield sites receive green scores as no major obstacles intersect the proposed site in Layout 1. King County Southeast scores yellow as it is bisected by an arterial road (State Route 164). Snohomish County Northwest is the only greenfield site to score red due to the presence of a BNSF Railway line within the boundaries of Layout 1. Existing airport sites performed poorly overall, as all but three sites score red due to having multiple major obstacles that would be impacted by an 11,000-foot-long runway. OLM, PWT, and SHN score yellow as they are bisected by two-lane arterial roads (Old Highway 99, State Route 3, and U.S. Route 101, respectively).

Layout 2 Results

The scores of all greenfield and existing sites, remained unchanged between Layouts 1 and 2, but the portion of each site affected by major obstacles increased due to the larger size of the

template. Snohomish County Northwest remains the only greenfield site to score red as the BNSF railway cuts across the area expected to be used for compatible development within Layout 2. Nine of the 12 existing sites score red, with OLM, PWT, and SHN scoring yellow. Notable obstructions include the Tacoma Narrows Bridge at the TIW site and the Cedar River and Lake Washington falling within the proposed RNT site.

Layout 3 Results

All greenfield and existing sites again receive the same scores in Layout 3. The aforementioned BNSF rail line in the Snohomish County Northwest site would likely preclude development of Layout 3 as it intersects the area proposed to develop a tertiary runway. The existing sites receive overall lower scores than greenfield sites due to their location within developed areas. Existing sites with multiple significant obstructions include BFI, which impacts Interstate 5, the Duwamish River, and State Route 99 (four-lane highway), and BLI, which is intersected by a BNSF rail line, Interstate 5, and shoreline along Puget Sound.

4.1.1.1. Accommodate Recommended Runway Length(s) (Runway Length)

Similar to the Minimum Area analysis, GIS data obtained from WSDOT was used to identify potential obstacles that could impact the development specifically of the airfield (runways, taxiways, and FAA-defined safety areas) in each layout. However, unlike the previous section, sites were evaluated to assess the potential to accommodate each runway and associated taxiway in their proposed location and recommended length as established in the facility templates without impacting any significant obstacles. This analysis only examines impacts to the airfield and excluded impacts to the proposed locations of the terminal, support facilities, and ancillary development areas. Objects were considered obstacles affecting runway length if they intersect the proposed location of the runway, parallel taxiway, or runway protection zone (RPZ) within each layout. The results correspond with each site ability to accommodate all runways in their recommended lengths within each corresponding layout. For example, a site that scores yellow or red in Layout 1 (due to having an obstruction to the 11,000-foot-long primary runway) will receive a yellow or red score in Layouts 2 and 3, regardless of whether or not the secondary and tertiary runways are unobstructed. The scoring range for the runway length evaluation is presented in **Table 5**. Similar to **Section 4.1.1**, arterial roads are considered less significant obstacles. Therefore, sites with only arterial roads intersecting the proposed runway locations receive a yellow score, while sites with any other major obstacle score red.

Table 5: Recommended Runway Length Scoring

Range	Score
No Obstacles Present	Green
Arterial Road Present	Yellow
Major Obstacles Present	Red

Source: Kimley-Horn

Layout 1 Results

Nine of the 10 greenfield sites receive green scores in Layout 1. King County Southeast is the only site to score yellow as State Route 164 is impacted by the RPZ of the 11,000-foot-long

cargo runway. One of the 12 existing airports (S50) score green, while four existing sites score yellow and seven score red. Although many of the existing and greenfield sites perform similarly between this evaluation and the Minimum Area Evaluation, it should be noted that some discrepancies exist. For example, the Snohomish County Northwest site scores red in Layout 1 for minimum area as it is impacted by a BNSF rail line. However, the rail line only impacts the northernmost corner of the site and does not impact the 11,000' runway. As such, Snohomish County Northwest scores green for accommodating recommended runway length.

Layout 2 Results

The majority of greenfield sites also performed favorably in Layout 2, as eight of the 10 again score green. Although the Snohomish County Northwest site scores green in Layout 1, the site scores red in Layout 2 due to the rail line intersecting the RPZ of the secondary 9,500-foot-long runway. The King County Southeast site scores yellow in Layout 2 because the obstacle (State Route 164) again impacts the proposed RPZ location of the 11,000-foot-long runway. Seven existing sites score red and four score yellow. S50 is the only existing airport site that scores green in Layout 2.

Layout 3 Results

The greenfield site scoring remained unchanged from Layout 2 to 3, with King County Southeast and Snohomish County Northwest being the only sites with an obstacle. The existing sites also performed similarly between Layouts 2 and 3 as all sites receive the same score. S50 is once again the only existing airport site to score green in Layout 3.

4.1.1. Terrain Development Impacts

Airfields need large, relatively flat areas of land to ensure appropriate drainage and FAA-mandated safety standards. As such, it is beneficial for an airport to be located in an area with minimal terrain variations to lessen the amount of land that needs to be moved to accommodate the airfield. Terrain within each of the greenfield and existing sites was evaluated using digital elevation models developed in CADD software using contour data provided by each corresponding county's GIS portal. The average surface elevation for each site and layout was calculated using the CADD surface property. Terrain within the site was then analyzed to determine the land area within the site that is more than 200 feet higher or lower than the average elevation.¹ This land area is communicated as a percentage of the total site size (2,400, 3,100, and 4,670 acres for Layouts 1, 2, and 3, respectively). As shown in **Table 6**, sites having less than 1.0 percent of terrain exceeding ± 200 feet elevation variation receive green scores, while sites having between 1.0 and 5.0 percent of terrain within ± 200 feet elevation variation receive yellow scores. All sites with greater than 5.0 percent of terrain exceeding ± 200 feet elevation variation receive red scores.

¹ Bodies of water were included in the portion of land with elevation variations exceeding ± 200 feet as they would be required to be filled or rerouted to accommodate an airport.

Table 6: Terrain Development Impacts Scoring

Range	Score
Less than 1% of site	Green
1-5% of site	Yellow
More than 5% of site	Red

Source: Kimley-Horn

Layout 1 Results

Seven of the 10 greenfield and nine of the 12 existing sites receive green scores in Layout 1. Of these, the five greenfield sites including King County Southeast, Lewis County, Pierce County Central, and both Skagit County sites, have no terrain with elevation variance exceeding 200 feet. Six existing sites (AWO, CLS, OLM, PWT, S50, and SHN) also have no terrain with elevation variance exceeding 200 feet. The Thurston County South greenfield site scores yellow as approximately 3.5 percent (85 acres) of terrain exceeds ± 200 -foot variance. Two greenfield (Snohomish County Northwest and Snohomish County Southeast) and three existing sites (BLI, RNT, and TIW) score red for having more than 5 percent of terrain with ± 200 -foot variations. Of these, Snohomish County Southeast and TIW have the largest portion of land with terrain variance, as 18.8 (451 acres) and 20.7 percent (497 acres) of each respective site has variations of greater than ± 200 feet.

Layout 2 Results

The overall scores of all sites remained the same between Layouts 1 and 2, however, the amount of terrain variance differed between each. Five greenfield and five existing sites still have no terrain exceeding ± 200 feet elevation variance, but OLM has two acres of terrain more than 200 feet above or below mean site elevation (0.1 percent). Snohomish County Southeast and TIW again have the highest percent of terrain with ± 200 -foot variance, increasing to 21 and 25 percent of the total site in Layout 2, respectively.

Layout 3 Results

All greenfield sites again receive the same score in Layout 3 while two existing sites earn differing scores between Layouts 2 and 3. These sites include BFI, which increases from green to yellow due to 4.0 percent of land (188 acres) within the site having greater than ± 200 -foot variation. S50 receives a red score in Layout 3 (as opposed to a green score in Layouts 1 and 2) as 7.1 percent of land has elevation variations of more than 200 feet. TIW has by far the most terrain variation of any site, as more than 43 percent of land in Layout 3 is more than 200 feet above or below average site elevation due to the layout extending into the Tacoma Narrows waterway.

4.1.2. Part 77 and Military Airspace Constraints

Airspace is a substantial consideration when locating a potential site for an airport as it is integral to ensure aircraft can operate to and from the airport with minimal impacts to surrounding airports and/or terrain. Planning for these elements ensures that aircraft would be able to operate at and around the proposed airport site in a safe and efficient manner. Detailed airspace analysis is necessary prior to making decisions on moving forward with in depth

analysis of sites, a high-level airspace analysis was conducted at this stage relative to the 10 greenfield sites. Further analysis will be conducted in later stages of this study to determine how proposed greenfield sites will interact with existing civil airspace and instrument procedures in the region.

Existing airports already have some level of protected airspace to support ongoing operations. However, varying airspace changes would likely be required at these airports to support a higher level of commercial passenger and cargo operations depending on the current use of the facility. These changes will be unique to each airport location and some changes may not be required at all existing sites. Therefore, this airspace analysis focused on greenfield sites.

The following measures were analyzed to determine potential airspace impacts in this initial analysis of greenfield sites:

- Part 77 airspace constraints
- Military airspace impacts

4.1.2.1. Part 77 Airspace Constraints

U.S. Federal Aviation Regulation (FAR) Title 14 Part 77 governs the preservation of airspace and establishes imaginary surfaces surrounding each runway to ensure no obstacles or other hazards are present to aircraft. To identify potential obstacles, terrain surrounding each proposed site was analyzed using the dimensions and slopes that form the Part 77 surfaces for precision approaches, assumed to be in place for a new airport in the Puget Sound region. Existing ground surfaces were created for each greenfield site using contour data provided by either a County's GIS portal, the State's GIS database, or United States Geological Survey (USGS) topographic information. The ground surfaces were then measured against the elevation of the Part 77 approach surfaces beginning 200 feet beyond the proposed end of each runway and extending outward along the runway centerline 10,000 feet at a slope of 50:1.²

Part 77 airspace impacts were scored using an aggregate of four metrics: the total land area of terrain penetrating the 50:1 slope (square feet [SF]), the total cut volume of terrain penetrating the slope (cubic yards [CY]), the maximum penetration height above the slope (feet), and the average height of terrain above the slope (feet). Similar to **Section 4.1.1.1** the score presented for each layout represents the terrain impacts for all runways within said layout, meaning Layout 1 is scored based on terrain extending from the 11,000-foot-long cargo runway while Layout 2's score is based on terrain extending from both the cargo runway and the secondary 9,500-foot-long runway and Layout 3's score corresponds with the terrain impacts of all three runways.

Table 7 presents the ranges used for the four metrics to score greenfield sites. It is important to note that sites were evaluated based on the planned runway ends established in the templates presented in **Chapter 1**. Runway locations could be modified within the template in later stages of planning to eliminate potential Part 77 airspace constraints.

² Approach surface dimensions were established based on standards set for precision instrument runways. Complete Part 77 descriptions and dimensions are available at: <https://www.ecfr.gov/current/title-14/chapter-I/subchapter-E/part-77>

Table 7: Part 77 Airspace Constraints Scoring

Land Area Range	Cut Volume Range	Maximum Height Range	Average Height Range	Score
Less than 7.5 million SF	Less than 5 million CY	Less than 100 ft	Less than 40 ft	Green
7.5 -15 million SF	5-10 million CY	100-200 ft	40-80 ft	Yellow
More than 15 million SF	More than 10 million CY	More than 200 ft	More than 80 ft	Red

Note: Land Area and Cut Volume were scored based on the amount of penetrating terrain per runway. As such, a site may score green or yellow in these categories even if the total volume or area of terrain for multiple runways exceeds the corresponding range.

SF = square feet, CY = cubic yards, ft = feet

Source: Kimley-Horn

Layout 1 Results

Four greenfield sites – King County Southeast, Lewis County, Pierce County Central, and Skagit County Southwest – receive a green score for Layout 1. Of these, Skagit County Southwest had the highest cumulative score as only 1,300 CY of land would need to be removed to a maximum depth of three feet to clear the approach path. Two greenfield sites score yellow while four greenfield sites score red. Snohomish County Northwest performed the poorest of any greenfield site, as more than 196 million CY of terrain penetrate the approach surface to a maximum depth of 316 feet.

Layout 2 Results

Most greenfield sites score similarly between Layouts 1 and 2, as all but two sites receive the same score. The Lewis County site scores yellow in Layout 2 as it has more than 10 million cubic yards of terrain penetrating the approach surface. The Snohomish County Southeast site scores red in Layout 2 (rather than yellow in Layout 1) as more than 65 million CY of terrain penetrate the approach surfaces of the two runways. Three sites receive green scores in Layout 2. Skagit County Southwest once again was found to have the least terrain penetrating the Part 77 surface (4,763 CY). Snohomish County Northwest has the largest volume of penetrating terrain (210 million CY) impacting the approaches to both runways.

Layout 3 Results

Lewis County is the only site to receive a different score between Layouts 2 and 3, moving from yellow to red due to having 22 million CY of terrain penetrating the approach surfaces of the three runways. King County Southeast, Pierce County Central, and Skagit County Southwest remain the only sites to score green, and Skagit County Southwest performs most favorably as only 23,847 CY of terrain penetrate the approach surfaces in Layout 3. Thurston County South is the only site to score yellow while six sites score red. Snohomish County Northwest performed the poorest of any site, with more than 210 million CY of terrain penetrating the approach surface.

4.1.2.2. Military Airspace Impacts

Military special use airspace (SUA) is established to protect civilian activities in the air and on the ground from military aircraft and activities. GIS data for this analysis was obtained from the Military Aviation and Installation Assurance Siting Clearinghouse and included the dimensions

of military operating areas (MOAs) and military training routes (MTRs). MOAs vary in size and extend from the surface to altitudes as high as 14,000 feet mean sea level (MSL) in the Western Washington region. MTRs extend from 200 above ground level (AGL) to 1500 AGL and are protected by military training corridors (MTCs) that extend 5.75 miles to each side of the route centerline.

Existing and greenfield sites were scored based on their distance from the nearest MOA, MTR, or MTC. **Table 8** shows the scoring range for military airspace impacts. For proposed sites that sit within the lateral bounds of a MOA or MTC, the distance was recorded as zero. Results are presented jointly for all greenfield site layouts (as opposed to analysis for each layout) as the military airspace would be impacted by the presence of an airport regardless of facility size and number of runways.

Table 8: Military Airspace Impacts Scoring

Range	Score
More than 10 miles	Green
5-10 miles	Yellow
Less than 5 miles	Red

Source: Kimley-Horn

Results – All Layouts

Generally, sites in the southern portion of the Puget Sound region performed worse than those in the northern portion due to the presence of military airspace and MTRs surrounding JBLM. Two greenfield sites – King County Southeast and Snohomish County Southeast – sit more than 10 miles from the nearest MTR or MOA, providing space for approach and departure routes to be implemented with minimal impacts to military airspace. Conversely, the greenfield sites in Pierce and Lewis counties fall within the bounds of MTCs. One additional greenfield site (Thurston County Central) also falls within five miles of military airspace. Airport development at these sites would require complete relocation of the MTCs, and as such, receive red scores.

4.1.3. Wind Coverage

The FAA recommends that an airport’s primary runway be oriented to provide acceptable crosswind limitations for aircraft at least 95 percent of the time. As such, it is critical to analyze prevailing wind patterns near greenfield sites to determine the capability to safely serve aircraft of all sizes. For all greenfield sites, the templates were placed so as to generally minimize visible impacts while keeping to as much of a north-south runway configuration as possible recognizing the general wind and weather patterns in the region.

Prevailing wind data was obtained from local automated weather observing systems (AWOS) using the FAA Airport Data and Information Portal (ADIP). As weather data is not recorded at the potential greenfield sites, this analysis utilized wind measurements recorded by AWOS stations at nearby existing airports. AWOS weather data was input into the ADIP Wind Rose

Generator to determine wind coverages at four wind speeds: 10.5, 13, 16, and 20 knots.³ While most greenfield locations are located close to existing airports with AWOS, some locations were nearly 15 miles from the nearest weather station. In these cases, wind roses were generated for multiple airports surrounding the greenfield site to provide an aggregate estimation of wind coverage. **Table 9** presents the scoring ranges used to evaluate sites for wind coverage. As shown, yellow was not utilized for this element as the sites could either meet the 95 percent coverage or could not.

Table 9: Wind Coverage Scoring

Range	Score
More than 95% coverage (16 knots)	
Less than 95% coverage (16 knots)	

Source: Kimley-Horn

Similar to the military airspace evaluation, results are presented jointly for all greenfield site layouts (as opposed to analysis for each layout) as the airspace would be the same regardless of the number of runways available on the site.

Results – All Layouts

All greenfield sites were found to have 95 percent or greater wind coverage at a 16-knot crosswind component. Snohomish County Southeast was found to have less than 95 percent coverage at a 10.5 knot crosswind component. However, 10.5 knots is the limit for small aircraft which are likely to represent a small portion of total operations at the proposed airport and will not impact the feasibility of the airport.

4.2. Criterion: Ground Access

Adequate ground access is vital to the success of an airport as it connects it with a larger multimodal transportation network. Although lack of appropriate existing ground access does not preclude development of an airport at a greenfield site, it can greatly increase development costs, thereby making the site comparatively less acceptable. The following elements were considered in evaluating the ground access at each of the study sites:

- Proximity to interstate/state highway access
- Proximity to transit access

4.2.1. Proximity to Interstate Highway Access

Highway access is perhaps the most important form of multimodal connectivity as the majority of travelers use vehicles to reach an airport. GIS data provided by the Washington Geospatial

³ The FAA establishes standard crosswind limitations based on Runway Design Code (RDC). As discussed in **Chapter 1**, the 11,000-foot-long cargo runway and the two 9,500-foot-long passenger runways were designed to RDC C-V and C-III, respectively. As such, 16 knots is the standard wind speed used in this analysis. However, all wind speeds were analyzed to represent a wider fleet mix operating at the airport.

Open Data Portal was used to determine the distance of the nearest access point to the Interstate highway system for each site. Sites were scored based on the linear distance from the calculated center of the site to the nearest interstate highway, usually Interstate 5 and Interstate 405, the primary north-south corridors in the region. **Table 10** presents the scoring ranges for Proximity to Interstate Highway Access. A singular analysis for each site, not for each layout, was conducted as it is expected that one roadway connection would be constructed for the airport regardless of the number runways present onsite.

Table 10: Proximity to Interstate/State Highway Access Scoring

Range	Score
Less than 5 Miles	Green
5 – 10 Miles	Yellow
More than 10 Miles	Red

Source: Kimley-Horn

Results – All Layouts

Overall, existing airport sites score more favorably than greenfield sites in Proximity to Highway Access as most are located in developed areas near existing interstates. These sites would likely need a new highway exit or short-distance connection to be constructed to provide adequate service. The most notable exceptions to this trend are PWT and SHN, which are both located more than 19 miles from the nearest interstate and would require significant roadway extensions, thereby scoring red. Five greenfield sites located in Snohomish, Skagit, and Lewis counties score green given their proximity to the Interstate 5 corridor. Both the King County Southeast and two Pierce County greenfield sites score red as they would more than 11 miles of roadway to be constructed, respectively, to connect to Interstate 5.

4.2.2. Proximity to Transit Access

Access to transit scoring was determined via the linear distance each site’s center was from the centerline of the three different transit systems evaluated: Bus Rapid Transit (BRT), Commuter Rail (Sounder), and Light Rail (Link). GIS data was obtained from WSDOT, Pierce County Transit, King County Metro, Community Transit, and Sound Transit, including both future and planned routes in the evaluation of transit access. Similar to the Interstate/State Highway Access analysis, each site was evaluated as a whole as there is expected to be one terminal area in all three layouts that will need to have transit connectivity.

4.2.2.1. Proximity to Bus Rapid Transit (BRT)

BRT services are provided by several agencies in the Puget Sound region including King County Metro’s RapidRide, Community Transit’s Swift, and Pierce Transit’s planned Stream services. BRT routes are generally more prevalent in urban areas and have a relatively small catchment area. As such, the distances chosen to score existing and greenfield sites for BRT proximity are lower than other modes of transit. The ranges used for BRT proximity scoring are presented in **Table 11**.

Table 11: Proximity to BRT Scoring

Range	Score
Less than 5 Miles	Green
5 – 10 Miles	Yellow
More than 10 Miles	Red

Source: Kimley-Horn

Results – All Layouts

As BRT is more prevalent in urban areas, the existing airport sites score higher overall than the greenfield sites, with five existing sites scoring green versus one greenfield site (Snohomish County Northwest) scoring green. However, five existing airport sites score red in the BRT category, with the remaining two sites scoring yellow. Eight of the 10 greenfield sites score red, with one (Pierce County Central) scoring yellow.

4.2.2.2. Proximity to Light and Commuter Rail

Light and commuter rail systems generally connect central urban areas and surrounding suburbs and can be a primary link between an airport and the community. Light rail is provided by Sound Transit Link and currently operates two lines in Tacoma and between Seattle and SeaTac. Sound Transit has plans to expand light rail services north into Everett, east into Bellevue, Redmond, and Issaquah, and south between SeaTac and Tacoma. As most planned light rail expansions are expected to be completed near 2040, they were included in this proximity analysis. Commuter rail systems provide connectivity at a larger regional level than light rail and BRT systems. Commuter rail services in the Puget Sound region are provided by Sound Transit’s Sounder line, which operates between Everett and Lakewood, with planned expansion to Dupont by 2045.

As light and commuter rail is designed to operate at a regional level it has a larger catchment area than highways or BRT, therefore greater distances were selected for the corresponding scores than that of highways or BRT. Although proximity to commuter rail and light rail were analyzed separately, both measures used the same scoring ranges given the similar challenges and complexity with expanding either commuter or light rail. The scoring ranges used to analyze proximity of sites to commuter rail and light rail systems are shown in **Table 12**.

Table 12: Proximity to Light and Commuter Rail Scoring

Range	Score
Less than 10 Miles	Green
10 – 25 Miles	Yellow
More than 25 Miles	Red

Source: Kimley-Horn

Light Rail Results – All Layouts

Existing airport sites score higher overall compared to greenfield sites due to their location near urban areas. Six of the 12 existing airports score green for light rail access, while one greenfield site (Snohomish County Southeast) scored green. Four greenfield and four existing airports score red for light rail access, with Lewis County and BLI having the greatest distance.

Commuter Rail Results – All Layouts

Due to the limited scope of commuter rail service in the region, most sites score poorly for commuter rail access. Similar to light rail access, existing airports performed better for commuter rail access than greenfield sites. No greenfield sites score green, while six of the existing sites do so. Furthermore, six of the greenfield sites score yellow versus two of the existing sites (AWO and OLM) scoring yellow. Similar to light rail, Lewis County and BLI were found to be furthest from commuter rail access.

4.3. Criterion: Development Costs

Although each greenfield site will require similar facilities and infrastructure construction costs, external factors may create variations in the total development costs, especially between greenfield and existing sites. These factors include relative location of site to developed areas and existing land uses that may affect property values. This section of the analysis examines the cost and complexity that is anticipated in the development of land for an airport utilizing the three layouts. The following elements were considered in evaluating the development costs at each study sites:

- Assessed property value
- Property acquisitions (parcels)

4.3.1. Assessed Property Value

Assessed property values relate to the overall cost associated with acquiring the necessary property to develop an airport. Assessed property values were estimated based on the total market and improved value of all parcels intersected by the proposed layout as reported by each respective county assessor to the Washington State database. Sites were scored based on the total parcel value, minus the value of existing airport use parcels, as appropriate (greenfield sites did not include any existing airport properties). Existing airports are generally located in more highly developed and densely populated areas than greenfield sites, making them more expensive and complex to develop to the full layouts as established. As such, separate scoring ranges were applied to greenfield sites and existing sites. The scoring ranges used to score greenfield and existing sites in terms of assessed property values are presented in **Table 13**.

Table 13: Assessed Property Values Scoring

Greenfield Site Range	Existing Site Range	Score
Less than \$200 Million	Less than \$500 Million	Green
\$200 Million – \$400 Million	\$500 Million – \$1 Billion	Yellow
More than \$400 Million	More than \$1 Billion	Red

Source: Kimley-Horn

Layout 1 Results

Greenfield sites receive higher scores overall compared to existing sites, despite the differing ranges used for each. Greenfield sites were determined to have an average assessed value of approximately \$159 million while existing sites were valued at an average assessed value of \$1.4 billion. Eight of the 10 greenfield sites score green while five of the 12 existing airports receive the same score. The least expensive greenfield site for Layout 1 is Lewis County, valued to be worth approximately \$30.5 million. The lowest-valued existing airport site is PWT, valued at approximately \$22.5 million for Layout 1. One greenfield site, Snohomish County Southeast, and five existing airports receive red scores. Snohomish County Southeast’s assessed property value is estimated at \$412 million while BFI, the most expensive existing site, is valued at \$3.6 billion for Layout 1.

Layout 2 Results

The estimated cost of all sites increased due to the larger size of Layout 2, however, most sites receive similar scores between Layouts 1 and 2. On average, greenfield sites were 28 percent more expensive between Layout 1 and 2 while existing sites were 22 percent more expensive. Three greenfield and one existing site moved from green to yellow in Layout 2. Lewis County and PWT are again the least expensive greenfield and existing sites. Snohomish County Southeast and BFI are the most expensive sites, valued at more than \$550 million and \$4.4 billion, respectively for Layout 2.

Layout 3 Results

The cost of greenfield and existing sites increased by an average of 47 and 39 percent between Layouts 2 and 3, respectively. As such, one greenfield and three existing sites moved from yellow to red, resulting in two greenfield sites and eight existing sites receiving red scores. Four greenfield sites receive green scores while the remaining four receive yellow scores. Four existing sites also score green while none fell into the yellow range. The least expensive greenfield layout remains the Lewis County site, valued at approximately \$46 million. Snohomish County Southeast and BFI were again determined to be the most expensive, with the latter being valued at over \$6.2 billion.

4.3.2. Property Acquisitions (Parcels)

Property acquisitions were evaluated based on the number of individual parcels that would need to be acquired. The fewer number of individual parcels and/or parcel owners is likely to reduce the time and complexity of acquiring the land to develop an airport. Parcel data was obtained from the same Washington State database used in the Assessed Property Costs evaluation. Sites were scored based on the total number of parcels that intersected each layout, minus

existing airport use parcels, as appropriate (not applicable to greenfield sites). Similar to Assessed Property Costs, scoring ranges differed between the greenfield and existing sites due to existing sites generally being surrounded by more densely developed areas. **Table 14** presents the ranges used to score greenfield and existing sites, respectively.

Table 14: Property Acquisitions Scoring

Greenfield Site Range	Existing Site Range	Score
Less than 500 parcels	Less than 1,500 parcels	Green
500 – 1,000 parcels	1,500 – 2,500 parcels	Yellow
More than 1,000 parcels	More than 2,500 parcels	Red

Source: Kimley-Horn

Layout 1 Results

Eight greenfield and nine existing sites receive green scores, while one of each site type score yellow. One greenfield site (Snohomish County Southeast) and two existing sites (RNT and S50) score red. The Skagit County Northwest site would require purchase of 191 individual parcels in Layout 1, the fewest of any greenfield site, while existing PWT would require acquisition of 145 non-airport parcels. Pierce County East is the only greenfield site to score yellow, requiring 880 parcels. Snohomish County Southeast performs the poorest of any greenfield site, requiring 1,023 individual parcels for Layout 1. Although the scoring distribution of existing sites was similar to greenfield sites, the average number of parcels needed to be purchased to accommodate existing sites in Layout 1 is nearly three times greater than greenfield sites. RNT performed the poorest of existing sites, covering more than 2,970 parcels in Layout 1.

Layout 2 Results

Layout 2's increased size caused more sites to score yellow or red as the average number of parcels occupied by greenfield and existing sites increased by 29 and 34 percent, respectively. Six greenfield and six existing sites score green, while three of each score yellow. Snohomish County Southeast remained the only greenfield site to score red while BFI joined RNT and S50 as existing sites receiving a red score. The Lewis County site surpassed Skagit County Northwest as the best performing site, requiring acquisition of 229 parcels. Snohomish County Southeast once again requires the most parcels of any greenfield site (1,364). S50 covers more than 4,100 parcels in Layout 2, the most of any existing site.

Layout 3 Results

Greenfield sites require an average of 767 parcels in Layout 3, a 41 percent increase from Layout 2. Conversely, existing sites were found to require 2,774 parcels on average in Layout 3, 66 percent more than Layout 2. The number of greenfield sites falling within the yellow scoring range increased from three to six. One greenfield site scores red in Layout 3, but the number of existing sites in the red range increased from three to five. The Lewis County site requires 307 individual parcels, the fewest of any greenfield or existing site. Snohomish County Southeast performs the poorest of any greenfield site, requiring more than twice the number of parcels of

any other site in Layout 3 (1,840). PWT is the best performing existing site (441 parcels), while RNT again required the highest number of parcels (6,727).

4.4. Criterion: Potential Environmental Impacts

Examining an airport's potential impacts on the surrounding environment and community is critical when choosing a potential development site, as excessive environmental impacts will likely increase costs and may preclude development entirely. A number of federal, state, and local agencies, including but not limited to the U.S. Environmental Protection Agency (EPA), United States Fish & Wildlife Service (USFWS), Washington State Historic Preservation Office (SHPO), and Washington State Department of Ecology (DOE), set standards for a variety of environmental factors which may apply to land development projects. The following factors were considered when evaluating the potential environmental impacts at each study site:

- Built environment and social resources
- Natural environment resources
- Impacts to disproportionately impacted communities
- Incompatible land uses

Development of a new airport or expansion at an existing airport would likely require analysis under the National Environmental Policy Act (NEPA) and Washington's State Environmental Policy Act (SEPA). The screening analyses completed as part of this Site Selection Study provide a high-level evaluation of potential environmental factors and do not represent a full NEPA or SEPA analysis. Further refined studies will need to be conducted if a site is selected to ensure development is conducted in accordance with NEPA and SEPA standards.

4.4.1. Built Environment and Social Resources

Built environment and social resources consist of man-made objects of consequence such as buildings, utility systems, roads, bridges, and transportation systems. This analysis examined two factors related to built environment and social resources: historic and archeological resources and hazardous materials. The following subsections describe the how each factor was evaluated and the results of the analysis.

4.4.1.1. Historic and Archeological Resources

Greenfield and existing sites were scored based on the number of historic resources that fall within the footprint of each site layout. GIS data was obtained from the U.S. National Park Service (NPS) and the Washington Department of Archeological and Historic Preservation (DAHP). Evaluated resources included buildings, structures, sites, objects, and districts included in the National Register of Historic Places as well as those eligible to be protected by the Washington State Historic Preservation Office (SHPO). Additionally, resources that have not yet been determined to be eligible for SHPO protection were evaluated if they were listed on the DAHP Historic Property Inventory. Resources were vetted to ensure no resources listed by the NPS and DAHP were double counted. The scoring ranges used to evaluate sites for historic and archeological resources are listed in **Table 15**.

Table 15: Historic and Archeological Resources Scoring

Range	Score
Less than 10 resources	Green
10-20 resources	Yellow
More than 20 resources	Red

Source: Kimley-Horn

Layout 1 Results

The Skagit County Northwest and Southeast sites were the only greenfield sites found to have historical resources within the Layout 1 boundaries. These sites contain one and three total resources, respectively, and therefore all greenfield sites receive green scores. Nine of the 12 existing sites score green in Layout 1, however, only three sites are completely clear of historic or archeological resources. Three existing sites, BFI, RNT, and S50, receive red scores. Of these, BFI contains 40 total resources onsite, the most of any proposed location. These resources include the Seattle City Light Georgetown Steam Plant, a National Historic Landmark (NHL), which may require special preservation actions. No other existing or greenfield site contains an NHL property.

Layout 2 Results

Greenfield sites receive the same scores in Layout 2 as Layout 1. Eight of the 12 existing sites score green, while S36 became the fourth existing site to score red. No sites fell into the yellow scoring range. Only two existing sites – PAE and PWT – do not contain resources onsite. BFI once again has the greatest number of resources within the confines of Layout 2, increasing from 40 to 45. RNT, S36, and S50 were found to contain 26, 22, and 23 total resources onsite, respectively, but none of these sites contained an NHL property.

Layout 3 Results

All greenfield sites receive green scores in Layout 3, although the number of resources at the two Skagit County sites increased to two and four, respectively, and the King County Southeast site was found to have a resource onsite. All existing sites receive equal scores between Layouts 2 and 3. BFI was again the poorest performing site, with 46 total resources. BFI remained the only site with an NHL property within the proposed template.

4.4.1.2. Hazardous Materials

The EPA is tasked with protecting people and the environment from significant health risks and enforces numerous environmental regulations. Existence of hazardous materials may present additional costs and pose potential safety risks for development of or at an airport. Data was sourced from the EPA’s Facility Registry Service (FRS) which maintains a comprehensive GIS database of industrial sites registered with the EPA. For the purposes of this analysis, sites were screened to determine if brownfield or superfund sites were present, and if present, how extensive the remediation would potentially be, as shown in **Table 16**. Existing airport sites are typically surrounded by other developments, meaning these sites are more likely to contain industrial uses and therefore brownfield/superfund sites versus undeveloped greenfield sites.

Table 16: Hazardous Materials Scoring

Range	Score
No hazardous materials onsite	Green
Hazardous materials present but no significant impacts	Yellow
Significant hazardous materials present	Red

Source: Kimley-Horn

Layout 1 Results

No greenfield sites had any brownfield or superfund sites present, meaning that all greenfield sites score green. Most of the existing airports located in more rural and undeveloped areas such as AWO and TIW score green as well, with seven total existing sites having no brownfield or superfund sites present due to a lack of nearby industrial developments. The four yellow-scoring sites had a handful of existing hazards present, but more investigation would be required to determine if the impact of these sites is significant to future development. With 11 brownfields and two superfund sites, BFI is the sole red-scoring site due not only to the number of sites, but the impact of the sites and future construction on the protected Duwamish Waterway.

Layout 2 Results

As with Layout 1, no greenfield sites had any brownfield or superfund sites present, and therefore all greenfield sites score green. The scores for existing sites remained the same as well, although Layout 2 at PAE includes a superfund site bringing the total number of sites to two, and BFI has an additional five sites within Layout 2. As the site sizes expand, it is to be expected that more hazardous sites would be present for the existing sites—especially in urban areas—as industrial development is much more common around other industrial sites, such as airports and airport facilities.

Layout 3 Results

As with Layouts 1 and 2, no greenfield sites have any brownfield or superfund hazard sites present, resulting in green scores for all greenfield sites. Although most of the existing sites remained largely unchanged, BFI, BLI, and RNT stood out with the most significant changes. BLI changed from green to yellow with the addition of a superfund site, however, currently no contaminants are present according to the Superfund Enterprise Management System (SEMS). Layout 3 for BFI has a total of 23 hazardous sites, nearly double the amount found in Layout 1, with 20 of them brownfield sites and three superfund sites. As with Layouts 1 and 2, these existing hazards along with future impacts to the Duwamish Waterway make BFI score red. While RNT has only one superfund site within the Layout 3 boundary, this site is documented to have significant soil impacts from a former metal foundry, and extensive remediation would be required for new construction, resulting in a red score.

4.4.1.3. Section 4(f) Resources

Section 4(f) of the U.S. Department of Transportation (DOT) Act of 1966 requires that transportation projects receiving federal funding or approval must work to minimize impacts to

park and recreation lands, wildlife and waterfowl refuges, and historic sites. Projects that receive funding or are approved by the U.S. DOT that impact these properties must prove that there is no feasible and prudent alternative that avoids Section 4(f) resources and that the project includes all possible planning to minimize harm to these properties.

The evaluation assessed the possible impact to parks, wildlife and waterfowl refuges, and recreational trails for each site layout. Historic properties were not considered when evaluating sites for Section 4(f) resources as they are considered built environmental resources and are evaluated in **Section 4.4.1.1**. This evaluation was completed using GIS data from the State of Washington, the NPS, and each respective county’s GIS database. Sites receive a score based on the combined impact to Section 4(f) resources within the boundaries of each layout. The scoring ranges used to evaluate each type of Section 4(f) resource are shown in **Table 17**. Sites receive the highest score of any single category, meaning that a site having significant impacts to parks but minimum impacts to wildlife refuges and recreational trails would receive a red score for all Section 4(f) resources.

Table 17: Section 4(f) Resources Scoring

Parks Range	Wildlife Refuge Range	Recreational Trails Range	Score
Less than 50 acres	Less than 50 acres	Less than 2 miles of trail	Green
50-100 acres	50-100 acres	2-3 miles of trail	Yellow
More than 100 acres	More than 100 acres	More than 3 miles of trail	Red

Source: Kimley-Horn

Layout 1 Results

No Section 4(f) resources were identified within the boundaries of any greenfield sites in Layout 1, resulting in all locations receiving a green score. Five existing sites also score green, but only three are clear of all Section 4(f) resources. Four existing sites score yellow and three score red (AWO, S50, and TIW). Of the sites that score red, S50 performs the poorest, as there are more than 160 acres of parks and four miles of recreational trails within the site in Layout 1.

Layout 2 Results

All greenfield sites receive the same score in Layout 2 as Layout 1. Five existing sites again score green while three score yellow. One existing site – RNT – scores red in Layout 2 after scoring yellow in Layout 1. RNT has the most significant impacts of any greenfield or existing site on Section 4(f) resources in Layout 2 as it would displace 115 acres of parks and more than five miles of recreational trails. No wildlife or waterfowl refuges are impacted by any proposed site in Layout 2.

Layout 3 Results

Similar to Layouts 1 and 2, all greenfield sites are absent of Section 4(f) resources in Layout 3 while most existing sites impact resources to some capacity. Three existing airport sites score green, with only PAE having no impacts to Section 4(f) resources. The existing sites scoring yellow include BLI, S36, and SHN. Six existing sites score red for Section 4(f) resource impacts.

Of these, S50 has the most significant impacts, as 330 acres of parks and two miles of recreational trails falls within the site in Layout 3.

4.4.2. Natural Environment Resources

Protecting natural environmental resources is an important consideration when developing an airport given their significance on surrounding ecosystems and communities. This analysis considers four specific factors related to natural environmental resources. These include wetlands, floodplains, protected wildlife habitats, and Section 4(f) resources. The following subsections describe the methodology and results of each evaluation.

4.4.2.1. Wetland Impacts

Wetlands are important habitats for many species, but they also play a critical role in maintaining local water quality and mitigating risk of damaging floods. Development in wetland areas is subject to additional restrictions or requirements often including mitigation or replacement of lost wetland with the dedication and construction of new wetland which can considerably increase overall project costs. To assess the potential impact to wetlands, the total acreage of wetlands included in the U.S. Fish and Wildlife Service National Wetlands Inventory (NWI) was measured for the three layouts at each potential site. Unlike other evaluations, sites are scored based on the total number of acres of wetlands on site rather than the percentage of the site occupied by wetlands, as shown in **Table 18**. This is due to the assumed mitigation ratios (4:1), which will increase complexity of site acquisition and development regardless of the size of the total site.

Table 18: Wetland Impacts Scoring

Range	Score
Less than 150 acres	Green
150-400 acres	Yellow
More than 400 acres	Red

Source: Kimley-Horn

Layout 1 Results

In Layout 1, six greenfield and eight existing sites score green for having minimal impacts to wetlands onsite. Of these, Skagit County Northwest and PWT perform most favorably of greenfield and existing sites, having only 45.4 and 51.2 acres of wetlands onsite, respectively. Pierce County East and both Thurston County greenfield sites score yellow. Four existing sites score red, with CLS having the most wetlands on site (558 acres). Lewis County is the only greenfield site to score red as the site occupies more than 420 acres of wetlands.

Layout 2 Results

Five greenfield and four existing sites score green in Layout 2. The best-performing greenfield and existing sites Skagit County Southwest and PAE, which have 51.1 and 63.5 acres of wetlands onsite, respectively. Two greenfield sites and four existing sites score yellow. Three greenfield sites score red, including both Thurston County sites, which score yellow in Layout 1.

Lewis County is again the poorest performing greenfield site with more than 530 acres onsite in Layout 2. The four existing sites which score red in Layout 1 also score red in Layout 2.

Layout 3 Results

The Skagit County sites are the only greenfield sites that receive a green score in Layout 3, as each have less than 80 acres of wetlands onsite. Five greenfield sites score yellow in Layout 3, including three sites that score green in Layout 2. The three greenfield sites which score red in Layout 2 also score red in Layout 3. Lewis County is the poorest-performing greenfield site due to the presence of 755 acres of wetlands onsite. All but two existing sites receive similar scores in Layouts 2 and 3. S50 and SHN receive a green score in Layout 2 and a yellow score in Layout 3, joining four other existing sites which score yellow. Four existing sites again score red in Layout 3 with TIW performing the poorest of any existing site. The Tacoma Narrows waterway impacts TIW as it is considered part of the nearly 2,000 acres of wetlands present onsite.

4.4.2.1. Floodplain Impacts

Airfields and facilities located within floodplains are susceptible to flooding damage or destruction during major storm or rain events and could require extended closure for repair. As such, avoiding flood-prone areas is important to the long-term resiliency and safety of an airport. The Federal Emergency Management Agency (FEMA) surveys and maps areas that are at elevated risk of flooding. These areas, called floodplains, are typically low-lying flat areas and may not strictly correspond to the location of wetlands or bodies of water. Areas designated as 100-year floodplains have an estimated 1 percent chance of flooding every year and areas designated 500-year floodplains have an estimated 0.2 percent chance of flooding every year. Sites were scored based on the combined amount of 100- and 500-year floodplains, in acres, present in each site, using the scoring ranges presented in **Table 19**.

Table 19: Floodplain Impacts Scoring

Range	Score
Less than 150 acres	Green
150-400 acres	Yellow
More than 400 acres	Red

Source: Kimley-Horn

Layout 1 Results

In Layout 1, five greenfield and seven existing sites score green for having minimal floodplain impacts. PAE and PWT have no known floodplains on site. The Snohomish County sites also perform favorably as they each have fewer than 10 acres of floodplains onsite. Three greenfield and existing sites score yellow in Layout 1. Two greenfield sites, Skagit County Northwest and Southwest, score red for floodplain impacts despite scoring green in wetlands impacts. Skagit County Northwest has more than 2,200 acres of floodplains, the most of any site. Four existing sites also score red in Layout 1, including CLS which occupies more than 2,170 acres of floodplains.

Layout 2 Results

The scoring results of Layout 2 are generally similar to Layout 1 as only four total sites receive different scores. Four greenfield sites score green in Layout 2. Thurston County South is one of three greenfield sites receiving a yellow score in Layout 2, moving from green in Layout 1 due to the presence of 200 acres of onsite wetlands. Three greenfield sites score red, including both Skagit County sites and Pierce County East. Five existing sites score green, while BFI and S36 move from green in Layout 1 to yellow in Layout 2. Four existing sites score red: AWO, CLE, RNT, and S50. Of these, CLS again has the largest area of floodplains onsite in Layout 2 (2,749 acres).

Layout 3 Results

Nearly all sites perform poorly in Layout 3 compared to Layout 2, as only two greenfield and two existing sites receive green scores. These sites include PAE and PWT, both of which have no floodplains onsite, and the Snohomish County Southeast and Thurston County Central sites, which have 7.8 and 325 acres of floodplains on site, respectively. Four greenfield and five existing sites score yellow in Layout 3. The Lewis County site and TIW receive red scores in Layout 3, joining three greenfield and four existing sites that score red in both Layouts 2 and 3. Both Skagit County sites perform very poorly in Layout 3 as more than 4,000 acres of each site are designated as floodplains. CLS also performs poorest among all existing sites as there are more than 3,500 acres of floodplains present in Layout 3.

4.4.2.2. Protected Wildlife Habitats and Species

The Washington Department of Fish and Wildlife (WDFW) and the USFWS are state and federal agencies tasked with monitoring the health of native species within local ecosystems. The Endangered Species Act of 1973 provides a strong federal legal framework for conservation and protection efforts of those species whose populations are below sustainable levels. The USFWS identifies the status of a species as “Endangered” once the observed population reaches a critically low level that may result in extinction. A USFWS identification of “Threatened” applies when a species population is under a healthy level with a trending pattern to be categorized as “Endangered”. Critical habitats for threatened and endangered species are identified by USFWS. Federally funded or approved projects in critical habitats must consult with USFWS to ensure that they will not destroy or adversely modify critical habitat.

For the purposes of initial site screening, the USFWS Information for Planning and Consultation (IPaC) powered by the environmental conservation online system (ECOS) was queried. This database tool assesses habitats for endangered species and populates results identifying potential impacts to protected species. Each site and layout were analyzed and rated based on if critical habitat was identified. **Table 20** shows the scoring ranges for potential impacts to protected wildlife.

Table 20: Protected Wildlife Habitats and Species Scoring

Range	Score
No critical habitat	Green
Critical habitat present onsite	Yellow

Source: Kimley-Horn

Layout 1 Results

All greenfield sites score green with the exception of the Skagit County Northwest and Thurston County South sites, which both score yellow. The Samish River, which runs through the Skagit County Northwest site, is identified as a critical habitat for Bull Trout. A portion of the Thurston County South site is identified as critical habitat for the Oregon Spotted Frog. Five existing sites: AWO, BFI, BLI, OLM, and RNT score yellow, while the rest of the existing sites score green. All five of these sites except OLM impact rivers or creeks identified as critical habitats for Bull Trout. The OLM site occupies land identified as critical habitat for the Olympia Pocket Gopher.

Layout 2 Results

The scoring results for all sites with the exception of S50 are identical between Layouts 1 and 2. Layout 2 of the S50 site impacts the Green River, which is considered a critical Habitat for Bull Trout. Therefore, S50 scores yellow in Layout 2. The critical habitats in all other yellow-scoring sites remain the same between Layouts 1 and 2.

Layout 3 Results

Results were generally similar between Layouts 2 and 3 as the scoring of all but one site remain unchanged. TIW score yellow in Layout 3 as opposed to green in Layouts 1 and 2 due to the presence of Bull Trout habitat identified in the Tacoma Narrows waterway. Although the score of the Thurston County Central site remains unchanged between Layouts 2 and 3, the number of critical habitats present increase from one to three as the site impacts critical habitats for the Yelm Pocket Gopher and Taylor’s Checkerspot butterfly.

4.4.3. Burden on Disproportionately Impacted Communities

It is important to not only examine an airport’s impacts on the general population but also to evaluate more specifically the burden on disproportionately impacted communities. Environmental Justice is a component of Title VI of the Civil Rights Act that charges organizations like the EPA and WSDOT with the responsibility to ensure no people are disproportionately impacted by proposed development, implementation, and enforcement of environmental policies regardless of their race, color, nationality, or income. Three factors of Environmental Justice were evaluated in this analysis:

- Impacts to people of color
- Impacts to low-income households
- Impacts to individuals with limited-English proficiency (LEP)

A five-mile buffer around each site was chosen in order to assess the broader impact of a new and/or expanded airport and its associated facilities (access roadways, transit infrastructure,

etc.) on the surrounding community. The buffer was measured from the center of each site in Layout 3, meaning that all layouts were evaluated the same given the buffer is the same for all layouts. Demographics data is based on block group data from the 2015-2019 American Community Survey, using the EPA’s Environmental Justice Screening and Mapping Tool (EJ Screen). People of color include respondents identifying as American Indian/Alaska Native, Asian, Black or African American, Hispanic or Latino, and/or Native Hawaiian/Pacific Islander, including those identifying as two or more races. Limited-English proficiency (LEP) includes any individuals five or older who reported speaking English less than “very well.” Low-income includes households making less than \$50,000, which is approximately 80 percent of the median household income among counties in the Puget Sound region.⁴

The scoring ranges for impacts to people of color, low-income households, and LEP individuals are shown in **Table 21**, **Table 22**, and **Table 23**, respectively. Scoring ranges for each evaluation were developed based on environmental health disparity ranks identified in the Washington State Environmental Justice Task Force (EJTF) Final Report.⁵ Sites were individually evaluated for each of the factors related to Environmental Justice, although all factors contribute to the overall impacts to disproportionately impacted communities.

Table 21: Impacts to People of Color Scoring

Range	Score
Less than 22% of population	Green
22-33% of population	Yellow
More than 33% of population	Red

Source: Kimley-Horn

Impacts to People of Color Results – All Layouts

In general, greenfield sites perform slightly more favorably than existing sites, as four greenfield sites score green while only two existing sites score green. Of these, Lewis County performs the best, as only 16 percent of the population within the five-mile buffer are people of color. Five greenfield and five existing sites score yellow, while one greenfield and five existing sites score red. RNT has the most disproportionate impact on people of color, as 57 percent of the population in the buffer are people of color.

⁴ 80 percent of area median income is the typical poverty threshold

⁵ The EJTF Final Report identified correlations between environmental health disparities and demographic factors including race, poverty levels, and life expectancy. The report is available online at: https://apps.leg.wa.gov/ReportsToTheLegislature/Home/GetPDF?fileName=EJTF%20Report_FINAL_39bdb601-508e-4711-b1ca-6e8c730d57bf.pdf

Table 22: Impacts to Low-Income Households Scoring

Range	Score
Less than 19% of estimated impacted households	Green
19-27% of estimated impacted households	Yellow
More than 27% of estimated impacted households	Red

Source: Kimley-Horn

Impacts to Low-income Households Results – All Layouts

Greenfield sites have substantially fewer impacts to low-income households than existing sites, as all but one greenfield site scores green. Conversely, 11 of the 12 existing sites score red for impacts to low-income households. Only the Skagit County Southwest greenfield site and existing site AWO score yellow. Pierce County East is the greenfield site with the fewest impacts to low-income households, as only nine percent of households within the 5-mile buffer are considered low-income. Skagit County Southwest has the greatest impact on low-income households of any greenfield site (19 percent of households). CLS is the poorest performing existing site, as 48 percent of the households in the five-mile buffer are considered low-income.

Table 23: Impacts to Individuals with Limited-English Proficiency Scoring

Range	Score
Less than 5% of estimated impacted people	Green
5-10% of estimated impacted people	Yellow
More than 10% of estimated impacted people	Red

Source: Kimley-Horn

Impacts to Limited English Proficiency Individuals Results – all Layouts

Seven greenfield and six existing sites score green for impacts to LEP individuals, indicating that impacts were slightly more even between greenfield and existing sites. Of these, Pierce County Central and PWT are the greenfield and existing sites that perform most favorably, as only two and three percent of the population of each respective site include LEP individuals. Two greenfield and one existing site score yellow. Snohomish County Northwest is the only greenfield site to score red with 11 percent of the population in the buffer being LEP. Five existing sites score red including RNT, which has 18 percent of the buffer population identifying as LEP.

4.4.4. Incompatible Land Uses

Noise is one of the most prevalent and impactful results from airport operation. As such, airports work with surrounding municipalities to reduce the effects of aircraft noise by establishing compatible developments and uses in the immediate vicinity of flight paths and airfields. The FAA considers certain uses such as residential, schools (including higher education), and

religious institutions, to be incompatible with airport operations due to their sensitivity to excessive noise.

Existing and greenfield sites were evaluated to determine what portion of land surrounding the proposed layout is considered incompatible with airport development. A buffer was established around the airport to provide an estimated area in which aircraft noise is expected to exceed the 65 Decibel (dB) day-night average sound level, (DNL) the FAA’s threshold for noise impacts for which funding is available to address. The buffer extends two miles from the approach and departure ends of each layout and one mile to each side, roughly matching the dimensions of the 65 dB DNL contour identified in the 2018 Seattle-Tacoma International Airport (SEA) Sustainable Airport Master Plan (2016 study year).⁶ Land parcels within the estimated noise buffer of each site layout were evaluated by calculating the percentage of acres of residential, school, and religious uses within each layout. The areas within the proposed airport layout were excluded from this analysis since it is assumed that the land these existing uses would be replaced with airport facilities. Parcel data were sourced from the Washington Geospatial Open Data Portal statewide parcel data. **Table 24** presents the scoring ranges used to evaluate sites for their impacts to incompatible land uses.

Table 24: Incompatible Land Uses Scoring

Range	Score
Less than 30% of acres	Green
30% – 50% of acres	Yellow
More than 50% of acres	Red

Source: Kimley-Horn

Layout 1 Results

Greenfield sites are generally located in less-heavily developed areas than existing airports, and the incompatible land use scoring was similarly distributed between each type of site. Three greenfield sites score green, including both Skagit County sites and Thurston County South. Skagit County Southwest has the fewest incompatible land uses in Layout 1, only 5.5 percent of the total land within the site. Two existing sites – PWT and SHN – also score green for having 7.9 and 11.0 percent of land being incompatible. Four greenfield and eight existing sites score yellow. Five sites score red, including three greenfield and two existing sites. Snohomish County Southeast and TIW are the poorest performing greenfield and existing sites, respectively.

Layout 2 Results

All greenfield sites receive the same score for Layout 2, although the percentage of incompatible land within each site changes. Skagit County Southwest again has the smallest portion of incompatible land uses of any greenfield site (5.7 percent), but Pierce County East replaced Snohomish County as the poorest-performing greenfield site due to 54 percent of land in the buffer being considered an incompatible use. The scores of existing sites are mostly

⁶ Available online at: <https://www.portseattle.org/plans/sustainable-airport-master-plan-samp>

similar between Layouts 1 and 2, with only PAE moving from yellow to red. PWT again has the least incompatible land use, scoring green, while TIW scores red.

Layout 3 Results

All greenfield sites receive the same scores in Layout 3 as Layouts 1 and 2. Skagit County Southwest scores green for having only 7.7 percent of land within Layout 3 being incompatible use. Pierce County East performs the poorest of the three greenfield sites scoring red as 55.2 percent of land within the buffer is incompatible. Scores of existing sites remain mostly consistent with the exception of BLI. BLI receives a green score in Layout 3, as opposed to a yellow score in Layout 2, due to the number of acres of incompatible land use remaining steady between layouts while the overall size of the template increased. Three existing sites score red, and of these, TIW performs the poorest as more than 63 percent of the site is identified as incompatible use.

4.5. Criterion: Market Factors

One of the core elements of a commercial service airport is serving its intended market, both passengers and air cargo, as many commercial service airports provide both types of service. The proximity of people, both in terms of general population as well as those that are currently utilizing commercial airline service, as well as businesses that utilize air cargo are essential indicators of the potential success of airlines. **Chapter 2** documented airline market factors and how those influence demand in the Puget Sound region. Data from this forecasting analysis was considered relative to the ability of various sites to attract that demand based on the factors that were analyzed.

The Puget Sound is also well known for its aerospace manufacturing, as it is home to the Boeing Company’s Boeing Commercial Airplanes division and several of its major production facilities. This activity is typically found at airports where the final products are tested and shipped, as well as the airports used to bring in staff and other resources. With several existing airports in the region serving as production and final assembly facilities, the potential impact of development of commercial service at these airports must be considered in light of any potential impacts to this activity.

The following elements were considered when evaluating the market factors at each study site:

- Population served within 90 minutes’ drive time
- Air cargo access (within 60-minute drive of Seattle)
- Consistency with airline market factors
- Impact to aerospace manufacturing

4.5.1. Population Served within 90 Minutes’ Drive Time

GIS data of all public roadways in Washington State were provided by WSDOT, with population data coming from 2019 5-Year estimates from the American Community Survey (ACS)/Census Bureau. A 90-minute drive time was selected to represent the general distance most passengers are willing to drive to access commercial airline service. While some passengers are willing to drive longer depending on the type of service that is provided, or less than 90

minutes, this average drive time is utilized by many commercial passenger airlines in examining their potential market base from which to draw in making decisions about starting or continuing commercial airline service.

To determine the 90-minute drive time areas, a constant speed of 40 miles per hour (mph) was assumed to account for congestion during peak times as well as off-peak travel times, resulting in a 60-mile “driveshed” for each site. These drivesheds were then used to clip the Census block groups to obtain the population data for each site. In order to have a more representative proportion of data, the geographic area of the clipped Census block group was divided by the unmodified Census block group to create a ratio that the population could be multiplied by to have a more representative population when looking at Census block groups that were unevenly split in the analysis to fit the drivesheds. For example, if 40 percent of a Census block with a population of 25,000 fell within the driveshed, the population within the driveshed would be calculated to be 10,000 people, representing 40 percent of the total population. The adjusted populations of all adjusted Census blocks were totaled, and sites were then scored based on the total population within the driveshed using the ranges listed in **Table 25**.

Table 25: Population Within 90 Minutes’ Drive Time Scoring

Range	Score
More than 3 million people	Green
1.5 million – 3 million people	Yellow
Less than 1.5 million people	Red

Source: Kimley-Horn

Results – All Layouts

In this analysis, an existing site (S50) performed most favorably of any site, however, the existing sites also had more sites scoring red compared to greenfield sites. BLI, CLS, and SHN all have populations less than 1.5 million within the 90-minute driveshed, compared to the two greenfield sites of Lewis County and Skagit County Northwest, which have 1.2 million and 544,000, respectively, in those same 90-minute drivesheds. Sites nearest the Seattle-Tacoma metropolitan area generally score green, while those scoring red and yellow are located in more rural areas of Thurston, Lewis, and Skagit counties, further from the central Seattle area.

4.5.2. Air Cargo Access

Similar to the analysis described in **Section 4.5.1**, a driveshed was created to determine the population within the given criteria, except the drive time was 60 minutes rather than 90, and the origin was a single point in downtown Seattle rather than the center of each site. The 60-minute driveshed was established based on WSDOT discussions with cargo carriers who indicated a preference and need to be within 60 minutes of downtown Seattle to meet their business requirements. Assuming the same constant speed of 40 mph, a driveshed of 60 minutes/40 miles from downtown Seattle was created, with the score being determined based on whether the airport site falls within the 60-minute drive time area, as demonstrated in **Table 26**.

Table 26: Air Cargo Access Scoring

Range	Score
Within 60 minutes of Seattle	Green
Not Within 60 minutes of Seattle	Yellow

Source: Kimley-Horn

Results – All Layouts

Only three of the 10 greenfield sites are located close enough to Seattle to receive green scores. These include King County Southeast, Snohomish County East, and Snohomish County Northwest. More than half of the existing sites score green due to their proximity to Seattle, including AWO, BFI, PAE, RNT, S36, S50, and TIW.

4.5.3. Consistency with Airline Market Factors

To determine alignment with key airline market factors described in **Chapter 2**, each greenfield and existing site was evaluated to determine the amount of projected unaccommodated demand that could be served within 90 minutes’ drive time. In a similar manner to **Section 4.5.1**, a 90-minute driveshed was established using a standard average speed of 40 mph for each site. The driveshed was overlaid with the projected unaccommodated demand discussed in **Chapter 2** to determine how many million annual passengers (MAP) of unaccommodated demand could be accommodated within 90-minutes’ drive. It is important to note that unaccommodated passenger demand is significantly higher than that of population, as demand counts visitors to the region and residents who will likely fly multiple times per year. **Table 27** presents the scoring ranges used to evaluate sites.

Table 27: Consistency with Airline Market Factors Scoring

Range	Score
More than 15 MAP	Green
5 – 15 MAP	Yellow
Less than 5 MAP	Red

Source: Kimley-Horn

Results – All Layouts

Compared to **Section 4.5.1**, most of the sites score similarly in this analysis, with eight of the 10 greenfield sites staying the same, and 11 of the 12 existing sites staying the same. For the greenfield sites that changed, Snohomish County Northwest went from a yellow to a green, while Thurston County South went from a yellow to a red. The sole existing site that changed was AWO, going from a yellow to a green.

4.5.4. Impact to Aerospace Manufacturing

The current use of existing airports for aerospace manufacturing and delivery was assessed. Aerospace manufacturing firms typically use airfields to test new aircraft and store aircraft awaiting completion or delivery. Large-scale aerospace manufacturing is typically incompatible

with high levels of commercial passenger service as both activities are time intensive and require a significant land area that is not available at most airports. As such, development of a large commercial airport at a site with existing aerospace manufacturing could disrupt those manufacturing activities and have a substantial impact on the regional economy. Existing airport sites were therefore analyzed to determine if development of a commercial airport using the templates presented in **Chapter 1** would impact existing aerospace manufacturing facilities. Greenfield sites were also analyzed, but given their rural nature, no impacts were identified.

Although some level of aerospace manufacturing or testing activities occurs at most of the airports in the region, BFI, PAE, and RNT are the only sites to likely have a substantial impact on aerospace manufacturing given that Boeing manufacturing and testing facilities are present at those facilities. Relocating these facilities to accommodate passenger and cargo facilities would exponentially increase the cost of site development and could have tremendous ramifications on these airports and the larger economy.

5. Summary of Screening Evaluation Results

A summary of the results from the screening evaluations discussed in the previous sections for the 10 greenfield and 12 existing sites for all sites in Layouts 1, 2, and 3, is presented in **Table 28**, **Table 29**, and **Table 30**, respectively.

Table 28: Screening Evaluation Results Summary – All Sites Layout 1

Criterion Category	Evaluation Element	Measure	Greenfield Sites										Existing Airports											
			Skagit NW	Skagit SW	Snohomish NW	Snohomish SE	King SE	Pierce E	Pierce C	Thurston C	Thurston S	Lewis	Bellingham Intl	Arlington Muni	Paine Field	Boeing Field	Renton Muni	Bremerton National	Norman Grier Field	Auburn Muni	Tacoma Narrows	Sanderson Field	Olympia	Chehalis-Centralia
Operational Capability and Capacity Potential	Minimum area available	Land area available with no major obstacles																						
		Accommodates recommended runway length																						
	Terrain development impacts	Percent of terrain within +/- 200' of average elevation																						
		Airspace constraints	Part 77 airspace surface constraints																					
			Impacts Military airspace																					
	Wind coverage	95 percent wind coverage																						
Ground Access	Highway access	Proximity to nearest Interstate/Highway																						
	Transit access	Proximity to nearest Bus Rapid Transit (BRT)																						
		Proximity to nearest Light rail																						
		Proximity to nearest Commuter rail																						
Development Costs	Order of magnitude costs	Assessed property value																						
	Property acquisitions	Number of parcels required																						
Potential Environmental Impacts	Built environmental and social resources	Historic and archeological resource impacts																						
		Hazardous material impacts																						
		Section 4(f) resource impacts																						
	Natural environmental resources	Areas of wetland impacts																						
		Areas of Floodplain impacts																						
	Burden to disproportionately impacted populations	Protected wildlife habitats and species																						
		Percent of population - people of color																						
		Percent of population - low-income households																						
Incompatible land uses	Percent of population -LEP individuals																							
	Incompatible land uses	Amount of incompatible land in noise buffer																						
Market Factors	Population served	Total population served (90-min. drive)																						
	Air Cargo access	Cargo access to Seattle (60-min. drive)																						
	Consistency with airline market factors	Unaccommodated passenger demand (90-min. drive)																						
		Impact to aerospace manufacturing	Impacts to manufacturing facilities																					

Source: Kimley-Horn

Table 29: Screening Evaluation Results Summary – All Sites Layout 2

Criterion Category	Evaluation Element	Measure	Greenfield Sites										Existing Airports											
			Skagit NW	Skagit SW	Snohomish NW	Snohomish SE	King SE	Pierce E	Pierce C	Thurston C	Thurston S	Lewis	Bellingham Intl	Arlington Muni	Paine Field	Boeing Field	Renton Muni	Bremerton National	Norman Grier Field	Auburn Muni	Tacoma Narrows	Sanderson Field	Olympia	Chehalis-Centralia
Operational Capability and Capacity Potential	Minimum area available	Land area available with no major obstacles																						
		Accommodates recommended runway length																						
	Terrain development impacts	Percent of terrain within +/- 200' of average elevation																						
		Part 77 airspace surface constraints																						
	Airspace constraints	Impacts Military airspace																						
		95 percent wind coverage	Existing airports not analyzed for airspace impacts																					
Ground Access	Highway access	Proximity to nearest Interstate/Highway																						
		Proximity to nearest Bus Rapid Transit (BRT)																						
	Transit access	Proximity to nearest Light rail																						
		Proximity to nearest Commuter rail																						
Development Costs	Order of magnitude costs	Assessed property value																						
	Property acquisitions	Number of parcels required																						
Potential Environmental Impacts	Built environmental and social resources	Historic and archeological resource impacts																						
		Hazardous material impacts																						
		Section 4(f) resource impacts																						
	Natural environmental resources	Areas of wetland impacts																						
		Areas of Floodplain impacts																						
		Protected wildlife habitats and species																						
	Burden to disproportionately impacted populations	Percent of population - people of color																						
		Percent of population - low-income households																						
		Percent of population - LEP individuals																						
Incompatible land uses	Amount of incompatible land in noise buffer																							
Market Factors	Population served	Total population served (90-min. drive)																						
	Air Cargo access	Cargo access to Seattle (60-min. drive)																						
	Consistency with airline market factors	Unaccommodated passenger demand (90-min. drive)																						
		Impacts to aerospace manufacturing	Impacts to manufacturing facilities																					

Source: Kimley-Horn

Table 30: Screening Evaluation Results Summary – All Sites Layout 3

Criterion Category	Evaluation Element	Measure	Greenfield Sites										Existing Airports												
			Skagit NW	Skagit SW	Snohomish NW	Snohomish SE	King SE	Pierce E	Pierce C	Thurston C	Thurston S	Lewis	Bellevue Intl	Arlington Muni	Paine Field	Boeing Field	Renton Muni	Bremerton National	Norman Grier Field	Auburn Muni	Tacoma Narrows	Sanderson Field	Olympia	Chehalis-Centralia	
Operational Capability and Capacity Potential	Minimum area available	Land area available with no major obstacles																							
		Accommodates recommended runway length																							
	Terrain development impacts	Percent of terrain within +/- 200' of average elevation																							
	Airspace constraints	Part 77 airspace surface constraints																							
		Impacts Military airspace																							
	Wind coverage	95 percent wind coverage																							
Ground Access	Highway access	Proximity to nearest Interstate/Highway																							
	Transit access	Proximity to nearest Bus Rapid Transit (BRT)																							
		Proximity to nearest Light rail																							
		Proximity to nearest Commuter rail																							
Development Costs	Order of magnitude costs	Assessed property value																							
	Property acquisitions	Number of parcels required																							
Potential Environmental Impacts	Built environmental and social resources	Historic and archeological resource impacts																							
		Hazardous material impacts																							
		Section 4(f) resource impacts																							
	Natural environmental resources	Areas of wetland impacts																							
		Areas of Floodplain impacts																							
		Protected wildlife habitats and species																							
	Burden to disproportionately impacted populations	Percent of population - people of color																							
		Percent of population - low-income households																							
		Percent of population -LEP individuals																							
Incompatible land uses	Amount of incompatible land in noise buffer																								
Market Factors	Population served	Total population served (90-min. drive)																							
	Air Cargo access	Cargo access to Seattle (60-min. drive)																							
	Consistency with airline market factors	Unaccommodated passenger demand (90-min. drive)																							
	Impact to aerospace manufacturing	Impacts to manufacturing facilities																							

Source: Kimley-Horn

Acronyms

ADIP	Airport Data and Information Portal
AGL	Above ground level
ASV	Annual service volume
AWOS	Automated weather observing system
BRT	Bus rapid transit
DAHP	Department of Archeological and Historic Preservation
ECOS	Environmental Conservation Online System
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
IPaC	Information for Planning and Consultation
JBLM	Joint Base Lewis-McChord
MOA	Military operations area
MSL	Mean sea level
MTC	Military training corridor
MTR	Military training route
NPS	National Park Service
PSRC	Puget Sound Regional Council
USFWS	U.S. Fish and Wildlife Service
WDFW	Washington Department of Fish and Wildlife
WSDOT	Washington State Department of Transportation