



Airport Compatible Land Use Program Update

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Puget Sound Regional Council
PSRC

prepared by: **MEAD
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Required Statement

The following statement is provided as required by Paragraph 429.a of Federal Aviation Administration Order 5100.38, Airport Improvement Program (AIP) Handbook:

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The report was developed through a joint effort with the Puget Sound Regional Council and Mead & Hunt.

For additional information or to obtain copies please contact the Puget Sound Regional Council's Information Center, 206-464-7532, e-mail info@psrc.org. The report and additional background information is available at www.psrc.org/transportation/airtrans/compatible/

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Airports

The PSRC Airport Compatible Land Use program addresses the following commercial, military, and public use general aviation airports. The regional airport system includes several privately owned airports which are open to the public (these airports are indicated below).

King County

Auburn Municipal Airport
Bandera State Airport
King County International Airport - Boeing Field
Crest Airpark (privately owned)
Lake Union Seaplane Base (privately owned)
Kenmore Air Harbor (privately owned)
Renton Municipal Airport
Seattle-Tacoma International Airport
Skykomish Airport
Vashon Island Airport
Will Rogers Wiley Post Memorial Seaplane Base

Kitsap County

Apex Airpark (privately owned)
Bremerton National Airport
Port Orchard Airport (privately owned)

Pierce County

American Lake Seaplane Landing Strip
Gray Army Air Field (now part of Joint Base Lewis-McChord)
McChord Air Force Base (now part of Joint Base Lewis-McChord)
Ranger Creek State Airport
Spanaway Airport (privately owned)
Swanson Field
Tacoma Narrows Airport
Pierce County Airport - Thun Field

Snohomish County

Arlington Municipal Airport
Darrington Municipal Airport
Firstair Field Airport (privately owned)
Harvey Field Airport (privately owned)
Sky Harbor Airport (privately owned)
Snohomish County Airport - Paine Field

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1.0 Introduction

Compatible land use surrounding airports is an important issue when planning for airport systems and the surrounding communities they serve. The topic of airport compatible land use has been discussed since the 1950s, when a report titled *The Airport and Its Neighbors – The Report of the President's Airport Commission* was published. This document, commonly called the Doolittle Report, established land use compatibility concerns that are still relevant today for many of the nation's airports. The Puget Sound Regional Council (PSRC), in an effort to prevent airport encroachment by urban development, has initiated this study to evaluate existing and future land uses and their impacts on the region's 28 public-use airports. These airports include commercial service airports and military bases such as Seattle-Tacoma International Airport and Joint Base Lewis-McChord (JBLM), as well as smaller general aviation airports such as Auburn Municipal Airport and Tacoma Narrows Airport. In Washington, all airports that have general aviation activity are considered general aviation airports, including Sea-Tac. Planning to discourage incompatible uses adjacent to general aviation airports is mandated by the Growth Management Act (RCW 36.70A.510) and the Planning Enabling Act (RCW 36.70.547).

The Growth Management Act also requires jurisdictions to discourage incompatible development in the vicinity of military installations (RCW 36.70A.530). In the central Puget Sound region, McChord AFB and Fort Lewis (now combined as Joint Base Lewis-McChord, or JBLM) are significant public facilities which have both positive and negative impacts on adjacent communities. Lakewood, Pierce County, and other neighboring jurisdictions have collaborated with JBLM over the years to enhance the relationship between the military bases and surrounding communities. JBLM is included in the PSRC Airport Compatible Land Use Program to recognize the importance of the military facilities as well as the significant amount of compatible land use planning which has been done and continues. Because of the unique nature of JBLM, and its relationship with surrounding jurisdictions, the requirements and recommendations contained within PSRC's Airport Compatible Land Use program, and the related Policy and Plan Review process, will be applied as guidance within the context of these two federal facilities rather than FAA's guidance for civilian airports.

In recent decades, the Puget Sound region's healthy and robust economy has resulted in growing airport activity and more urban development adjacent to the region's busiest airports. Housing and job growth within the region's urban growth area has brought new noise sensitive development in closer proximity to the region's airports. Within the urban core of the region, economic growth has also increased property values, raised operating costs for airport sponsors, and, in the case of privately owned airports, increased pressure to close airports and redevelop airport sites into more profitable land use. In response to these and other pressures, several airports have closed in recent years, including Martha Lake Airport (Mountlake Terrace), Sand Point, Bellevue, Krutzer/Lake Union, Tacoma Seaplane Base, and Spanaway (scheduled for closure in 2010). Land development patterns, as reflected in the adopted comprehensive plans in the central Puget Sound region, show the potential for additional development of incompatible land uses (primarily residential) adjoining the region's airports. Incompatible land uses can degrade airport operations, impede airport expansion, reduce quality of life for airport neighbors, and ultimately lead to community opposition of the airport. These impacts reduce the airport's ability to function as an essential public facility, thus diminishing the return on the public investment. Encroachment is a key factor

contributing to escalating airport operating costs, restriction of airport operations, and difficulty preserving the federal investment.

The 28 airports and the communities they serve are unique; therefore, no one solution will work in all areas. The information, tools, and techniques necessary to address compatibility issues for each of these airports and surrounding communities need to be tailored to their individual needs. There is not a “one size fits all” approach to the land use issue that will meet the requirements of every airport or every community. In some instances, airports and their local communities have the opportunity to proactively address land use compatibility before problems arise. In other instances, the amount of development around an airport may have already reached a level where the goal can only be to limit future uses that may be more incompatible, often thought of as a “do no more harm” approach. Many airports and their communities will find themselves in between these two scenarios, with some opportunities to prevent new conflicts and mitigating those that already exist, where feasible.

The underlying goal of this document and this effort from the PSRC is to promote a compatible relationship between the 28 airports within the Puget Sound region and the communities they serve, not only to preserve the airports as the essential public facilities they are, but also to provide for the public health, safety, and welfare for those persons located in proximity to these facilities. It should be noted that the primary intent of this document, as well as PSRC’s review process, is not to create additional requirements for local jurisdictions, but to provide additional guidance to help them meet Growth Management Act (GMA) intentions.

The need to plan for compatible land uses near airports is not a new concept. The Doolittle Report recommended that airports and metropolitan areas be planned jointly so that each develops to serve the other, with large fan-shaped areas at runway ends zoned to restrict development. The recommendations laid out in the Doolittle Report were not significantly implemented throughout the nation’s aviation system, and as a result, incompatible land uses surround many airports and limit their operational utility. PSRC is addressing airport compatibility planning by identifying existing land use compatibility issues and working with cities and counties to develop solutions.

1.1 History of Airport Compatible Land Use in Washington

The state of Washington first addressed airport land use compatibility when height hazards were addressed by the legislature in 1945 with the passage of Revised Code of Washington (RCW) 14.12, *Airport Zoning*. Additionally, the State Aviation System Plan, adopted in 1973, dug further into the issue of airport land use compatibility. During the 1970s and 1980s the system plan initially dealt with noise and height hazards, although a mention was made of general incompatible land use encroachment concerns. The 1991 update reflected these same issues, together with provisions of the Growth Management Act (GMA), adopted in 1990, which requires cities and counties to use their comprehensive plans and development regulations to discourage incompatible uses adjacent to public use airports.

At the time the GMA was adopted, the state legislature found that uncoordinated and unplanned growth was threatening the environment, economic development, and quality of life in Washington. The GMA called for cities and counties to complete an inventory of airport facilities and to allow for the siting of

airports deemed to be Essential Public Facilities (EPFs) under GMA RCW 36.70A.040. Jurisdictions are required to develop a siting process for locating Essential Public Facilities and should not prohibit the siting, expansion, or continuation of an Essential Public Facility within their comprehensive plans or development regulations. Additionally, jurisdictions cannot develop strategies or provisions within their comprehensive plans or development regulations that would render siting an Essential Public Facility impossible, impractical, or incapable of being accomplished. However, it is not inappropriate for a jurisdiction to require applicable conditions or mitigation measures when siting essential public facilities, such as airports.

The 1990 Growth Management Act set the stage for statewide coordinated and planned growth. The elements of the GMA address quality of life issues, including environmental protection, economic growth, and the health and safety of Washington's residents. In 1996, as an amendment to the GMA, Senate Bill 6422 recognized the inherent social and economic benefits of aviation. RCW 35.63.250, 35A.63.270, 36.70.547, and 36.70A.510 provide legislation that requires all local and county governments to discourage incompatible land uses near airports. The basis for requiring communities to plan for compatible land uses around general aviation airports is primarily found in RCW 36.70.547. While it is state law to discourage incompatible land use around general aviation airports, it is a local decision on how the implementation is carried out. In July 2010, as a result of SSB 6214, the structure of the Growth Management Hearings Boards was consolidated into a single Growth Management Hearing Board. This body is charged with reviewing petitions that request deviations or further consideration of the intent of the GMA, including potential issues related to planning for land uses and development around airports.

1.1.a Planning for airports under the GMA – Inherent Conflicts

While the Growth Management Act laid out an excellent process for addressing a wide variety of critical planning issues across the state, it created internal conflicts for planning around the state's public use airports. On the one hand, the law requires cities and counties to use their plans and regulations to discourage the siting of incompatible land uses adjacent to public use airports. On the other, the law requires local jurisdictions to establish urban growth boundaries and to encourage new urban development inside those boundaries. In the central Puget Sound region these requirements lead to conflicting policy objectives and competing priorities. Preserving prime agricultural land, flood-prone areas, steep slopes, and other critical areas means clustering urban growth and higher density development within existing urban areas. Increasingly, this growth is located in close proximity to busy public use airports. For example, Sea-Tac International Airport, the busiest airport in the state, is located within the city of SeaTac, which hosts a regional growth center. This designation, created in part to meet the requirements of the Growth Management Act, directs high-intensity commercial and residential growth adjoining Sea-Tac Airport. As a result, the Port of Seattle and city of SeaTac have a long history of cooperative planning aimed at addressing the complex and sometimes conflicting goals inherent in implementing GMA. Port and city staffs regularly review each other's plans, regulations, and development proposals to maintain communication and ensure their common interests are achieved.

As witnessed by the city of SeaTac and the Port of Seattle, implementing the GMA involves partnerships between local planning agencies, airport sponsors, the Washington State Department of Transportation (WSDOT), the Washington State Department of Commerce (Commerce), and PSRC. Each of these

entities has a unique role in implementing these regulations. Local agencies develop plans and regulations in consultation with airport sponsors and the state. The WSDOT Aviation Division provides information and technical assistance to local agencies to help them develop effective policies and plans. PSRC incorporates airport compatible land use into its process for reviewing the transportation elements of local agency comprehensive plans. The goals of these plan review processes are to provide a forum for information exchange, facilitate discussions between PSRC and local agencies, improve local land use planning decisions, and discourage further urban encroachment around the region's airports.

Meanwhile, the Growth Management Act imposes no specific planning requirements upon airports. Airports may expand operations and expand geographically or physically without the federal obligation to coordinate with surrounding communities. Unlike local governments planning under the GMA, airports are not required to prepare long-range plans for projected growth. In addition, transportation plans prepared by aviation authorities are not required to be coordinated or consistent with plans of adjoining communities. Though airports must identify planned capital improvements in airport master plans and airport layout plans in order to receive federal aviation funding, the FAA does not require airport master plans to be consistent with the plans of adjoining communities. Given the absence of long-range planning requirements for airports, local governments have historically been in a more proactive position to plan for compatible land use around airports. Still, airports play an important role in the process. Successful planning between airports and surrounding communities is dependent upon the preparation and dissemination of long-range plans for airports and communities alike.

Airports are not directly regulated under the GMA; however, airport development is tied to local land use by federal regulations. Pursuant to the National Environmental Policy Act of 1969, most airport actions require an environmental impact statement or environmental assessment prior to using federal money for construction or modification. During this analysis, the airport is required to investigate existing and future characteristics of the areas that surround them. If significant detrimental impacts to the natural or human environment are identified, the project or design may need to be modified or mitigated to prevent the airport from creating issues of incompatibility with the surrounding community.

By accepting federal funds, airports become bound by grant assurances. Grant assurances, required by the FAA, are conditions placed upon the granting of airport improvement funds by the FAA. These assurances require the airport sponsor to comply with certain conditions, such as keeping the airport open to the flying public, and ensuring land use compatibility around the airport. For more information on FAA grant assurances, see Section 1.2 below.

1.1.b WSDOT Land Use Compatibility Program

The Washington Department of Transportation (WSDOT) Aviation Division has completed an update to its 1999 land use compatibility program. The new guidebook (*Airports and Compatible Land Use Guidebook*) can be found at www.wsdot.wa.gov/aviation/Planning/ACLUguide.htm. The update is directed towards city and county planners needing to comply with state laws that require they provide for airport compatibility as part of their comprehensive plans. The Guidebook is intended to serve as a desk reference for city and county planners. It provides a general overview of airport land use compatibility concerns and issues, walking the reader through a series of steps necessary to evaluate compatibility

matters affecting the local airport, develop compatibility strategies and criteria, and incorporate these into their comprehensive plans and zoning ordinances. The Guidebook also serves as a tool kit that can be used to address specific problems and conditions. A summary of state and federal regulations related to airport land use compatibility is also included.

The Guidebook will serve as a resource to airports, cities, and counties within the Puget Sound region and throughout the state. It does not place additional planning requirements upon local governments. This PSRC report incorporates the guidance reflected in the Guidebook and most of the recommendations contained in each are identical.

1.1.c WSDOT Long-Term Air Transportation Study

In 2005 WSDOT conducted a *Long-Term Air Transportation Study (LATS)* for general aviation and commercial airports within the state. This study was conducted to analyze the current capacity of aviation facilities in Washington, and to identify what is needed to meet future demand. Recommendations from this study were published in July 2009 on capacity, land use, and stewardship. The Aviation Planning Council, as a part of the study, made several recommendations regarding land use. Although many of these recommendations are directed at local land use agencies, it's clear that successful planning for airport compatible land use requires collaboration between airport sponsors and the authorities responsible for land use planning in the surrounding community. The Aviation Planning Council's recommendations included the following:

- Amend the GMA and planning enabling statutes to require “protection” of airports from encroachment of incompatible land uses, as well as providing for the siting of such uses as Essential Public Facilities.
- Prohibit the placement of noise sensitive uses within airport traffic patterns of public use airports.
- Revise Washington Administrative Codes (WACs) and/or RCWs governing the siting of public schools to prohibit new construction of schools in areas impacted by the airport traffic pattern.
- Revise WACs and RCWs to prohibit structural, visual, electrical, and wildlife hazards that interfere with critical airspace surfaces, negatively impact airport operations, or endanger public safety.
- Strengthen the authority of the WSDOT, regional transportation planning organizations (RTPOs), and metropolitan planning organizations (MPOs) to certify that transportation and land use elements of comprehensive plans and development regulations provide sufficient protection to airports. Transportation funds provided by these organizations should be provided to jurisdictions that protect these resources.
- Require local jurisdictions and airport sponsors to coordinate land use planning, site master planning, and permitting, to protect airport operations and avoid conflicts.

- Provide a means for airport operators and the state of Washington to take such actions as necessary to enforce measures intended to protect airports from encroachment.

1.2 Federal Aviation Administration Land Use Guidance

In addition to state regulations that apply to cities and counties, the Federal Aviation Administration (FAA) has requirements to protect airports from incompatible land uses, primarily related to the height of structures and objects which could affect safe navigation of aircraft in the vicinity of airports. Federal Aviation Regulation (FAR) Part 77, *Objects Affecting Navigable Airspace* provides guidance to protect airspace, including the area that encompasses the airport, runway protection zones, and airport approaches. For most airports, these FAR Part 77 surfaces extend beyond airport boundaries. Airport sponsors and local land use planning agencies must collaborate to address height hazards in these areas to ensure the safety of aircraft in the air and people on the ground. For more information, see section 1.2.c. below. While in some cases the areas are owned by the airports, more often than not the land is outside the airport's property line. This limits an airport owner's ability to directly manage the land use activities within these areas. The FAA provides guidance in FAA Order 5190.6B, *FAA Airport Compliance Manual*, regarding this issue, but the majority of the responsibility falls to the airport sponsor to address. Order 5190.6B states that "State and local governments, and planning agencies should provide for land use planning and development, zoning, and housing regulations that are compatible with airport operations." This guidance encourages the airport sponsor and the local municipalities to work collaboratively to develop zoning and land use controls such as comprehensive plans, airport land use plans, and airport overlay zoning ordinances. These items would help prevent future incompatible land uses and support the health, safety, and welfare of those persons near the airport, as well as the flying public.

To assist airport and local government collaboration in developing these plans and zoning ordinances, each airport and affected community should consult FAA Advisory Circulars (ACs) and FAR Part 77 to ensure the airport meets appropriate design criteria. In the absence of such collaboration, local governments are more likely to review and approve land uses and structures without full appreciation for how land uses or structures may affect airport operations. Likewise, airport planning can sometimes be done in a vacuum, with airports forgetting to look beyond their boundaries, and thus leading to ineffective communication and lack of coordination.

FAA documents that address land use related issues, along with criteria established in federal grant assurances and airport design guidelines, provide the foundation and justification for compatible land uses. Three FAA criteria lay the foundation for land use compatibility:

- Grant assurances, which are part of the Airport Improvement Program (AIP) funding process.
- FAA design standards, which pertain to the physical layout of an airport.
- FAR Part 77, which provides guidance on navigable airspace around an airport.

These three criteria are discussed in the following sections to illustrate the primary reasons the FAA recommends compatible land uses near airports.

1.2.a Grant Assurances

Grant assurances, found in the Airport and Airway Improvements Act of 1982, United States Code (USC), Title 49, subtitle VII as amended, are required as part of a project application from airport sponsors who are eligible to request federal funds. Upon acceptance of grant money, these assurances are incorporated into and become part of the grant agreement. The airport sponsor is obligated to comply with specific assurances, which include the maintenance of compatible land use within the vicinity of the airport.

Grant Assurance 21, included in the September 1999 amendment to 49 USC 47107, requires all airports that accept federal money to take appropriate action against incompatible land uses in the immediate vicinity of the airport. Such actions include adopting zoning laws and zoning changes that will increase airport land use compatibility. This grant assurance obligates an airport sponsor to protect the federal investment through the maintenance of a safe operating environment. As noted previously, the challenge associated with this grant assurance is that the land uses in proximity to the airport are often outside the control of the airport owner, making it difficult to control land use decisions in these areas. This is why airport sponsors must work cooperatively with the surrounding jurisdictions to achieve the desired outcome of land use compatibility.

1.2.b FAA Design Standards

Safety areas, as defined by FAA AC 150/5300-13, *Airport Design*, are implemented for the safe and efficient operation of an airport. Many design requirements are contained in this AC, but those discussed below are directly related to areas in proximity to runway ends and runway approach areas. These design requirements fulfill safety-related functions for an airport. It is important to fully understand the role of these design requirements during land use compatibility discussions.

Runway Protection Zones (RPZs), formerly known as clear zones, were originally established to define land areas below aircraft approach paths in order to prevent the creation of airport hazards or development of incompatible land use. First recommended in the 1952 Doolittle Report, the establishment of clear areas beyond runway ends was deemed worthy of federal management. These clear areas were intended to preclude obstructions potentially hazardous to aircraft, and to control building construction for the protection of people on the ground. The U.S. Department of Commerce concurred with the recommendation on the basis that this area was "primarily for the purpose of safety for people on the ground." The FAA adopted clear zones with dimensional standards to implement the commission's recommendation. These clear zones, created to enhance safety, are now an important element of all airport planning.

RPZs are designed to protect people and property on the ground. They are located at each end of every runway, and should ideally be controlled by the airport. Control is preferably exercised by the acquisition of sufficient property to achieve and maintain an area that is clear of all incompatible land uses, objects, and activities. The RPZ is trapezoidal in shape and centered on the extended runway centerline. Dimensions for a particular RPZ are based on the type of aircraft and approach visibility minimums associated with the runway end. Unless noted by a special circumstance, the RPZ begins 200 feet beyond the end of the runway and has specific land use restrictions in order to keep the approach and

departure areas clear of obstructions. The RPZ has two specific areas. The first is the central portion of the RPZ, which is equal in width to the runway Object Free Area (OFA). The second is the controlled activity area (CAA), which is adjacent to the central portion of the RPZ. **Table 1-1** provides RPZ dimensional requirements and **Figure 1-1** provides a graphic representation of the RPZ.

The RPZ dimensional standards are for the runway end with the specified approach visibility minimums. The departure RPZ dimensional standards are equal to or less than the approach RPZ dimensional standards. When an RPZ begins at a distance other than 200 feet beyond the runway end, separate approach and departure RPZs should be provided. Refer to FAA AC 150/5300-13, Appendix 14 for approach and departure RPZs.

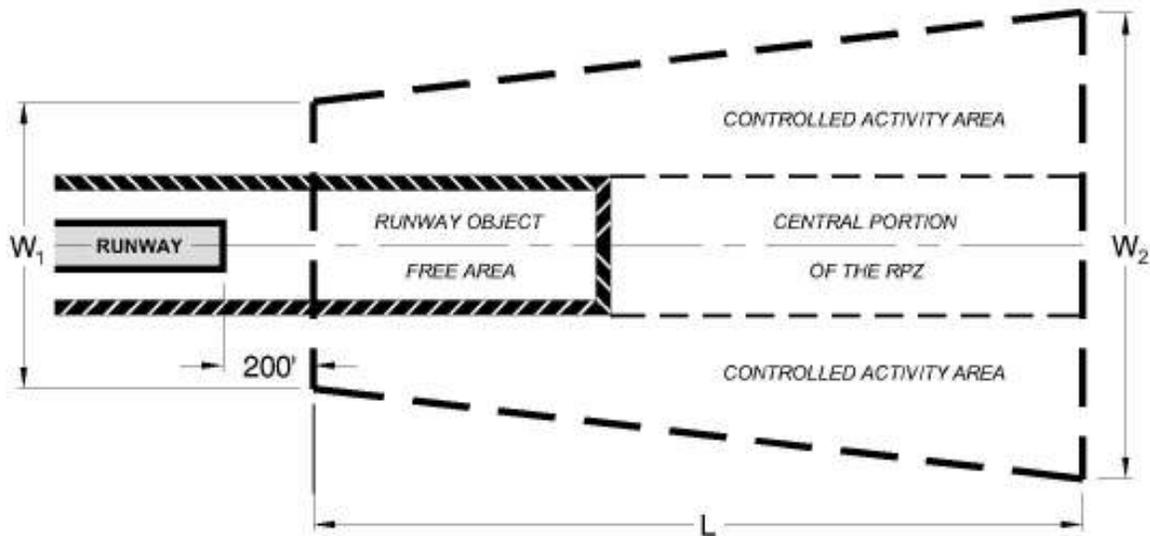
Table 1-1 Runway Protection Zone Dimensional Requirements

Approach Visibility Minimums ¹	Facilities Expected to Serve	Dimensions			
		Length L feet (meters)	Inner Width W ₁ feet (meters)	Outer Width W ₂ feet (meters)	RPZ acres
Visual and not lower than 1-mile (1,600m)	Exclusively Small Aircraft	1,000 (300)	250 (75)	450 (135)	8.035
	Aircraft Approach Categories A & B	1,000 (300)	500 (150)	700 (210)	13.770
	Aircraft Approach Categories C & D	1,700 (510)	500 (150)	1,010 (303)	29.465
Not lower than ¾-mile (1,200m)	All Aircraft	1,700 (510)	1,000 (300)	1,510 (453)	48.978
Lower than ¾-mile (1,200 m)	All Aircraft	2,500 (750)	1,000 (300)	1,750 (525)	78.914

¹ The RPZ dimensional standards are for the runway end with the specified approach visibility minimums. The departure RPZ dimensional standards are equal to or less than the approach RPZ dimensional standards. When an RPZ begins other than 200 feet (60m) beyond the runway end, separate approach and departure RPZs should be provided. Refer to FAA AC 150/5300-13, Appendix 14 for approach and departure RPZs.

Source: FAA AC 150/5300-13, *Airport Design Standards*

RPZs can often extend beyond airport property. Therefore, from an off-airport land use compatibility perspective, the critical safety zone identified by FAA design standards is the RPZ. The FAA recommends that the entire RPZ be owned by the airport and be clear of all obstructions if practicable. Where ownership is impracticable, avigation easements are recommended to obtain the right to govern the height of structures and vegetation within the RPZ footprint. Obtaining easements that are restrictive enough to limit the types and heights of building opportunities are often just as costly as purchasing the property outright. **Appendix A** contains a sample avigation easement.

Figure 1-1 Runway Protection Zone Diagram

Source: FAA AC 150/5300-13, *Airport Design Standards*

1.2.c Objects Affecting Navigable Airspace

Title 14 Code of Federal Regulation (CFR) Part 77 (FAR Part 77) establishes standards for determining and defining objects that may pose potential obstructions to air navigation. While design standards contained in FAA AC 150/5300-13 are intended to protect specific ground areas, FAR Part 77 was developed by the FAA to evaluate objects in proximity to an airport that may penetrate the airspace surrounding airports. The airspaces identified in FAR Part 77 are also referred to as imaginary surfaces.

The imaginary surfaces outlined in FAR Part 77 relating to land use compatibility are explained below.

Appendix B contains graphics of FAR Part 77 surfaces (or boundaries) superimposed over an aerial photo for each of the 28 airports within the region.

- **Primary Surface**

The primary surface must be clear of all obstructions except those fixed by their function, such as runway edge lights, navigational aids, or airport signage. The majority of the primary surface is already controlled by runway safety area criteria contained in FAA AC 150/5300-13, *Airport Design Standards*, and therefore does not warrant inclusion as a land use zone.

Even though the primary surface is not included as a land use zone, it functions as an important safety area because it is longitudinally centered on a runway and is intended to provide an obstruction-free area around the runway surface. When the runway has a prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. When the runway does not have a prepared hard surface or planned hard surface, the primary surface terminates at each end

of the runway. The width of a primary surface ranges from 250 to 1,000 feet depending on the existing or planned approach and runway type (visual, non-precision, or precision).

- **Transitional Surface**

The transitional surface extends outward and upward at right angles to the runway centerline and extends at a slope of seven feet horizontally for each one-foot vertically (7:1) from the sides of the primary and approach surfaces. The transitional surfaces extend to the point at which they intercept the horizontal surface at a height of 150 feet above the established airport elevation. For precision approach surfaces that project through and beyond the limits of the conical surface, the transitional surface also extends 5,000 feet horizontally from the edge of the approach surface and at right angles to the runway centerline.

- **Horizontal Surface**

The horizontal surface is a horizontal plane located 150 feet above the established airport elevation and encompasses an area from the transitional surface to the conical surface. The perimeter is constructed by generating arcs from the center of each end of the primary surface and connecting the adjacent arcs by lines tangent to those arcs. The radius of each arc for all runway ends (designated as utility or visual) is 5,000 feet and 10,000 feet for precision and non-precision runway ends, respectively.

- **Conical Surface**

The conical surface extends upward and outward from the periphery of the horizontal surface at a slope of 20 feet horizontally for every one foot vertically (20:1) for a horizontal distance of 4,000 feet. Height limitations for the surface range from 150 feet above the airport reference elevation at the inner edge to 350 feet above ground level (AGL) at the outer edge.

- **Approach Surface**

The approach surface is longitudinally centered on the extended runway centerline and extends outward and upward from the end of the primary surface. The approach slope of a runway is a ratio of 20:1, 34:1, or 50:1, depending on the approach type. The length of the approach surface varies from 5,000 to 50,000 feet and also depends on the approach type. The inner edge of the approach surface is the same width as the primary surface and expands uniformly to a width ranging from 1,250 to 16,000 feet, depending on the type of runway and approach.

Table 1-2, Figure 1-2, and Figure 1-3 depict various dimensional requirements for the primary surface and other FAR Part 77 surfaces for civil airports. A visual approach runway has relatively small surfaces with approach and horizontal surfaces extending 5,000 feet from the primary surface at an approach slope of 20 feet horizontally for each one foot vertically (20:1). For a non-precision approach runway, both the approach and horizontal surfaces extend either 5,000 or 10,000 feet from the primary surface, depending on the design category of the runway. The approach surfaces for precision approach runways are similar to those for non-precision approach runways except that the approach surface extends 50,000 feet from the primary surface, and the horizontal surface extends 10,000 feet from the primary surface.

New approach procedures that use Global Positioning Systems (GPS), such as Area Navigation (RNAV) and Lateral Precision with Vertical Guidance (LPV) approaches, create a greater degree of flexibility in the definition of non-precision and precision instrument approaches. The FAA has not altered the text related to FAR Part 77 to reflect these changes to date.

Under FAR Part 77, the FAA is authorized to undertake an aeronautical study to determine whether a structure or object is or could be a hazard to air navigation utilizing the Form 7460-1 Notice of Proposed Construction or Alteration. While the FAA uses this form and its associated air space analysis to determine whether an object is considered a hazard or non-hazard to air navigation, the FAA is not authorized to regulate tall structures. No specific authorization permits the FAA to limit structure heights or determine which structures should be lighted or marked, even if they are determined to be a hazard. In fact, in every aeronautical study determination the FAA acknowledges that state or local authorities control the appropriate use of property beneath an airport's airspace. This illustrates the need for local land use controls to support the safe operation of airports.

Table 1-2 FAR Part 77 Surface Dimensional Requirements (civil airports)*

Dimensions shown in Figure 2-2	Item	Dimensional Standards (feet) for Runway Classifications (see legend below)					
		Visual Runway		Non-Precision Instrument Runway			Precision Instrument Runway
		A	B	A	B		
					C	D	
A	Primary surface width and approach surface width at inner end	250	500	500	500	1,000	1,000
B	Horizontal surface radius	5,000	5,000	5,000	10,000	10,000	10,000
C	Approach surface end width	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach surface length	5,000	5,000	5,000	10,000	10,000	*
E	Approach slope	20:1	20:1	20:1	34:1	34:1	*
F	Conical surface width	4,000	4,000	4,000	4,000	4,000	4,000
G	Transitional surface width	7:1	7:1	7:1	7:1	7:1	4,000

* FAR Part 77 surfaces for military airfields are defined under FAR Part 77.28. These would apply to the two airfields at Joint Base Lewis-McChord.

Runway Classification Legend

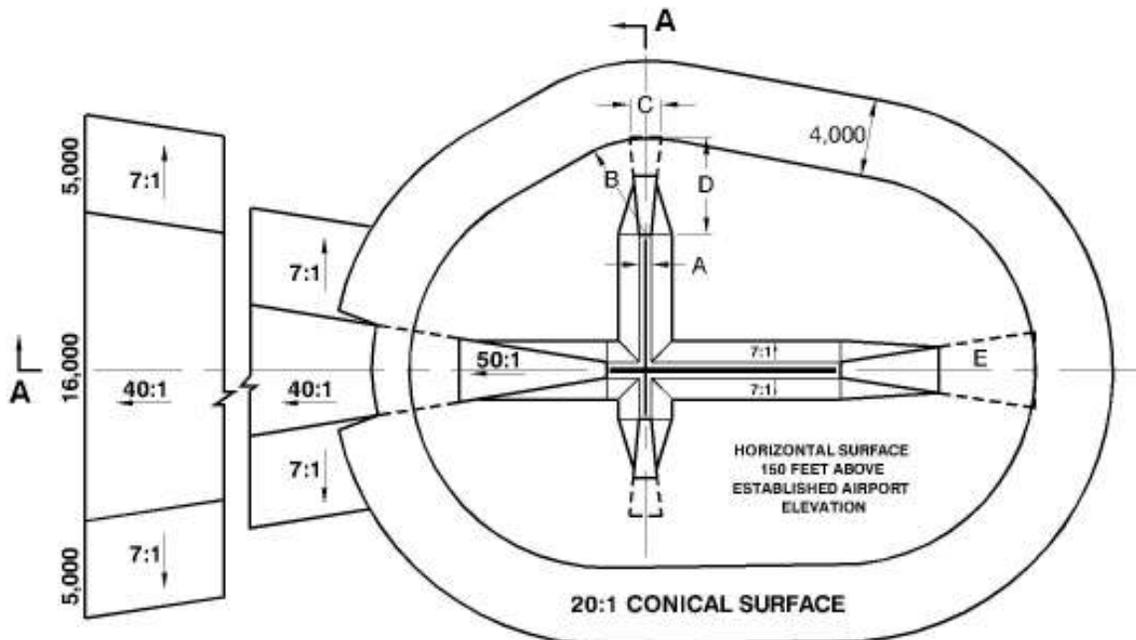
- A – Utility runway.
- B – Runway larger than utility.
- C – Visibility minimums greater than ¼-mile.
- D – Visibility minimums as low as ¼-mile.
- * – Precision instrument approach slope is 50:1 for inner 10,000 feet and 40:1 for an additional 40,000 feet.

Runway Definitions

- Utility runway means a runway that is constructed for and intended to be used by propeller driven aircraft of 12,500 pounds maximum gross weight and less.
- Visual runway means a runway intended solely for the operation of aircraft using visual approach procedures, with no straight-in instrument approach procedure.
- Non-precision instrument runway means a runway having an existing instrument approach procedure utilizing air navigation facilities with only horizontal guidance or area type navigation equipment, for which a straight-in non-precision instrument approach procedure has been approved.
- Precision instrument runway means a runway having an existing instrument approach procedure utilizing an Instrument Landing System (ILS), or a Precision Approach Radar (PAR).

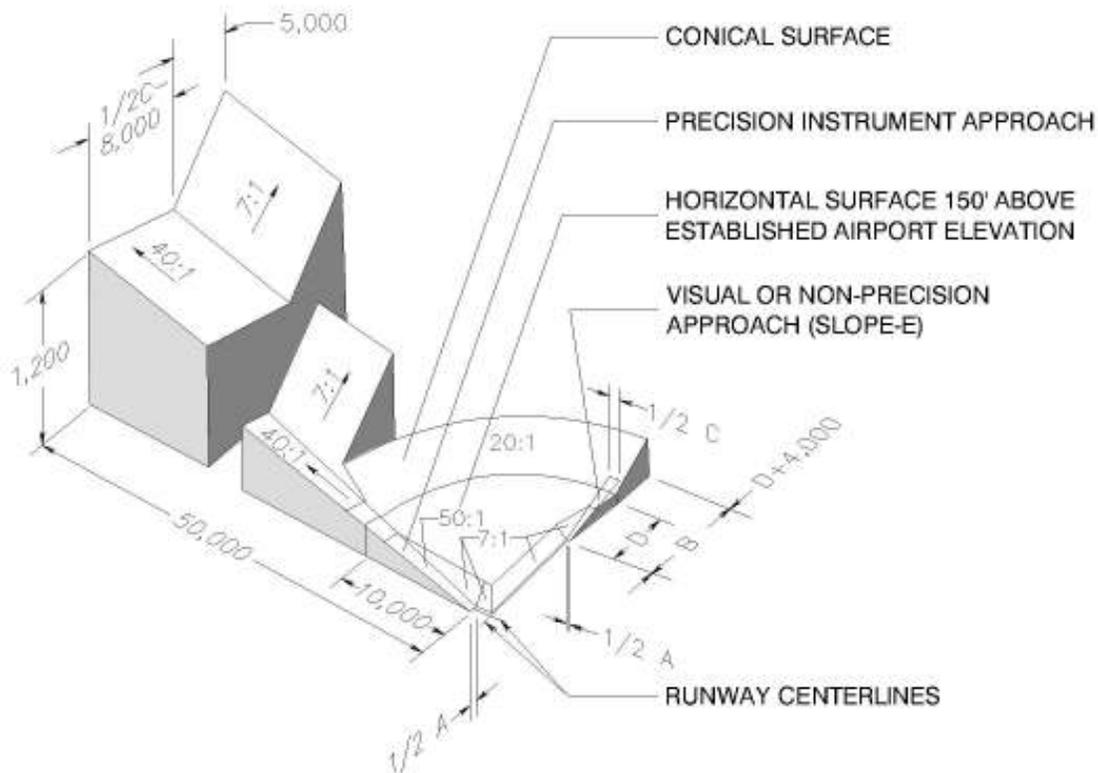
Source: FAR Part 77 Objects Affecting Navigable Airspace

Figure 1-2 FAR Part 77 Surfaces – Plan View



Source: FAR Part 77 Object Affecting Navigable Airspace

In addition to the FAA's 7460-1 Notice of Proposed Construction of Alteration process, the FAA has a notification process for any construction, alteration, activation, deactivation, or change to the status or use of a civil or joint use (civil/military) airport. The FAA provides a notification form ("Notice of Landing Area Proposal" FAA Form 7480-1) and review process for such activity, which is normally confined to activities on airport property undertaken by airport sponsors.

Figure 1-3 FAR Part 77 Surfaces – 3D Isometric View of Section A (civil airports)

Source: FAR Part 77 Object Affecting Navigable Airspace

1.2.d Other Airport Related Surfaces

In addition to the RPZ and FAR Part 77 surfaces, other surfaces may also be evaluated by the FAA for obstructions. Two of these surfaces are worth mentioning since they may contribute to the height limitations for airports with instrument approaches and, in some instances, air carrier operations.

- **Departure Surface for Instrument Runways**

This surface is applied to runways with an instrument approach and is defined in FAA AC 150/5300-13, Appendix 2. This surface has a slope of 40:1 (40 feet laterally on the ground for every one foot vertically in height) with corresponding dimensions of 1,000 feet inner width, 6,466 feet outer width, and 10,200 feet in length. Objects penetrating this surface may affect departure procedures.

- **One-Engine Inoperative Obstacle Identification Surface**

For runways and airports that support air carrier operations, FAA AC 150/5300-13, Appendix 2 requires the clearance of this additional departure surface. Providing a 62.5:1 slope (62.5 feet laterally on the ground for every one foot vertically in height), the inner dimensions of the surface are 600 feet wide and the outer width is 12,000 feet wide. The corresponding length is 50,000 feet.

Both of these surfaces, while important to be maintained clear of height obstructions, may also be considered for compatible land use decisions.

1.3 Summary

This document will serve as a guide for PSRC staff, airport sponsors, and local land use planners to ensure that city and county comprehensive plans, as well as airport master plans, adequately address the potential for incompatible land uses near airports in the Puget Sound region. This reference includes discussion of land use compatibility and factors that affect it, along with a plan checklist for PSRC and local jurisdictions. Clearly, it is essential that local land use policies and development regulations address airport compatible land use issues.

2.0 Compatible Land Use Concerns

Land uses compatible with airports are defined as those developments that comply with generally accepted restrictions on location, height, and activity that provide for safe aircraft movement and airport operations, as well as the preservation of public health, safety, and welfare for those persons located in proximity to airport environs. Airport environs include the airport itself and areas in which aircraft operate, including the approach and departure areas, as well as the aircraft traffic pattern. This area of impact, often called an airport influence area, can vary greatly in size and layout depending on the specific type, layout, and frequency of use of an individual airport. For example, the airport influence area for Seattle-Tacoma International Airport is much larger than the area of influence for Bremerton National Airport.

Similar to the airport influence area, specific types of land uses that should be discouraged near an airport can also vary. Land uses such as dense residential developments, schools, and hospitals are considered to be incompatible with airport operations. However, specific land use proposals must be evaluated in detail (specific land use type, density, height, and location with respect to the airport) in order to assess whether they are compatible with an adjacent airport. Some uses are not generally sensitive to airport noise (such as commercial, industrial, or agricultural operations), and may appear to be compatible near an airport. However, these uses may attract wildlife that interferes with the safe operation of aircraft, and would therefore be considered to be incompatible.

Conversely, some land uses that are generally considered incompatible may have to be placed near an airport as a last resort. For example, if an area must be developed for a residential use, it may be more advantageous to develop a multi-family development with clustered structures and more dedicated open space compared to a single-family residential development that would provide less open space. This philosophy asserts that there is a hierarchy of preferred residential land use near airports where high-density, multi-family development is preferred, as opposed to low-density, single-family development. Mixed use retail and residential is even better, as it mixes airport compatible and incompatible land uses.

Existing development can also impact airports. Recent incorporation of some governments in the Puget Sound region left some jurisdictions facing pre-existing compatibility issues. In such cases, jurisdictions may advocate for relocating existing incompatible land uses or mitigating adverse impacts the land uses have on the airport (and vice versa).

Aviation contributes to the local economy and business activities of the state of Washington; therefore, it is important to consider the potential impacts incompatible land uses can have on aviation. Aviation activity is forecast to increase in Washington, making it critical to preserve and protect the most viable aviation facilities. Federal, state, and local resources have been invested to develop aviation infrastructure within the state, and it is prudent to protect these essential public facilities. Compatible land use planning can protect the navigable airspace and ground area around airports and maximize the return of investment on infrastructure, as well as maintain a safe operating environment.

This chapter summarizes land uses that present compatibility concerns for airports and their surrounding communities. These land uses have several common and potentially adverse impacts to airport/aircraft operations. Each land use should be evaluated independently for compatibility with the airport environs.

2.1 Definition of Compatible Land Use

One of the primary challenges with compatible land use is establishing a specific definition of what is considered incompatible to an airport and its aircraft operations. Airport compatible land uses are defined as those developments that comply with generally accepted restrictions on location, height, and activity that provide for safe aircraft movement and airport operations. Additionally, it includes the preservation of public health, safety, and welfare for those persons located in the airport's environs.

This definition can seem vague since no specific land use types are mentioned. The general wording is intentional because nearly every type of land use can be both compatible and incompatible depending on the management, location, and ancillary types of impacts associated with the land use in relation to the airport. For example, land uses typically considered to be compatible with airport operations include commercial, industrial, and some agricultural activities. However, each of these may also contain aspects considered incompatible, such as:

- Commercial uses may have dense concentrations of people.
- Industrial uses often have tall smoke/ventilation stacks that generate smoke/steam and create visual obstructions.
- Agricultural operations can attract wildlife, which can interfere with aircraft operations.

Working with airport personnel, planners within the local municipality need to assess the compatibility of the land use in greater detail as it relates to and airport operations. Descriptions of land use issues include high concentrations of people, tall structures, visual obstructions, and wildlife and bird attractants.

The WSDOT *Airports and Compatible Land Use Guidebook* provides best management practices to assist airports and communities in planning for compatible land use, and is available online at www.wsdot.wa.gov/aviation/Planning/. The following sections have been organized to follow the guidance available in the Guidebook.

2.2 Land Use Issues

Safety issues are a primary area of concern with compatible land uses. This includes the safety of aircraft and their occupants while in the air and on the ground, as well as the safety of persons on the ground located in proximity to airports. Four primary themes are identified for consideration and are discussed in the following pages to illustrate the associated concerns:

- Airspace Protection: tall structure, visual obstructions, wildlife and bird hazards
- Noise Issues
- Over-flight
- Safety Issues: concentrations of people, financial risk associated with life or property loss

2.2.a Airspace Protection

Areas surrounding an airport and areas under low-level flight routes (approach areas and airport traffic pattern areas) are of utmost concern regarding airspace obstructions. Airspace-related land use concerns include tall structures, visual obstructions, and wildlife attractants. A more detailed discussion of common airspace obstructions can be found below.

- **Tall Structures**

It is critical to avoid tall structures within the approach and departure surfaces of an airport, as described in FAR Part 77. Low-level flight occurs on or near an airport during approach and departure, as well as during flights such as crop dusting and search-and-rescue operations. Tall structures include buildings, objects, and vegetation (e.g., trees). Tall objects adversely affect approach corridors and instrument approach altitudes. Therefore, the siting of tall objects such as multi-story structures, power lines, wind farms, and telecommunication towers should be discouraged, as should allowing trees to grow to substantial heights near airport traffic patterns and flight paths. The risk to aircraft safety associated with tall structures may be minimized if structures are clearly marked with lighting and if the airport issues a Notice to Airmen (NOTAM) to pilots, alerting pilots of the existence of these various structures.

Placement of tall structures around an airport also threatens the airport's long-term viability. Advanced approach procedures increase the airport's ability to remain open during inclement weather, but require obstruction-free areas as low as 200 feet above the airport's elevation that can extend out as far as 50,000 feet from the runway end. The more advanced the approach, the more restrictive the surface will be. The proliferation of tall structures around an airport without such an approach greatly reduces the chance of the airport obtaining instrument capability in the future. This limits the airport's potential operational utility, particularly during poor weather.

Per FAA AC 70/7460-1K, *Obstruction Marking and Lighting*, when an airport sponsor, developer, property owner, or other party proposes any type of construction or alteration of a structure that may affect the National Airspace System (NAS), the airport sponsor, developer, property owner, or responsible party is required to submit FAA Form 7460-1, *Notice of Proposed Construction or Alteration* to the Obstruction Evaluation Service (OES).

FAA Form 7460-1 is required for any proposed construction or alteration:

- Of more than 200 feet AGL at its site; and/or
- Of greater height than an imaginary surface at a slope of 100 feet horizontal for every one foot vertical (100:1) for a horizontal distance of 20,000 feet from the nearest point of the nearest runway.

If required, the FAA will include FAA Form 7460-2, *Notice of Actual Construction or Alteration*, with a determination. Forms 7460-1 and 7460-2 are required at all federally obligated airports to assess each proposed or temporary construction in the vicinity, typically within three to five miles of the airport. The FAA evaluates the forms based on the FAR Part 77 provisions, which require that an aeronautical study be conducted to determine whether or not a proposed construction project would pose a hazard to navigable airspace. The FAA is able to provide applicants with a vicinity map and information about the degree of Part 77 surface penetration, if applicable. FAA Form 7460-1 may be submitted online at <https://oeaaa.faa.gov/oeaaa/external/portal.jsp>. The FAA Form 7460-1 review process can occur simultaneously with local jurisdiction permit processes so as not to delay development proposals. FAA requires a 45-day notice prior to actual construction or filing for building permits, allowing FAA adequate time for review. For more information about these notice requirements, visit <https://oeaaa.faa.gov/oeaaa/external/portal.jsp>. Local jurisdictions wishing to expedite building permits should coordinate closely with project sponsors and the FAA to facilitate a timely FAA review.

The growing popularity of cellular communication has prompted the construction of an abundance of towers around the nation. Cellular communication towers have appeared and continue to multiply in business parks, industrial areas and shopping malls areas, and along highways. As a result, cell towers have become a significant concern when evaluating height issues near airports and their airport influence area. These towers can affect aircraft operations during low-level flight, approach, and departure.

Wind farms are becoming increasingly prevalent as renewable energy gains momentum in the U.S. These facilities generally contain numerous wind turbines that may be tall and cover a sizeable area. The turbines can cause hazardous conditions for air traffic controllers if they create “clutter” on radar screens that interferes with radar signals, and makes it more difficult to recognize aircraft. In June 2003 the British Department of Trade and Industry (DTI) conducted a study titled *American Wind Energy Association, Wind Turbines and Radar: An Informal Resource*. The study determined that wind turbine clutter effects on air traffic control radar systems can be reduced or eliminated. However, provisions must be made early in the planning process to implement the

necessary steps to address these issues. Many impacts associated with wind farms can be mitigated during the design phase of the facility, as long as the local community and developers receive useful input from airport operators early in the process.

Land uses with potential concern for tall structures include:

- **Multi-family residential** in high-rise buildings (whether the height will be a problem depends on how close the building is to the airport and proximity to the airport's extended runway centerline)
- **Commercial** (office buildings and associated lighting structures)
- **Industrial/manufacturing** (ventilation or smoke stacks, light poles)
- **Institutional** (multi-story hospitals, schools, parking and associated lighting structures)
- **Infrastructure** (cell towers, wind turbines, radio towers, bridges, water towers)
- **Agricultural** (natural vegetation)
- **Recreational** (light poles, press boxes, scoreboards)

It is imperative that airport operators inform local planners and decision makers of these critical safety considerations. Local jurisdictions adjoining an airport can choose to establish and enforce height restrictions and/or land use limitations that extend beyond the basic FAA standards. A favorable FAA determination and opinion do not override the local governing authority, which has the final determination of what may and may not be built within its jurisdiction.

- **Visual Obstructions**

Land uses that obscure pilot visibility should be limited to ensure safe aircraft navigation. Visibility can be obscured by conditions such as dust, glare, light emissions, smoke, steam, and smog.

- **Dust** and sand particles carried through the air by wind can create hazardous conditions by severely reducing visibility. When construction or farming activities occur near an airport, there is a risk for exposed earth materials to be carried by high winds across airport operational areas. Areas where low-level flight altitudes occur (during approach to and departure from runways) are particularly susceptible to dust.
- **Glare** from reflective surfaces can blind or distract pilots during low-level flight altitudes. Water surfaces, such as storm water detention ponds, can produce glare, as can light-colored or mirrored building materials. It is important to evaluate these items during site plan review and to consider whether they may impact a pilot's vision.
- **Lights** that may affect a pilot's vision can include those that mimic the airport lighting and those that emit light upwards into the flight path. A pilot's ability to identify an airport during low-level flight altitudes can be hindered by emissions during evening hours, storm events, or times of reduced visibility such as fog. Also, lights arranged in a linear pattern can be mistaken for airport navigational lights. Bright lights can be distracting and cause blurred or momentary loss of vision for pilots as they pass from darkness into well-lit areas. Consequently, limiting light emitting uses is recommended.

- **Smoke, steam, and smog** can create a hazardous haze that contributes to reduced visibility for a pilot. Facilities such as manufacturing and ethanol plants, or utilities such as electrical plants, can generate these conditions. The location of these types of land uses relative to an airport's operational areas should be carefully considered, along with the prevailing winds associated with the airport and the site of the subject land use.

The primary goal for addressing airspace obstructions is safety. Minimizing obstructions in the approach and departure areas to airports can reduce the potential for adverse impacts to pilots. It is recognized that many elements are often beyond the control of the airport and the local municipality related to these uses. However, mitigation of these impacts should be sought where feasible. For example, industrial and manufacturing land uses often generate smoke or steam from facility operations that can reduce visibility for approach, departure, and low-level flight. An attempt should be made to reduce the potential for these visual obstructions using methods such as limiting the height of emission stacks or moving the emission points farther away from runway centerlines. Other examples of visual obstructions are high-intensity light sources such as loading docks, cargo transfer areas, and fixtures in parking lots. These can cause visibility concerns for pilots when aircraft pass through areas of intense light and then back into areas of darkness.

Methods to address these concerns might include shielding lights, using lower-intensity lights, or changing fixture locations. Furthermore, some types of developments have infrastructure created with glare-producing metal or other reflective materials.

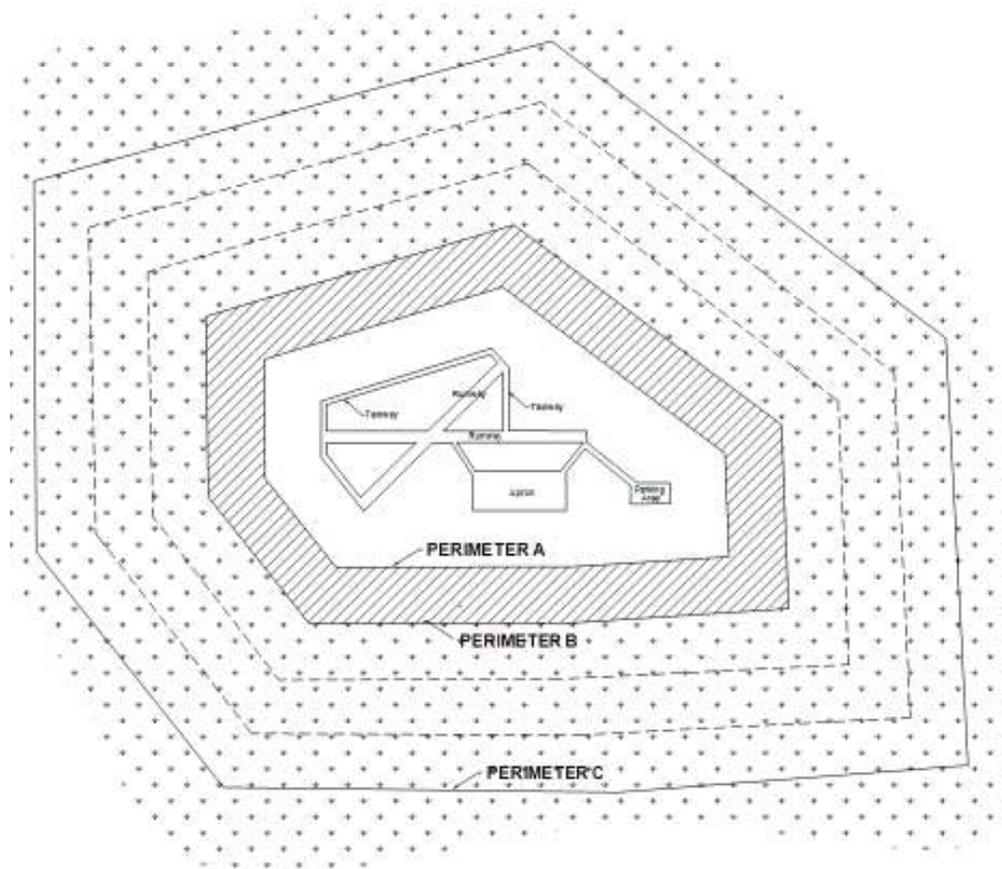
Residential, commercial, and institutional land uses often have bright, linear lighting in parking lots, and water detention ponds, all of which may cause visual obstructions. Infrastructure uses also pose concerns, such as wind turbines with reflective blades that can hinder a pilot's view. Agriculture uses that expose earth materials and cause dust are a concern due to reduced visibility.

- **Wildlife and Bird Attractants**

Aircraft collisions with wildlife are a threat to human health and safety. Wildlife strikes killed 194 people and destroyed 163 aircraft between 1990 and 2005, according to the *FAA Wildlife Strikes to Civil Aircraft in the United States*. While codes and ordinances cannot eliminate this hazard, design and management of water retention basins and open fields can reduce their attractiveness to wildlife. Monitoring wildlife activity and habitats on or near an airport is another method that can help reduce wildlife hazards around airports. Development and implementation of a wildlife management plan plays a critical role in airport planning by giving an airport the tools and techniques to properly maintain habitat management controls. FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*, discusses various incompatible land uses and bird attractants. WSDOT's Airport Stormwater Guidance Manual includes design techniques that may reduce the attractiveness of storm water retention basins to wildlife.

Figure 2-1 illustrates the areas where wildlife attractants are not allowed on or near airport property, based on the guidance in FAA AC 150/5200-33B. Guidelines urge airport sponsors to discourage the creation of pools, ponds, sewage lagoons, and fountains on or within a three- to five-mile radius of a public use airport (three miles for airports serving piston-engine aircraft and five miles for those serving turbo-prop and jet aircraft). Permanent water sources should be managed by removal, physical exclusion, or alteration of appearance. Successful retention/detention designs include temporary holding basins that drain within 24 hours and underground facilities, such as French drains or buried rock fields. If drains and ditches cannot be removed, the banks should be mowed regularly to control bird nesting and roosting.

Figure 2-1 Hazardous Wildlife Attractants Separation Distances for Airports



PERIMETER A - For airports serving piston-powered aircraft, hazardous wildlife attractants must be 5,000 feet from the nearest air operations area.

PERIMETER B - For airports serving turbine-powered aircraft, hazardous wildlife attractants must be 10,000 feet from the nearest air operations area.

PERIMETER C - For airports serving all aircraft types, recommended five-mile range to protect approach, departure, and circling airspace from wildlife hazards.

Source: *Graphic Developed by FAA Central Region Airports Division based upon guidance in FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports.*

Control techniques to manage wildlife hazards or bird attractants include the physical removal of wildlife, installation of fences, and maintenance of airport grounds in such a manner that deters wildlife habitation. Habitat management controls include:

- Select and space tree species to minimize habitats.
- Maintain appropriate grass lengths to minimize wildlife attractants.
- Prohibit certain agricultural crops near an airport (see **Table 2-1**).
- Eliminate standing water.
- Use repellents to disperse wildlife in a humane manner.

The U.S. Department of Agriculture (USDA) has prepared numerous resources to help protect airports and the flying public from wildlife hazards. “Protecting the Flying Public and Minimizing Economic Losses within the Aviation Industry” was prepared in 2009 and can be found on the USDA web page here:

http://www.aphis.usda.gov/wildlife_damage/airline_safety/pdfs/Summary%20Report%20WS%20Airport%20Wildlife%20Hazards%20Program%20FY%2008.pdf. Woody plants such as oak, fir, pine, maple, and cedar should be avoided as they provide roosting habitats. Additionally, upland weeds and shrubs should be discouraged near an airport as they provide a food source and habitat for wildlife. Marsh plants such as water lily, wild celery, and wild rice can also provide a food source for a variety of wildlife and should be discouraged. Cultivated or ornamental plants such as birch trees and dogwoods provide food sources and some habitat options as well. Local agencies may have specific landscaping requirements or tree ordinances that need to be considered before planning to remove or minimize the presence of wildlife attractants.

The management of potentially hazardous wildlife on or near an airport proves to be challenging because it typically combines active control measures such as repellents, along with passive control measures such as preventing and eliminating refuge areas and attractants. Another key component to implement these short- and long-term control measures is to accurately monitor and record wildlife obstructions and control wildlife activity on and near airports. It is important to report all bird and wildlife strikes to the FAA to support the study of wildlife management. In addition to FAA AC 150/5200-33B, the FAA has published a manual titled *Wildlife Hazard Management at Airports* to serve as a reference for wildlife issues within proximity to airports. A new resource for general aviation (GA) airports was published in 2010 by the National Academies of Science (NAS) Transportation Research Board (TRB) Airport Cooperative Research Program (ACRP) on wildlife issues at general aviation airports.

Land uses that are typically associated with wildlife attractants include industrial and manufacturing land uses, as they can generate habitats and opportunities that are inviting to wildlife and birds. These uses often have buildings that offer roosting opportunities for birds, as well as habitats for small rodents and mammals. Trash storage facilities, parking lots, and water detention areas can provide food, water, and habitat opportunities for wildlife. As birds fly between these areas to other roosting or food sources, they can establish a flight path that may interfere with the approach or departure of aircraft to an airport.

The FAA and the USDA Animal and Plant Inspection Services (APHIS) Wildlife Services (WS) have signed a Memorandum of Understanding (MOU) to address wildlife hazards to aviation. The MOU establishes that Wildlife Services has the expertise to provide technical and operational assistance to

alleviate wildlife hazards at airports. Airports may enter into agreements with Wildlife Services for the completion of a wildlife hazard assessment or mitigation efforts. A wildlife hazard assessment can be conducted by a wildlife damage management biologist to provide the scientific basis for the development, implementation, and refinement of a Wildlife Hazard Management Plan, if needed. A wildlife biologist, in cooperation with airport staff, can prepare a plan based on specific needs and concerns regarding a particular airport. **Table 2-1** notes wildlife attractants as a concern to flight and open airspace.

Table 2-1 Minimum Distances Between Airport Features and On-Airport Agriculture Crops

Aircraft Approach Category and Design Group ¹	Distance in Feet From Runway Centerline to Crop		Distance in Feet From Runway End to Crop		Distance in Feet from Centerline of Taxiway to Crop	Distance in Feet from Edge of Apron to Crop
	Visual & $\geq \frac{3}{4}$ Mile	< $\frac{3}{4}$ Mile	Visual & $\geq \frac{3}{4}$ Mile	< $\frac{3}{4}$ Mile		
Category A & B Aircraft						
Group I	200 ²	400	300 ³	600	45	40
Group II	250	400	400 ³	600	66	58
Group III	400	400	600	800	93	81
Group IV	400	400	1,000	1,000	130	113
Category C, D, & E Aircraft						
Group I	530 ³	575 ³	1,000	1,000	45	40
Group II	530 ³	575 ³	1,000	1,000	66	58
Group III	530 ³	575 ³	1,000	1,000	93	81
Group IV	530 ³	575 ³	1,000	1,000	130	113
Group V	530 ³	575 ³	1,000	1,000	160	138
Group VI	530 ³	575 ³	1,000	1,000	193	167

1. Design Groups are based on wing span and Category is based on aircraft approach speed:

Design Group

- Group I: Wing span up to 49 feet
- Group II: Wing span 49 feet up to 79 feet
- Group III: Wing span 79 feet up to 118 feet
- Group IV: Wing span 118 feet up to 171 feet
- Group V: Wing span 171 feet up to 214 feet
- Group VI: Wing span 214 feet up to 262 feet

Category

- Category A: Speed less than 91 knots
- Category B: Speed 91 knots up to 121 knots
- Category C: Speed 121 knots up to 141 knots
- Category D: Speed 141 knots up to 166 knots
- Category E: Speed 166 knots or more

2. If the runway will only serve small airplanes (12,500 pounds and under) in Design Group I, this dimension may be reduced to 125 feet; however, this dimension should be increased where necessary to accommodate visual navigational aids that may be installed. For example, farming operations should not be allowed within 25 feet of a Precision Approach Path Indicator (PAPI) light box.

3. These dimensions reflect the Threshold Siting Surface (TSS) as defined in AC 150/5300-13, Appendix 2. The TSS cannot be penetrated by any object. Under these conditions, the TSS is more restrictive than the OFA. The dimensions shown here are to prevent penetration of the TSS by crops and farm machinery.

Source: FAA AC 150/5300-13 Airport Design, Appendix 17

Landfills and similar facilities such as composting areas, recycling centers, sanitary and water treatment facilities, and waste sorting facilities can act as wildlife attractants and require specific measures to avoid bird strike hazards. FAA Advisory Circular (AC) 150/5200-34A, *Construction or Establishment of Landfills near Public Airports*, addresses the development and management of landfills. This AC provides guidance to comply with 49 U.S.C. 44718(d) as amended by Section 503 of the *Wendell H. Ford Aviation Investment and Reform Act for the 21st Century* (AIR-21) Public Law No. 106-181 (April 5, 2000). This code section restricts the construction or establishment of a Municipal Solid Waste Landfill within six miles of most airports. In addition, 40 CFR 258, Subpart B, *Criteria for Municipal Solid Waste Landfills*, requires that owners or operators who propose to site new landfill facilities and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the FAA, and must demonstrate that the units are designed and operated in such a way that the landfill facility does not pose a bird hazard to aircraft. Consequently, the area between five and six miles of an airport should be limited from consideration for solid waste landfills.

Sanitary and water treatment facilities generally attract a large number of birds due to the combination of water bodies and open green space that surround the facilities. Large concentrations of birds can pose a threat to aircraft safety during low-level flight near treatment facility areas. Some communities have considered the co-use of airport property with wastewater treatment facilities, an arrangement that would appear to be a beneficial use of property. However, spraying or disposal of wastewater can attract insects, small mammals, and birds. This can in turn increase the potential for wildlife strikes as the number of wildlife in the area around the airport increases. Consequently, it is recommended that sanitary, wastewater treatment, recycling, composting, and solid waste transfer facilities be located away from airport property.

Other types of land uses such as residential, commercial, institutional, recreational, and agricultural uses are also associated with wildlife concerns. These uses often include trash facilities that generate a food source to birds and small mammals, and water detention ponds that supply water and a habitat to wildlife. They can also contain landscaping that offers both roosting opportunities and food sources. Agriculture and open space activities provide attractive vegetation and roosting environments. While the growth of agricultural products is generally discouraged in the vicinity of an airport, the FAA and many state agencies have acknowledged that agricultural uses are much more compatible with airport environs than all other uses, but note that best management practices and diligent evaluation is required. Consequently, the FAA has acknowledged that if agricultural uses are to take place on or near an airport, certain dimensional standards should be adhered to. The dimensional standards are illustrated above in **Table 2-1** and found in FAA AC 150/5300-13 *Airport Design*, Appendix 17, *Minimum Distances between Certain Airport Features and any On-Airport Agriculture Crops*.

While aviation safety is of paramount concern, it is recognized that the elimination of all wildlife hazards to aviation in proximity to an airport is not possible, and that not all wildlife are equally hazardous to aviation. Guidelines and assistance provided by USDA's Wildlife Services can be followed in order to effectively analyze the comparative threats by wildlife, while WSDOT's Airport Stormwater Guidance Manual provides design techniques to decrease the attractiveness of open water areas/facilities to wildlife.

2.2.b Noise Issues

Noise is defined as any sound that is undesired or interferes with hearing. Living near an airport can be considered “noisy” due to the nature of airport and aircraft operations, such as arrivals, departures, overflights, aircraft maintenance, and engine run-ups and testing. Aircraft noise is evaluated by the extent to which the noise intrudes on a person’s quality of life, or interrupts or interferes with activities. Noise generated by cars, trucks, or industries within urban areas, also known as an area’s ambient noise level, may cause aircraft noise to seem less intrusive. Noise levels are based on a person’s tolerance to certain noise levels around airports. Aircraft noise may interrupt or interfere with speech, hearing, or sleep of persons living in proximity to airports, thus affecting the quality of life for these individuals.

Noise impacts generated by airports are greatly influenced by a variety of factors, including:

- Number of aircraft operations
- Type of air service (commercial versus general aviation)
- Aircraft fleet mix (single-engine piston, multi-engine piston, jets, rotorcraft, etc.)
- Airfield layout
- Location of the surrounding development relative to the airport
- Type of surrounding land uses (residential, commercial, industrial/manufacturing, institutional, infrastructure, agricultural, recreational)
- Configuration of surrounding land use
- Time of day, time of year, weather conditions - Visual Flight Rules (VFR), Instrument Flight Rules (IFR)
- Topography

Challenges associated with noise-related issues stem from the difference between FAA noise standards and a property owner’s perception of aircraft noise. FAA Order 5190.6B advises that “for some individuals, a reduced level of noise may not eliminate the annoyance or irritation.” The FAA and the U.S. Department of Housing and Urban Development (HUD) have defined limits for noise impacts that are based on specific exposure to noise levels. The FAA and HUD use a unit of measurement called the Day-Night Level (DNL) to measure aircraft noise. Based on these defined limits, a DNL of 65 or greater indicates a level of impact that can alter a person’s quality of life. People who live and work outside of the 65 DNL contour often note potential noise impacts that will have minimal recognition by the FAA. This often stems from their response to individual noise events rather than a 24-hour average. While helpful in determining the airport’s impact on noise-sensitive land uses, the DNL is not a stand-alone land use compatibility planning tool.

Aircraft noise contours that correspond to the DNL levels are defined using the FAA’s Integrated Noise Model (INM). The INM contains a database that relates noise levels to each specific type of aircraft. On a three-dimensional (3-D) grid around an airport, the INM computes the noise exposure level for a specific aircraft and engine thrust used at a particular point along the flight track of an aircraft. Noise levels are then indicated by a series of contour lines superimposed on a map of an airport and the surrounding communities. Although these contour lines tend to be viewed as definitive, it should be noted that the INM is only a planning tool used to identify areas around an airport likely to be affected by aircraft noise.

Airport sponsors, local communities, and the FAA use INM-generated noise contours, noise monitoring equipment, and other information in preparing noise compatibility programs.

The FAA provides guidance through several FARs for the development of Noise Compatibility Plans for areas affected by aircraft noise. These FARs include:

- FAR Part 36, *Noise Standards: Aircraft Type and Airworthiness Certification*
- FAR Part 91 Subpart I, *Operating Noise Limits*
- FAR Part 150, *Airport Noise Compatibility Planning*
- FAR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*

The primary resource for noise-related issues is FAR Part 150, *Airport Noise Compatibility Planning*. FAR Part 150 describes acceptable types of land uses for each DNL noise level. For example, Part 150 noted that residential developments should not be allowed in areas exposed to 65 DNL or greater. However, this does not necessarily mean that residential land uses are compatible outside of the 65 DNL contour. In addition, if a noise-sensitive facility is developed within the 65 DNL, the FAA recommends construction that utilizes noise level reduction techniques. The vast majority of airports within the Puget Sound region do not conduct FAR Part 150 noise studies since they do not meet the threshold for potential noise concerns, according to FAA Order 1050.1E *Environmental Impacts Policies and Procedures*. Appendix A Section 14.6 of the Order states that “no noise analysis is needed for...airports whose forecast operations...do not exceed 90,000 annual propeller operations or 700 jet operations.”

Land uses that should be avoided due to noise impacts include residential development and institutional land uses (such as schools, churches, hospitals, libraries, etc.). If unable to avoid these uses, mitigation techniques should be employed in the construction of structures. Aircraft noise and over-flight can often create a nuisance for social land uses and institutions in the vicinity of an airport. Noise impacts (e.g., aviation, vehicular, etc.) have been determined to affect people’s quality of life and also the quality of service within affected areas. Noise can be considered a detriment to the learning process at schools and universities because of the distraction it can create. Vibrations related to aircraft noise can affect hospitals and health care facilities. Ideally, residential and institutional land uses should be precluded from development in the airport influence area. If this is not feasible, various measures can be taken to minimize aircraft noise impacts. Specific noise-reducing building materials and construction techniques can be used as a mitigation measure, such as the installation of additional insulation to the roof and walls of existing structures or the use of energy efficient windows to limit the amount of audible aircraft noise impacts.

The basic approach to enhance noise compatibility is to minimize the extent to which noise disrupts human activities or otherwise creates an annoyance. In general, the best approach is to allow fewer people to occupy high-noise impacted areas. When this approach is not practical, alternatives include:

- Shielding people from noise through sound proofing and insulation.
- Increasing awareness of noise issues through educational programs.
- Allowing land uses that have relatively high ambient noise levels or are otherwise not particularly noise sensitive to be placed near airports.

Public perception of aircraft noise and aircraft over-flights is a valid concern for airports because severe annoyance and exposure to aircraft noise may mobilize individuals to take political action to reduce aviation activity or close an airport. Such action can have unintended consequences such as loss of airport-related jobs, decreased airport-related revenues, and reduced emergency access to the airport system. In addition, loss of airport capacity due to airport closure or activity limitations essentially wastes the public investment in airport infrastructure.

2.2.c Over-flight Annoyance

Over-flight annoyance is often a by-product of the level and frequency of aircraft noise and over-flight of aircraft experienced by people in the vicinity of an airport. While this is a concern, it is hard to quantify over-flight annoyance as it is a matter of personal perception. Annoyance can range from an occasional irritation to a severe annoyance that interrupts a person's daily activities and lowers quality of life. Reducing the number of persons occupying areas that experience frequent aircraft over-flights or exposure to aircraft noise will help to eliminate this concern. However, as noted, this issue is often a perceptual issue that can vary depending on personal tolerance levels.

Placing land uses that may be adversely impacted by the frequency of flight (e.g., residential) within flight paths or in proximity to an airport may wake residents or expose them to noise due to the number of operations. This level of annoyance is difficult to quantify or to fully mitigate. Institutional uses such as schools and universities are particularly affected because over-flight can interrupt a student's learning or a teacher's lesson. Recreational uses such as stadiums and auditoriums may view over-flight as being negative if it draws attention away from the specific event.

2.2.d Safety Issues

The safety of aircraft and its occupants, as well as the safety of persons on the ground located in proximity to airports, are areas of primary concern for compatible land use. Consequently, limiting the number of people in the airport influence area is a desired goal of land use compatibility planning. This means concentrations of people, or population density, should be avoided. The level of concentration, or density, is measured by the number of people per unit of area and is often categorized as high, medium, or low. Available accident data suggests the greatest percentage of aircraft accidents occur near runway ends during approach and departure. The risk of damage and personal injury can be reduced significantly by limiting the number of people in areas adjacent to airports and within the airport influence area, particularly near runway ends. Providing open spaces void of structures in the airport influence area can also reduce the risk of damage and personal injury.

An acceptable level of land use density varies depending on the particular needs of associated communities and the type of aircraft using an airport. The degree of risk associated with density and the probability of aircraft accidents is generally based on such factors as type of airport, number of operations, and type of surrounding land uses. Therefore, determining an appropriate density within the vicinity of the airport can be a challenge and needs to be balanced with community needs and existing development patterns. For example, to deem an area near an airport that is already heavily developed as having incompatible uses would be counterproductive to the process of land planning since there likely are neither

sufficient funds nor political will to remove the uses. Instead, an effort should be made to establish methods to limit the development of new uses that would further perpetuate or increase the level of incompatibility. Over time, jurisdictions may transition from incompatible residential development to a more mixed use environment to enhance compatibility.

These methods may help determine appropriate density levels near airports in the Puget Sound region:

- Analysis of parking requirements established in local zoning ordinances
- Maximum occupancy level set in accordance with building codes
- Residential density measured in the number of dwelling units per acre (du/ac)
 - Low density
 - Medium density
 - High density
- Urban density measured with an acceptable floor-area ratio
- Surveys of similar uses
- Community population and employment growth targets established pursuant to the Growth Management Act (GMA)

Land uses that should be avoided or minimized near airports for safety reasons include those with high densities and intensities, such as residential development (single- and multi-family), institutional uses (hospitals, day care facilities, schools, convalescence centers, etc.), commercial uses (big-box retail), and recreational uses (stadiums, auditoriums, etc.). In general, the higher the concentration of people that a land use supports or attracts, the less compatible it will be within the airport influence area. The lower the concentration of people, the more compatible the land uses will be near an airport.

At this time, a national standard is not available for acceptable densities around an airport. One of the few examples of density standards is found in the *California Airport Land Use Planning Handbook*, which provides measures that a municipality can use as a benchmark when defining densities for various land uses within their community, including:

- Light Industrial use: 35 to 50 people per acre within the facility
- Two-Story Motel: 35 to 50 people per acre within the dwelling unit
- Single-Story Shopping Center: 75 to 125 people per acre within the facility
- Single-Story Office: 50 to 100 people per acre within the building
- Sit-Down Restaurant: 100 people per acre within the building
- Fast Food Restaurant: 150 people per acre within the building

On a broadened scale, according to the American Planning Association (APA) *Planning and Urban Design Standards*, residential density is most commonly measured by the number of dwelling units per acre (du/ac). Examples of these densities:

- Low-residential density is defined as less than 9 dwelling units per acre
- Medium-residential density is defined as between 10 and 30 dwelling units per acre
- High-residential density is defined as greater than 30 dwelling units per acre

In dense urban areas, floor-area ratio (FAR) may also be used to determine the density. The floor-area ratio is defined as the ratio of the gross building floor area to the area of the building site.

While there are some definitions for specific densities, local communities may wish to establish their own levels of density. Options include:

- Analysis of parking requirements established in local zoning ordinances
- Maximum occupancy level set in accordance with building codes
- Surveys of similar uses

2.3 Airport Influence Areas

As discussed previously, the Washington State Legislature in 1996 passed Substitute Senate Bill 6422, *General Aviation Facilities-Protection from Incompatible Land Uses*. The bill directed WSDOT's Aviation Division to develop a technical assistance program and called for planning guidelines for areas adjacent to airports. These areas are now referred to as *airport influence areas*. These areas include considerations for noise, over-flight, airspace protection, and the safety of people and property on the ground. **Table 2-2** provides a summary of the land use strategies for the recommended influence areas as identified in WSDOT's Guidebook.

It should be noted that the WSDOT airport influence areas reflect the general areas where aircraft are most often maneuvering, such as in and around the Runway Protection Zone (RPZ), lateral to the runway, in the runway approach, and under the traffic pattern, as well as where aircraft accidents are known to have occurred. A pre-determined size or shape of airport influence areas does not exist as these areas are unique to each airport. However, a typical influence area for a general aviation airport will extend approximately two miles in all directions, whereas the influence area for a busier airport, or one with an instrument approach, will often be much larger. For a small General Aviation airport, zone 6 extends 5,000 feet. For a medium sized General Aviation airport, zone 6 extends 10,000 feet. These areas serve as guidance of best management practices, and their implementation is not mandatory. Implementation of these influence areas in some form is recommended to assist in compliance with the Growth Management Act; however, the specific method of compliance is currently left to the discretion of the local community.

Table 2-2 Land Use Guidelines and Planning Strategies for New Development

Characteristics of Existing Influence Area Environments:	Rural Existing land use is agricultural or remote; few buildings; new development not anticipated	Limited Development Existing development low-intensity or scattered; little new development anticipated	Developing Extensive vacant or underutilized land with urban development potential	Developed Fully or mostly developed; potential redevelopment
In and Around Runway Protection Zone	Airport should control land consistent with design standards Height restrictions Avoid new buildings	Airport should control land consistent with design standards Height restrictions Avoid new buildings Avoid new roads	Airport should control land consistent with design standards Height restrictions Avoid new buildings Avoid new roads	Airport should control land consistent with design standards Height restrictions Infill uses if low intensity
Lateral to Runway	Aviation-related development preferred No new residential tracts Low intensity non-residential uses acceptable No new schools, day care centers, nursing homes, etc. Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage keeping land agricultural, undeveloped, or in airport-related uses	Aviation-related development preferred No new residential tracts Low intensity non-residential uses acceptable Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage keeping land agricultural, undeveloped, or in airport-related uses	Aviation-related development preferred Low/moderate intensity non-residential uses acceptable No new residential tracts No new schools, day care centers, nursing homes, etc. No new shopping centers or places of public assembly* Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage light industrial and other low-intensity uses or airport-related uses	Aviation-related development preferred Low/moderate intensity non-residential uses acceptable No new residential tracts No new schools, day care centers, nursing homes, etc. No new shopping centers or places of public assembly* Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage light industrial and other low-intensity uses or airport-related uses
Approaches / Extended Runway Centerline	Low-intensity non-residential uses acceptable (consider a one-story limit to ensure acceptable intensity) No new residential tracts No new schools, day care centers, nursing homes, hospitals, etc. Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage continuation of agricultural and related uses	Low-intensity non-residential uses acceptable (consider a one-story limit to ensure acceptable intensity) No new residential tracts No new schools, day care centers, nursing homes, hospitals, etc. Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage continuation of agricultural and related uses	Low/moderate-intensity non-residential uses acceptable (consider a two-story limit to ensure acceptable intensity) No new residential tracts; infill discouraged No new schools, day care centers, nursing homes, hospitals, etc. No new shopping centers, industrial uses with high concentrations of people, places of public assembly* Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage light industrial, office, and other low-intensity uses	Low/moderate-intensity non-residential uses acceptable (consider a two-story limit to ensure acceptable intensity) Residential as infill acceptable No new schools, day care centers, nursing homes, hospitals, etc. No new shopping centers, industrial uses with high concentrations of people, pieces of public assembly* Tall structures restricted to protect airspace Caution regarding land uses that attract birds Encourage light industrial, office, and other low-intensity uses
Traffic Pattern	Maintain existing minimal development conditions to maximum extent practical	Limit residential tracts Encourage continued agricultural and ag-related commercial or other low-intensity commercial uses	Encourage non-residential uses except for areas with very high intensities (such as sports arenas) Favor high-density or clustered residential if residential is necessary over low-density if residential is necessary	Encourage non-residential uses except for ones with very high intensities (such as sports arenas) Favor high-density residential as infill or redevelopment

*Places of worship, auditoriums, outdoor sports arenas, etc.

2.4 Military Land Use Compatibility

Growth Management Act

Military installations are an important part of the state's economy, and the Military Cluster is now included in the Regional Economic Strategy for the central Puget Sound region. While the defense presence generates economic growth for the PSRC region, the military presence is not without its challenges. Military bases attract development nearby due to economic activity associated with base operations. Large bases place demands on the surface transportation system. Encroachment of incompatible uses presents safety issues to people on the ground, exposes surrounding communities to aircraft noise, and may adversely impact the ability of a base to fulfill its military mission. The State Legislature recognized these challenges in 2004 when enacting changes to the Growth Management Act. The legislation (RCW 36.70A.530) requires local jurisdictions to use their comprehensive plans and development regulations to discourage incompatible development in the vicinity of military installations. RCW 36.70A.530 (1) starts with the following statement: *Military installations are of particular importance to the economic health of the state of Washington and it is a priority of the state to protect the land surrounding our military installations from incompatible development.*

Joint Land Use Study (JLUS)

At the federal level, the Department of Defense (DOD) created the Joint Land Use Study Program to address compatibility concerns with surrounding communities. The Joint Land Use Study (JLUS) is a cooperative land use planning effort between military installations and the surrounding jurisdictions. Joint Land Use Studies identify potentially incompatible land uses around military installations, quantify the impacts of base operations on surrounding land uses, and recommend strategies to mitigate incompatibility and encroachments. A Joint Land Use Study is designed to promote community growth and development that is compatible with an installation's training and operational missions. The most recent Joint Land Use Study for JBLM was completed in 1992. The plan identified key issues and outlined a set of land use objectives aimed at enhancing land use compatibility between the military bases and surrounding communities. The following text, contained in the 2010 *JBLM Growth Coordination Plan* (see discussion below) discusses the Joint Land Use Study:

In 1992, a Joint Land Use Study (JLUS) was conducted to encourage compatible land development in the vicinity of McChord AFB, Fort Lewis, and Camp Murray. The McChord AFB 2000 General Plan (McChord AFB 2000) summarizes the focus and outcomes of the 1992 JLUS process. The study participants included McChord AFB; Fort Lewis; Camp Murray; Pierce and Thurston counties; the cities and towns of Tacoma, Steilacoom, DuPont, Roy, Yelm, and Rainier; and the Nisqually Indian Tribe. The JLUS process included an analysis of existing land uses, noise effects on land use types, and methods of noise abatements, as well as provided recommendations for implementing strategies to minimize noise impacts on communities in the vicinity of McChord AFB, Fort Lewis, and Camp Murray. The focus of the JLUS was on the reduction of noise impacts; other planning issues addressed included local and regional transportation and communication. The JLUS analysis revealed a number of incompatible land uses on the north end of McChord AFB within the clear zone and APZs 1 and 2. Incompatible land uses were also identified within the 70-75 Day/Night Noise Levels (DNL) and 75-80 DNL contours. As a result of the JLUS analysis, an area that included a hodgepodge of land uses was consolidated to commercial in APZ 1 and to residential in APZ 2 (McChord AFB 2000).

The 1992 partnership among McChord AFB, Fort Lewis, and local communities to assess land use compatibility and encroachment issues was deemed largely successful by participants. It was the responsibility of the participating jurisdictions to ensure that JLUS recommendations were taken into account when developing land use plans and other related planning documents. Many of the jurisdictions within the study area adopted new policies and standards related to the following JLUS objectives. For example, the JLUS resulted in Pierce County's first airport overlay zone as well as other policy modifications that improved land use compatibility with JBLM. The JLUS objectives relating to land use are identified below:

- *Strive to protect people and land use activities in the Clear Zone for McChord AFB. (LU-JLUS Objective 74)*
- *Ensure compatibility within the Accident Potential Zones for McChord AFB. (LU-JLUS Objective 75)*
- *Recognize aircraft noise as an environmental constraint when developing land use classifications and regulations. (LU-JLUS Objective 76)*
- *Recognize safety issues associated with training, artillery, and small arms activities on the military installations of McChord AFB and Fort Lewis. (LU-JLUS Objective 77)*
- *Cooperate with McChord AFB, Fort Lewis, and Camp Murray in developing plans for circulation improvements in and around the installations. (LU-JLUS Objective 78)*
- *Provide the military installations with opportunities to participate in the review and development of land use programs, policies, and decisions that affect them. (LU-JLUS Objective 79)*
- *Recognize the unique character of land uses associated with military operations and support structures. (LU-UML Objective 80)*
- *Clarify the relevance of the Urban Military Lands designation on the analysis of residential land capacity within the Pierce County Urban Growth Area. (LU-UML Objective 81)*
- *Recognize the possibility of military lands reverting back to Pierce County. (LU-UML Objective 82)*
- *Provide guidance for designating other military lands. (LU-UML Objective 83)*
- *Recognize those portions of the federal military installations that lie outside the Urban Growth Area (UGA). (LU-RML Objective 84)*

Air Installation Compatible Use Zone (AICUZ)

In addition to the JLUS process, aircraft noise, safety, and related land use planning around military airfields are addressed by the *Air Installation Compatible Use Zone (AICUZ)* planning process (similar to the FAA's FAR Part 150 Noise Control and Compatibility Planning for Airports). The DOD completed an AICUZ study at McChord Air Force Base before it was combined with Fort Lewis to create JBLM. The AICUZ program goals are to:

- Promote the health, safety, and welfare of persons in the vicinity of and on air installations by minimizing aircraft noise and safety impacts without degrading flight safety and mission requirements.
- Promote long-term compatible land use on and in the vicinity of air installations by encouraging State and local governments to adopt enabling legislation and compatible land use regulations into their land use planning and control processes and by partnering with communities and other eligible entities to protect land through restrictive use and conservation easements.

The AICUZ program addresses land use compatibility on and in the vicinity of the air installation where:

- Aircraft operations may affect the public health, safety, or welfare.
- Certain uses or structures may obstruct the airspace, attract birds, create electromagnetic or thermal interference, or produce dust, smoke, steam, or light emissions that may impact a pilot's vision, or otherwise be hazardous to or incompatible with aircraft operations.

Under AICUZ requirements, air installations must use the land area and height standards defined in the Unified Facilities Criteria 3-260-01 for purposes of identifying airspace obstructions and potential land use compatibility issues in accordance with part 77 of title 14, Code of Federal Regulations. AICUZ studies must include the following:

- A description of the aircraft noise and aircraft accident potential environment around the air installation for existing operations.
- A description of the long-term (5-10 year) aircraft noise and accident potential environment for projected aircraft operations that is consistent with the planning horizon used by state, tribal, regional, and local planning bodies.
- Recommendations for achieving compatible land use development considering aircraft noise, accident potential, bird or wildlife aircraft strike hazard (BASH), electromagnetic interference, dust, steam, smoke, or light emissions, and heights of natural and man-made objects near the air installation that affect flight safety within the air installation's environs.
- Identification of existing and potential incompatible land uses.

The McChord AFB AICUZ study provided valuable policy guidance and technical support to surrounding jurisdictions (Pierce County, City of Lakewood, and City of Tacoma), who have continued their ongoing cooperative planning with the military base.

2010 Growth Coordination Plan

Recent decisions by the Department of Defense have had significant impacts on JBLM and adjacent communities. The 2005 Base Realignment and Closure (BRAC) and other decisions have reaffirmed the DOD commitment to consolidate growth at JBLM. Between 2003 and 2010 the military related population at JBLM grew from 92,000 to 132,000 (43%) and additional growth is forecast. To address this recent and anticipated growth, a *Joint Base Lewis McChord Growth Coordination Plan* was completed in 2010. The mission of the growth plan is:

Joint Base Lewis McChord (JBLM) and its surrounding communities in the South Puget Sound (South Sound) are intricately bound to one another. Strong, supportive communities surrounding the base enhance the quality of life of military personnel and their families by providing quality neighborhoods, schools, recreation opportunities, and other services. In turn, the strength of JBLM enhances the economic well-being of the surrounding region, spurring a demand for retail, services, and jobs, among others. To ensure the mutually beneficial relationship continues, careful planning and coordination are needed to ensure that local facilities and infrastructure are adequate to meet the needs of JBLM, as well as to ensure that the South Sound region is taking full advantage of the military asset in its midst. This is the challenge and mission before us.

The *Joint Base Lewis McChord Growth Coordination Plan* lays out a program of regional collaboration addressing a broad range of concerns: economics; housing; education, childcare, and schools; transportation; land use policy; public safety; utilities and infrastructure; health; social services; and quality of life. The Land Use appendix addresses existing uses on and near the bases, and includes a land use needs assessment containing the following statements and recommendations:

Army Compatible Use Buffer (ACUB)

The Growth Coordination Plan discusses the Army Compatible Use Buffer (ACUB) program, an integral component of the Army's triple-bottom line of sustainability: mission, environment, and community. In recent years, Army installations have been experiencing increasing encroachment from a variety of sources, including population growth, urban land use, and environmental requirements. The ACUB program proactively addresses encroachment, which causes costly workarounds or compromises training realism as authorized under Title 10, Section 2684a, of the United States Code.

Need for Coordination among Local, Regional, and Military Planners

A structure or process is needed to allow for the collaboration of JBLM and community planners [those from surrounding civilian communities] to achieve common goals related to accommodating military growth, such as adequate housing, travel demands, proper utility servicing, amenities related to quality of life, and other regional interests.

Consistently Recognize JBLM as a Center of Regional Significance

Regional growth strategies, comprehensive plans, and zoning codes are in place at the county and city levels to guide new development into existing areas planned for urban growth. Stakeholders agree that current plans underestimate JBLM's regional importance associated with its operations, growth, employment, benefits, and impacts. Consistent policy direction should encourage improved community planning efforts [partnerships between base personnel and planners from surrounding communities] to support JBLM as a major employment generator and help facilitate complimentary land use planning around it. Potential Opportunities and Strategies:

- *Address JBLM growth and planning efforts in PSRC and TRPC regional growth strategies.*
- *Incorporate background text and policies addressing military activities and operations in the land use element of local comprehensive plans. Develop bulleted recommendations for local jurisdictions to incorporate into the Pierce and Thurston County Countywide Planning Policies.*
- *Incorporate provisions in Countywide Planning Policies that address/acknowledge the interaction between military operations and local land use development. Develop bulleted policy recommendations for local jurisdictions to incorporate into their local comprehensive plans (2014 update).*
- *Pursue community outreach to inform local residents about growth associated with the military, and solicit feedback on potential impacts on their neighborhoods. (Responding to change will be easier if residents have ownership in the process/discussion.)*
- *Encourage cooperative planning efforts between JBLM and surrounding jurisdictions with regard to major on-base developments, such as the planned Freedom's Crossing lifestyle center.*
- *Identify JBLM staff to participate in PSRC and TRPC standing committees.*
- *Identify JBLM staff representation on the Pierce County and Thurston County Growth Management Coordination Committees.*

Land Use Compatibility with JBLM Operations

Land use compatibility is a growing concern among stakeholders. Base operational and physical changes, as well as regional growth, have created the need to re-evaluate land use compatibility surrounding the base. Development standards for residential and other sensitive lands adjacent to the base need further assessment to ensure that land use conflicts are avoided, as well as to determine whether new definitions and modified standards need to be established by local jurisdictions. Potential Opportunities and Strategies:

- *Conduct [an updated] Joint Land Use Study (JLUS) with surrounding jurisdictions and JBLM to improve land use compatibility around and related to the base and its range and airfield operations.*
- *Specifically define land use compatibility / incompatibility for the different types of JBLM operations.*
- *Identify locations of potential future land use incompatibility around JBLM.*
- *Draft a "Military Lands Compatible Use" issue paper and forward to local jurisdictions for use during local comprehensive plan updates.*
- *Identify funding sources for property acquisition in the Clear Zone.*

For more information, visit the JBLM website at www.jblm-growth.com/plan.php.

Addressing Civilian and Military Compatible Land Use

Although both civil and military compatible land use programs have the similar goals of addressing noise and safety issues, the planning criteria used around military bases are different than the FAA guidance used around civilian airports. The FAA governs critical airspace around civilian airports using FAR Part 77.25 while the Department of Defense uses FAR Part 77.28 for military airports. Although there are technical differences in the way the DOD and FAA handle noise and safety issues, PSRC's Airport Compatible Land Use Program includes JBLM, and encourages the DOD and local jurisdictions to continue their cooperative efforts to enhance safety and address noise and other issues around JBLM. McChord Air Force Base and Fort Lewis (including Gray Army Air Field) were combined as Joint Base Lewis-McChord (JBLM) in 2010 under the Base Realignment and Closure (BRAC) program.

JBLM is a major military presence in Pierce County and the South Sound, generating significant economic benefit to the region and the state. In addition to substantial and growing military on-base employment and population, there are significant numbers of civilian jobs and residents located in surrounding communities because of their relationship to the military bases. Pierce County, Thurston County, the cities of Tacoma and Lakewood, and other neighboring jurisdictions have collaborated with JBLM over the years to enhance the relationship between the military bases and surrounding communities. JBLM is included in the PSRC Airport Compatible Land Use Program to recognize the importance of the military facilities as well as the significant amount of compatible land use planning which has been done and continues. Because of the unique nature of JBLM, and its relationship with surrounding jurisdictions, the requirements and recommendations contained within PSRC's Airport Compatible Land Use program, and PSRC's *Plan Review Manual*, will be applied as guidance within the context of these two federal facilities rather than the FAA's guidance for civilian airports. Lastly, planning around JBLM will also need to recognize the importance of the facilities' military mission and the need to mobilize troops and equipment as required, depending on changing conditions. PSRC's Airport Compatible Land Use program has been prepared to be consistent with and supportive of the recommendations and strategies identified in the military base planning documents cited here.

2.5 Seaplane Bases

The regional public use airport system covered by the PSRC Airport Compatible Land Use Program includes four seaplane bases: Kenmore Air Harbor, Lake Union Seaplane Base (Seattle Seaplanes), Will Rogers/Wiley Post Memorial Seaplane Base, and American Lake Seaplane Landing Strip. The American Lake Seaplane Landing Strip has extremely low activity levels and no dedicated airplane or pilot facilities other than a city dock. Because of the variable traffic patterns, very low use level, and the lack of seaplane facilities, this seaplane landing strip does not warrant detailed land use or development regulations by surrounding jurisdictions. Nevertheless, local land use authorities should consider the prevailing take-off and landing patterns when considering future land use or development proposals, such as tall towers. For more information about American Lake see Appendix D.

Although considered general aviation facilities by FAA and WSDOT Aviation Division, the region's seaplane bases have unique operating conditions and facilities quite different than land-based airports. Because the water "runways" at seaplane bases are not located as precisely as land-based runways, the approach and departure paths used by seaplanes are less precise. In addition, most flights to and from seaplane bases are not under the control of air traffic personnel. Nevertheless, these facilities serve a variety of public purposes, and there is a need for communities adjoining seaplane bases to plan cooperatively with the seaplane base operators. The challenge in planning for compatible land use around seaplane bases arises specifically due to the lack of precision regarding the location of the water runways, as well as the unique take-off and landing conditions. For these reasons, the requirements and recommendations contained within PSRC's Airport Compatible Land Use program, and the related Policy and Plan Review process, will be applied as guidance within the context of the seaplane base operating environment rather than the FAA's guidance for land-based airports.

2.6 Coordination between Airports and Governments

Development of noise contours, airport activity forecasts, or updates to an airport layout plan (ALP) are significant planning efforts that require financial resources, public outreach, and coordination with government agencies. Close coordination between airports and surrounding communities during the planning process is essential. An airport and its surrounding community should strive to reduce the risk of incompatible development. Airports and communities should collaborate during planning processes to allocate responsibility for implementing land use compatibility programs. For example, when an airport develops noise contours as part of its master planning process, the surrounding community can incorporate these contours into a new zoning ordinance that reduces noise impacts on its residents and sensitive land uses from unacceptable noise levels. Airports should take the surrounding community's zoning and comprehensive plan maps into account during ALP updates to minimize the impact any new airport projects might have on existing or planned land uses. Both parties should be actively involved in the planning process of the other.

2.7 Other Compatibility Techniques

Airport compatibility zones are not the only way airports can meet the land use compatibility obligations of the GMA. Several other strategies can be used individually or in combination such as: direct zoning, mixed-use zoning, cluster development, infill development, transfer of development rights, fee-simple property acquisition, high-intensity land use limitations, sound transmission building codes, aviation easements, and ordinances such as wireless communication and wind energy ordinances, which are aimed at limiting height.

2.8 Conclusion

Defining compatibility and determining which land uses will be considered compatible with airport operations can be a challenging task. This document, along with the WSDOT's Guidebook, has identified compatibility factors that should be considered when analyzing the level of compatibility of a particular land use and its proximity to the airport. The factors include airspace protection, noise, over-flight, safety, impacts of light, vibration, fumes, and low-flying aircraft. It should be noted that the discussions provided in this document are general and that each land use must be evaluated individually to ensure compatibility relative to individual community and airport needs. By achieving a greater level of land use compatibility around airports, the airports and associated operations will experience a greater level of safety, as will persons in the air and on the ground.

3.0 Current Planning and Land Use Assessment

To achieve a better understanding of the level of land use compatibility supported by local entities, a review of planning documents for municipalities within the PSRC Regional Airport System was carried out in late 2009 and early 2010. The PSRC Regional Airport System includes 28 airfields in King, Snohomish, Pierce, and Kitsap counties in western Washington. The comprehensive plans, zoning ordinances, and development regulations of 29 cities and four counties within the jurisdiction of PSRC were reviewed to evaluate their policies and provisions related to discouraging incompatible land use near the airports. Plans, ordinances, and regulations for most of the cities and counties were available online. For those not available online, city and county staff were contacted via telephone to acquire them. The extent to which a city or county plan is affected by aviation activity varies widely depending on the airfield's location, role, and activity. As a result, the aviation-related content of plans, ordinances, and regulations varies as well. A review of existing policies and provisions is summarized and provided in the next section. The following describes the documentation of existing land use controls and regulations as shown in **Table 3-1**, and provides a brief summary of the evaluation results. This assessment demonstrates that there is limited inclusion of airport-related compatibility considerations in existing comprehensive plans.

3.1 Local Planning Policy Review

Twelve specific evaluation criteria were assessed for the region's airports. Many of the airports have areas of impact that cross over municipal boundaries, resulting in 33 jurisdictions (29 cities and four counties) being evaluated as part of this program update. This assessment was conducted by evaluating the local comprehensive plans and zoning ordinances for the subject jurisdictions to assess the following 12 questions:

1. Does the local comprehensive plan identify airports within or near the jurisdiction's boundaries?

This question was intended to determine if the existing plans identify airports within or near the jurisdictional boundaries of the entity. The responses to this question were noted as either a "Yes" or "No." Of the 33 plans, 30 identify airports within or near the jurisdiction's boundaries. Four of the 30 plans do not identify all of the airports that may have an impact on the jurisdiction.

2. Does the local comprehensive plan or zoning ordinance define land uses considered incompatible (if yes, what is the source of the definitions)?

This question evaluated the comprehensive plans, zoning ordinances or both, to determine if language exists within the documents to define land uses that would be incompatible with an airport. Of the 33 jurisdictions, 14 define land uses that are considered incompatible with airports.

3. Does the local comprehensive plan identify existing incompatible land use in the vicinity of the airport(s)?

Of the 33 plans, nine identify existing incompatible land uses in the vicinity of airports. It should be noted that the lack of a reference to existing incompatible land uses in the comprehensive plan may simply indicate that there are no incompatible land uses in the vicinity of particular airports.

4. Does the local comprehensive plan identify planned incompatible land use in the vicinity of the airport(s)?

None of the 33 plans specifically note planned development as being incompatible land use in the vicinity of airports. This does not mean that all planned development is compatible with airport operations. Rather, the analysis demonstrates a need to identify and articulate land uses that are incompatible with airport operations.

5. Does the local comprehensive plan include policies to discourage the incompatible land use?

Of the 33 plans, 20 have at least one policy identified that discourages incompatible land use near airports. Some plans have multiple incompatible land use policies. These policies are typically found in the Land Use, Transportation, or Capital Facilities elements of the plans. The location of the policies within the plans is inconsistent.

6. Dose the local comprehensive plan contain a process to preserve the airport as an essential public facility (EPF)?

Twenty-nine of the 33 jurisdictions have a process to define EPFs. Few plans recognize the need to preserve an airport in particular as an EPF. None of the jurisdictions have a process specific to airports as EPFs, or EPFs in general.

7. Does the local comprehensive plan include development regulations to discourage incompatible land use?

Nine of the 33 plans have development regulations discouraging incompatible land use. The type of development regulations vary in extent, ranging from prohibition of particular uses, to a formal land use review and permitting process, to requirements for recognition statements in residential titles. In two of the 24 jurisdictions without incompatible land use development regulations, the comprehensive plan has a specific goal of updating the development regulations to include provisions discouraging incompatible land use.

8. Does the local comprehensive plan or zoning ordinance contain provisions or overlay zones to address height hazards based on FAR Part 77 (if yes, which surfaces are included)?

Eight of the local communities have some sort of height hazard mitigation zone. Not all of the height hazard zones are based on Part 77, and some of those zones include only the approach and transitional surfaces. Of the 25 jurisdictions without height hazard zones, five have included in their comprehensive plans either a specific goal or policy to establish a height hazard zone, or a general goal or policy to limit structure heights (based on aviation issues) in certain areas.

9. Does the local comprehensive plan contain maps or graphics showing FAR Part 77 surfaces?

Three of the 33 jurisdictions have an FAR Part 77 map or graphic to supplement the height hazard zone text.

10. Does the local comprehensive plan contain maps showing areas affected by airport noise (noise contours)?

Three of the 33 local jurisdictions have a noise contour map in one of these documents.

11. Does the local planning document include an overlay zone to address airport noise?

Three of the 33 documents have an existing airport noise overlay zone. Six of the 30 jurisdictions without an airport noise overlay zone have specific goals or policies for implementing new airport noise mitigation measures.

12. Does the local comprehensive plan and/or zoning ordinance address airport compatibility zones as defined by the WSDOT?

Six of the 33 jurisdictions reference the state-recommended airport compatibility zones in some way in their local planning documents. This does not mean that all six have implemented the airport safety zones, just that the airport safety zones are referenced in some way in these documents.

Table 3-1 Regional Land Use Controls and Regulations (Page 1 of 4)

Relevant Jurisdiction	County	Assessment from 2004 PSRC plan review	Date Comp. Plan Adopted	Date Trans. Element Certified by PSRC	Identify airports within or near the jurisdiction's boundaries	Define land uses considered incompatible (if yes, what is the source of the definitions?)	Identify existing incompatible land use in the vicinity of the airport(s)	Identify planned incompatible land use in the vicinity of the airport(s)	Include policies to discourage the siting of incompatible land use	Contain a process to preserve the airport as an essential public facility
Auburn	King	Meets most requirements	Revised 11/2006	5/1/2004	Yes	No	No	No	No	Yes
Burien	King	Meets all requirements	12/2007	2/23/2006	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Covington	King	Does not meet requirements	Revised 12/2003	6/24/2004	Yes	No	No	No	No	Yes
Des Moines	King	Meets some requirements	3/2006	7/1/2003	Yes	Yes, RCW 36.70.547 and WSDOT Land Use Handbook	No	No	Yes	Yes
Federal Way	King	Does not meet requirements	2007	7/1/2003	Yes	No	No	No	No	Yes
Kenmore	King	Meets most requirements	Revised 4/2003	6/1/2003	Yes	Yes, no source referenced	No	No	Yes	Yes
Kent	King	Does not meet requirements	8/2004	1/12/2006	SeaTac – Yes Crest Airpark - No	No	No	No	No	Yes
Lake Forest Park	King	Does not meet requirements	12/2005	9/28/2006	No	No	No	No	No	Yes
Normandy Park	King	Does not meet requirements	2004	9/1/2007	Yes	No	No	No	No	No
Renton	King	Meets all requirements	11/2004	5/1/2002	Yes	No	Yes	No	Yes	Yes
SeaTac	King	Meets all requirements	Revised 12/2006	9/1/2007	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Seattle	King	Meets some requirements	12/2005	6/1/2002	Yes	No	No	No	Yes	Yes
Skykomish	King	Does not meet requirements	8/2004	2/24/2005	No	No	No	No	No	Yes
Tukwila	King	Meets some requirements	12/2005	7/1/2007	Yes	No	No	No	Yes	Yes
Bremerton	Kitsap	Meets some requirements	12/2004	7/28/2005	Yes	No	No	No	Yes	No
Eatonville	Pierce	Does not meet requirements	Revised 2/2007	6/29/2006	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Gig Harbor	Pierce	Does not meet requirements	3/2002	7/1/2002	No	No	No	No	No	No
Lakewood	Pierce	Meets most requirements	Unknown	5/5/2004	McChord AFB – Yes American Lake - No	No, but does support control of "type, density, and design of uses"	No	No	Yes	Yes
Steilacoom	Pierce	Not included in review	Revised 2008	4/28/2005	Yes	No	No	No	No	No
Tacoma	Pierce	Meets most requirements	Revised 2007	5/24/2007	Yes	No	No	No	No	Yes
University Place	Pierce	Does not meet requirements	12/2004	4/27/2006	Yes	No	No	No	No	Yes

Table 3-1 Regional Land Use Controls and Regulations (Page 2 of 4)

Relevant Jurisdiction	County	Assessment from 2004 PSRC plan review	Date Comp. Plan Adopted	Date Trans. Element Certified by PSRC	Identify airports within or near the jurisdiction's boundaries	Define land uses considered incompatible (if yes, what is the source of the definitions?)	Identify existing incompatible land use in the vicinity of the airport(s)	Identify planned incompatible land use in the vicinity of the airport(s)	Include policies to discourage the siting of incompatible land use	Contain a process to address the airport as an essential public facility
Arlington	Snohomish	Meets all requirements	2005	1/25/2007	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Darrington	Snohomish	Meets most requirements	2004	5/24/2007	Yes	Yes, no source referenced	No	No	Yes	Yes
Everett	Snohomish	Meets all requirements	Revised 2007	5/27/2004	Yes	Yes, no source referenced	No	No	Yes	Yes
Marysville	Snohomish	Meets most requirements	4/2005	9/1/2007	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Monroe	Snohomish	Meets some requirements	2005	1/1/2008	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Mukilteo	Snohomish	Meets some requirements	11/2007	12/15/2005	Yes	Yes, RC36.70.547	Yes	No	No	Yes
Snohomish	Snohomish	Meets most requirements	Revised 2007	3/22/2007	Yes	Yes, RCW 36.70.547	No	No	Yes	Yes
Sultan	Snohomish	Does not meet requirements	Revised 9/2008	10/1/1996	Yes, but not Sky Harbor	No	No	No	No	Yes
County Plans										
King	King	Does not meet requirements	Revised 2008	1/25/2007	Yes	No	No	No	Yes	Yes
Kitsap	Kitsap	Meets most requirements	12/2006	5/1/1999	Yes, but Bremerton National only	No	No	No	Yes	Yes
Pierce	Pierce	Meets all requirements	Unknown	2/1/2001	Yes	Yes, no source referenced	Yes	No	Yes	Yes
Snohomish	Snohomish	Meets some requirements	Revised 6/2008	2/1/2003	Yes	Yes, no source referenced	No	No	Yes	Yes

Table 3-1 Regional Land Use Controls and Regulations (Page 3 of 4)

Relevant Jurisdiction	County	Include development regulations to discourage incompatible land use	Have provisions or overlay zone to address height hazards based on FAR Part 77 (If yes, which surfaces are included?)	Contain maps or graphics showing FAR Part 77 surfaces	Include maps showing areas affected by airport noise (noise contours)	Include an overlay zone to address airport noise	Address airport safety zones (not an FAA requirement)
Auburn	King	Yes, but does not define incompatible uses	Yes, approach, transitional, horizontal, and conical	No	No	No	No
Burien	King	Yes	Yes, references SeaTac airport height maps but no detailed surfaces discussion	No	No	Yes	No
Covington	King	No	No	No	No	No	No
Des Moines	King	No, but comp plan has policy to regulate siting of incompatible uses	No	No	No	No	No
Federal Way	King	No	No	No	No	No	No
Kenmore	King	Somewhat, requires new residential titles in Aviation Facilities overlay zone to have statement recognizing airport	No, but comp plan has policy to ensure plans and regulations address height hazards	No	No	No, but comp plan has policy to ensure plans and regulations address noise issues	No
Kent	King	No	No	No	No	No	No
Lake Forest Park	King	No	No	No	No	No	No
Normandy Park	King	No	No	No	No	No	No
Renton	King	Yes	Yes, approach and transitional	Yes	Yes	Yes	Yes
SeaTac	King	No	No	No	Yes	No, but has noise insulation building code standards and comp plan recommendations for an overlay zone.	No
Seattle	King	No	Yes, but only addresses Boeing Field and not the seaplane bases. Areas based on state safety zones.	No	No	No, but has comp plan policy to pursue programs and strategies consistent with noise reduction.	Yes
Skykomish	King	No	No	No	No	No	No
Tukwila	King	No	Yes, approach, transitional, horizontal, and conical	Codified Airport Height Map (at City Hall)	No	No, comp plan puts onus on airport to reduce noise.	No
Bremerton	Kitsap	No	No	No	No	No	No

Table 3-1 Regional Land Use Controls and Regulations (Page 4 of 4)

Relevant Jurisdiction	County	Include development regulations to discourage incompatible land use	Have provisions or overlay zone to address height hazards based on FAR Part 77 (If yes, which surfaces are included?)	Contain maps or graphics showing FAR Part 77 surfaces	Include maps showing areas affected by airport noise (noise contours)	Include an overlay zone to address airport noise	Address airport safety zones (not an FAA requirement)
Eatonville	Pierce	No, but 2007 comp plan amendments indicate town is in process of revising development regulations to identify incompatible uses.	Yes, but current restrictions are not Part 77 based. Comp plan policy exists to adopt Part 77 surface regulations.	No	No	No	No
Gig Harbor	Pierce	No	No	No	No	No	No
Lakewood	Pierce	Yes	No	No	No	No, but has comp plan identifies McChord AFB contours and establishes corresponding mitigation regulations	No
Steilacoom	Pierce	No	No	No	No	No	No
Tacoma	Pierce	No	No	No	No	No	No
University Place	Pierce	No	No	No	No	No	No
Arlington	Snohomish	Yes	No, but comp plan recommends prohibition of any construction penetrating Part 77 surfaces	No	No	No zone, but prohibition of noise-sensitive land uses within 65 DNL area recommended by comp plan	No
Darrington	Snohomish	Yes	No	No	No	No	No
Everett	Snohomish	No	No zone, but comp plan policy requires proof of airspace analysis for permits within 20,000 feet of runways	No	No	No	No
Marysville	Snohomish	No	No	No	No	No	Yes
Monroe	Snohomish	Yes	Yes, primary, approach, transitional, horizontal, conical	Yes	No	No	Yes
Mukilteo	Snohomish	No	No	No	Yes	No, but has policy to evaluate how new proposals are affected by airport noise	No
Snohomish	Snohomish	No	No, but has policy to safeguard runway approaches according to FAA guidelines	No	No	No	No
Sultan	Snohomish	No	No	No	No	No	No
County Plans							
King	King	No	No	No	No	No	No
Kitsap	Kitsap	No	No, but comp plan has policy to limit heights in approach and departure paths	No	No	No	No
Pierce	Pierce	Yes	Yes, approach and transitional	No	No	Yes	Yes
Snohomish	Snohomish	No	No, but has "landing field area" zoning designation with height restrictions	No	No	No	Yes

3.2 Current Land Use Patterns

In order to better devise a plan for communities and airports to work together to minimize incompatible land uses near airports within the Puget Sound region, an analysis of current and future land uses has been performed. Due to the differences in land use definitions among municipalities, generalizations have been made to keep analysis consistent from airport to airport. Land uses are grouped into categories that generally describe the type of development occurring within them, and also the degree of sensitivity the land uses will have on airports and aircraft operations. These uses were assigned an intensity rating to better convey the scale of development relative to the existing development of the area. See Appendix D for the land use analysis maps and suggested actions to enhance compatibility between airports and surrounding communities. The suggestions contained in Appendix D are provided only for guidance purposes, and will not be formally applied in PSRC's future policy and plan review process.

Data used to create these findings has come from a variety of sources. Primarily, city and county land use and zoning maps were used to verify the type of land use. This data was combined with the FAR Part 77 surfaces for each airport. In addition, satellite imagery augmented the analysis by providing insight into the intensity of the development and the available space for development to expand.

Six land use categories were used to organize the findings. A seventh category, labeled "other," was used when a prevalent land use was found near only one airport. In the summary spreadsheet, the categories are further represented with a single letter. Residential and public land uses are among the most sensitive to airport development. "R" signifies the residential land use category. This can be single-family housing, apartments and condominiums, mobile homes, or other similar land uses. "P" is used to represent public land uses. This label is generally used for parks, schools, churches, and other areas where people assemble.

<p>R: Residential P: Public C: Commercial I: Industrial T: Transportation A: Agricultural O: Other</p>

While not as sensitive to airport operations as residential and public land uses, commercial and industrial developments generally contain a large number of people during working hours. "C" signifies the commercial land use category. These uses might be office towers, business parks, shopping centers, gas stations, or other places where people conduct business. "I" land uses are industrial, such as warehouses and manufacturing plants, which primarily are places where people work to create or store goods. Proximity of these land uses to runway ends has the same safety concerns as residential and public development. In addition, the potential height of certain development in these two categories can pose a hazard to aerial navigation.

Transportation and agricultural land uses are the least sensitive to airport development. "T" is an overarching category for transportation-related land uses. These include freeways and highways, rail yards, sea ports, and parking lots. In general, if the primary function of the land use is to enable the movement of goods or people from one point to another, it is labeled "T." The final land use category is "A," which stands for agriculture and resource extraction. Land within this category is undeveloped, used for farming, or used for mining and timber operations.

3.3 Future Land Use Plans

Table 3-2 (see next page) displays the results of the Future Land Use Inventory. Future land use was analyzed using a composite of general comprehensive plan maps, current zoning maps, and satellite imagery. Each of these elements served a different purpose, and the combination of all three generated strong indications of what land near airports had the potential to be developed.

Satellite photos were used to identify tracts of open or underutilized land. Current zoning maps give indication of what type of land use and building density is allowed, and the comprehensive plan maps give clues as to how the agency envisions development in the future. The analysis identified certain development “hotspots,” or areas of land where development is likely and could potentially become incompatible with airport operations in the future.

The types of issues regarding development varied from airport to airport. Airports in metropolitan areas were generally surrounded by developed land. A primary concern for these airports is whether the general plan indicates a change in the type of land use beneath an airport surface. For example, this could include land use changing from a compatible use, such as a warehousing district, to something less compatible, such as an area of public assembly. Even if the land use remains the same, new zoning and density allowances could potentially impact airport operations. A commercial district beneath an approach area may not create problems for airport operations, but problems could arise if the city were to grant developers the right to build taller buildings and/or developments with a higher population density. Airports in more rural areas are faced with the challenges of retaining critical areas from advancing development. In many cases, areas that were once farmland have been bought and converted into subdivisions. In these instances, suburban residents are generally more sensitive to airport noise and operations than agricultural operations.

Regardless of the setting of the airport, the primary goal of the future land use analysis is to identify where potential development or intensification may occur and enable airports and other stakeholders to plan for compatible uses that will benefit all parties involved. If airports and municipalities can develop a plan for maintaining airport facilities and operations before development begins, this outcome is preferable to addressing compatibility issues after development occurs.

Table 3-2 Future Land Use Inventory (page 1 of 2)

King County Airports	Local Jurisdiction	Development*	Impacted Surface**
Auburn Municipal	City of Auburn	C/I	Horizontal
	City of Kent	None	N/A
	King County	None	N/A
Bandera State	King County	None	N/A
Boeing Field	City of Burien	None	N/A
	King County	P	SW/SE Conical
	City of Mercer Island	None	N/A
	City of SeaTac	None	N/A
	City of Seattle	None	N/A
	City of Tukwila	None	N/A
Crest Airpark	City of Covington	None	N/A
	City of Kent	None	N/A
	King County	None	N/A
Lake Union (Seattle Seaplanes & Kenmore)	City of Seattle	C/R	S/N Approach
Renton Municipal	King County	None	N/A
	City of Mercer Island	None	N/A
	City of Newcastle	None	N/A
	City of Renton	C	S Approach
	City of Seattle	None	N/A
	City of Tukwila	C	SW Horizontal
Seattle-Tacoma International	City of Burien	R	W Horizontal
	City of Des Moines	C/R	S Approach & Conical
	City of Federal Way	None	N/A
	City of Kent	C	SE Horizontal & Conical
	King County	R	SE Approach
	City of Normandy Park	None	N/A
	City of SeaTac	None	N/A
	City of Seattle	C	N Approach
Skykomish	King County	R	W & E Approach, Conical, Horizontal
	Town of Skykomish	R	W Approach, Conical, Horizontal
Vashon Island	King County	C/R	All Surfaces
Will Rogers/Wiley Post	King County	R	SW Conical, SW Horizontal
Memorial Seaplane Base	City of Mercer Island	R	N Approach, N Conical
	City of Newcastle	R	SE Horizontal
	City of Renton	R	S Conical
	City of Seattle	None	N/A
Kitsap County Airports	Local Jurisdiction	Development*	Impacted Surface**
Apex Airpark	Kitsap County	R	All Surfaces
Bremerton National	Town of Allyn	None	N/A
	City of Belfair	R	S Approach, Conical, Horizontal
	City of Bremerton	Annexation/UGA	All Surfaces
	Kitsap County	A/I	NW Horizontal
	Mason County	R	SW Approach
Port Orchard	Kitsap County	A	Horizontal/ Transitional

Table 3-2 Future Land Use Inventory (page 2 of 2)

Pierce County Airports	Local Jurisdiction	Development*	Impacted Surface**
American Lake Seaplane Landing Strip	City of Lakewood	None	N/A
Gray Army Air Field	City of DuPont	R	NW Conical
	Ft. Lewis Army Base		
	McChord Air Force Base	None	N/A
McChord Air Force Base	Town of Steilacoom	R	N Approach
	City of Lakewood	C/I/R	N Approach/NW Conical & Horizontal
	City of Tacoma	CIR	N Approach, NW Conical
	Pierce County	C/R	E Horizontal & Conical
Ranger Creek State	Pierce County	None	N/A
Spanaway	Ft. Lewis Army Base	None	N/A
	McChord Air Force Base		
	Pierce County/Spanaway	I/C/R	E & SE Conical & Horizontal
Swanson Field	Town of Eatonville	R	W Horizontal
	Pierce County	R	S Approach, E Horizontal
Tacoma Narrows	City of Gig Harbor	None	N/A
	Pierce County	R	W & SW Conical & Horizontal
	City of Tacoma	None	N/A
	City of University Place	None	N/A
Thun Field	Pierce County	C/I/R	E Horizontal
Snohomish County Airports	Local Jurisdiction	Development*	Impacted Surface**
Arlington Municipal	City of Arlington	I/R	NW & South Approach, Horizontal
	City of Marysville	I	S Approach, Conical, Horizontal
	Snohomish County	Annexation/R	All Surfaces
Darrington Municipal	City of Darrington	NO DATA	NO DATA
	Snohomish County	R	W Conical & Horizontal
Firstair Field	City of Monroe	R	E Conical & Horizontal
	Snohomish County	R	Horizontal
Harvey Field	City of Snohomish	R	NW Approach
	Snohomish County	I	Horizontal & Transitional
Sky Harbor	City of Sultan	R	S Approach & Horizontal
	Snohomish County	R	N & W Conical
Snohomish County	City of Everett	None	N/A
Paine Field	City of Mukilteo	R	S Approach
	Snohomish County	None	N/A

***Type of Development**

A = Agriculture/Resource Extraction
 C = Commercial
 R = Residential
 P = Public
 I = Industrial
 UGA = Urban Growth Area

****Direction of Impacted Surface**

N = North
 S = South
 E = East
 W = West
 NE = Northeast
 NW = Northwest
 SE = Southeast
 SW = Southwest

Development types shown in Table 3-2 include both compatible and incompatible land uses. The level of compatibility is dependent on land use type, density, height, and location relative to the airport influence area, extended runway centerline, and FAR Part 77 surfaces. For this reason the information presented here does not portray whether these future land uses are compatible with the related airport.

4.0 Local Comprehensive Plan Submittal Process

4.1 Background – Why does PSRC require this information?

As local communities develop comprehensive plans and local airports develop airport master plans with airport layout plans, a collaborative approach should be taken to integrate these documents. As noted in the case studies discussed in Chapter 3, where there has been a conscious effort to include both entities in the planning process, there has been greater success in the preservation of the safety of both residents and aircraft. While these examples still have compatibility issues, a demonstrated effort is being made to achieve greater compatibility where feasible. Coordination of counties, cities, and towns with airport owners, managers, operators, pilots, ports, and aviation divisions is required by RCW 36.70.547. In addition, WAC 365-196-455 (Washington Administrative Code) contains procedural criteria for adopting comprehensive plans and development regulations, and requirements and recommendations for airport compatible land use around airports. For more information, see section 4.4 below.

One of the goals of this document is to offer resources to assist local communities and airports with the coordination of these planning efforts. As provided in state law, PSRC has the authority to review and certify local comprehensive plans and countywide planning policies by the state of Washington. PSRC aims to provide a systematic and proactive process to assist communities and airports with planning issues. Plans are reviewed in accordance with GMA, *VISION 2040*, and *Transportation 2040*. PSRC's Plan Review Checklist addresses the transportation system; however, it notes only briefly the existence of airports. In an effort to be more responsive and to reflect Long Term Air Transportation Study (LATS) findings, PSRC has developed information for use by airports and local planning agencies as they prepare airport master plans, local comprehensive plans, plan amendments, development regulations, zoning ordinances, and other provisions to address airport compatible land use.

PSRC staff use two levels of guidelines for their GMA-mandated policy and plan review process. The guidelines include Level A and Level B, which are described in the following paragraphs and outlined in more detail in section 4.3 below.

Level A information is **required** in all agency comprehensive plans for those jurisdictions having public use general aviation airports within or adjacent to their boundaries. This information is used in PSRC's review of agency comprehensive plans. These guidelines offer flexibility and do not proscribe the exact nature or details of the required information. Local planning agencies may decide how to meet these guidelines, using information from the WSDOT Aviation Division's *Airports and Compatible Land Use Guidebook*, the Transportation Research Board's Airport Cooperative Research Program's Report 27: *Enhancing Airport Land Use Compatibility* (2010), California Department of Transportation Division of Aeronautics' *Airport Land Use Planning Handbook* (2003), or other appropriate sources.

Supporting guidance information is available from the following websites:

- **PSRC Air Transportation Planning**
www.psrc.org/transportation/airtrans/
- **PSRC Plan Review**
www.psrc.org/growth/planreview
- **WSDOT Aviation Division**
www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm
- **Transportation Research Board**
http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_027v1.pdf
- **CalTrans Aeronautics**
www.dot.ca.gov/hq/planning/aeronaut/landuse.html
- **Federal Aviation Administration**
www.faa.gov/airports/environmental/land_use/

Level B information is **recommended** but not required. Agencies are encouraged to include this information to address airport compatible land use issues. Much of the information included in these guidelines is readily available from existing sources, including the local planning agency, airport sponsor (which in many cases is part of the municipality), WSDOT Aviation Division, and PSRC. Local planning agencies are encouraged to review these guidelines early during their planning process and to contact PSRC staff as needed. The contact information for PSRC staff is as follows:

PSRC Staff Contacts

- **Airport-related technical information:**
Stephen Kiehl: 206-971-3290 or skiehl@psrc.org
- **Plan review and certification**
Rocky Piro: 206-464-6360 or rpiro@psrc.org

4.2 Plan Review and Certification

The Growth Management Act includes provisions for regional review and certification of local comprehensive plans. By regional policy, local agency comprehensive plans must be certified before those agencies can apply for and receive federal or state transportation funding through the Regional Transportation Improvement Plan (RTIP). On a broader level, local comprehensive plans are keys to the successful implementation of VISION 2040, which serves as the region's long-range comprehensive growth, transportation, economic development, and environmental strategy. VISION 2040 outlines the region's vision for accommodating growth over the next 30 years. The Regional Growth Strategy and multicounty planning policies in VISION 2040 reflect broad direction agreed to by member jurisdictions and agencies that, in general, will be implemented through local agency comprehensive plans. PSRC has developed and refined a *Plan Review Manual* which provides a comprehensive set of guidelines and procedures to assist local planning agencies as they prepare and adopt their comprehensive plans and development regulations. This regional guidance and plan review process help ensure local planning agencies are meeting state and local planning requirements, and that adopted plans are consistent with regional policies contained in VISION 2040. PSRC's Plan Review and Certification process was approved by the PSRC Executive Board in September 2003 and is described in VISION 2040. The following excerpt from the *Plan Review Manual* summarizes what is taken into account for certification:

Certification is based on three things: (1) addressing what state law refers to as regional guidelines and principles – which in the central Puget Sound region are the 174 multicounty planning policies in VISION 2040 (see Appendix C), (2) conformity with the Growth Management Act requirements for transportation planning (see Appendix D and Appendix E-3), and (3) consistency with the regional transportation plan - Transportation 2040 (see Appendix E-2) (Chapter 47.80.023, Revised Code of Washington). The Regional Council's Executive Board formally certifies the transportation-related provisions based on recommendations from the Council's two policy boards.

PSRC's *Plan Review Manual* outlines a step-by-step process to guide local agencies through the plan preparation, submittal, review, and certification process (see www.psrc.org/growth/planreview/). Following is an outline of the key elements of the plan review process with related web links:

- Overall Plan Review Process – www.psrc.org/growth/planreview
- How the Plan Review Process Works - www.psrc.org/growth/planreview/how-prp-works
- Planning Requirements and Guidance - www.psrc.org/growth/planreview/pr-manual/
- Plan Submittal - www.psrc.org/growth/planreview/reporting-tools/

4.3 Comprehensive Plan Submittal Process

The following information provides direction and assistance to local agencies as they prepare comprehensive plans, plan updates, and plan amendments. Much of the information listed is available from existing sources, and website addresses for this information are provided where appropriate. PSRC's intent is to help local agencies find and use this information as easily as possible.

Addressing Airport Compatible Land Use in Local Plans

The Level A information listed below is required for comprehensive plans, and should be taken into account when developing a plan update or amendment. Level B information is discretionary, and jurisdictions may want to consider including this information in their plans. This airport compatible land use planning information will be considered along with other information (such as centers plans, transit plans, conformity with GMA requirements, consistency with VISION 2040 and Transportation 2040, and consistency with countywide planning policies), all of which are reviewed as part of PSRC's Policy and Plan Review process. The latest PSRC Plan Review materials, including the 2009 *Plan Review Manual*, can be found on PSRC's website at www.psrc.org/growth/planreview/pr-manual/.

4.3.a Level A - Required Information

The following information must be taken into consideration in addressing airport compatible land use. However, not all items listed below need to be included within the agency's comprehensive plan. It may be more appropriate to include some information in a zoning ordinance (and related maps), development regulations, sub-area plan, references to environmental documents, or other supporting documentation. If this is done, the plan should make reference to the other documents. Local agencies are asked to submit the following to PSRC as part of the comprehensive plan review process.

1. Satisfy legal requirements

Include a brief discussion of how the agency satisfies RCW 36.70.547 and RCW 36.70A.510 requirements for addressing airport compatible land use. This section could list all relevant plan provisions and where they are located within the plan (as well as those provisions located within other documents, such as the zoning ordinance, development regulations, sub-area plan, etc.).

2. Address major issues

Include a brief statement of key airport compatible land use issues and where in the document they are addressed. Discuss how the plan is addressing key issues, such as lowering residential density in some areas, requiring noise insulation in high noise areas, limiting height of structures according to FAR Part 77 guidance, address land uses which attract birds and wildlife, etc. If applicable, discuss how the plan deals differently with existing developed areas versus areas with little or no development.

3. Goals and policies

Include goals and policies to discourage incompatible land uses adjacent to airports. In addition, include or make reference to relevant countywide planning policies, if they exist. Sample goals and policies can be found in the WSDOT Aviation Division's *Airports and Compatible Land Use Guidebook* at: www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm.

4. Identify the airport

Include a map showing public use airport(s) within and adjacent to the jurisdiction. This map can be located within the land use, transportation, public facilities, or other appropriate element of the plan document. If possible, include a more detailed map of the airport location and boundaries (this can be obtained from the airport master plan and/or airport layout plan).

5. Define compatible and incompatible

Define land uses considered by the local jurisdiction to be compatible and incompatible with the airport. These definitions should make reference to land use compatibility relative to airport noise, height hazards, safety, or other issues, and could refer to the airport influence area (see item 7 below). Information about the types of uses generally considered to be compatible and incompatible with airports can be found in the WSDOT Aviation Division's *Airports and Compatible Land Use Guidebook* at: www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm.

6. Define adjacent

Include a definition of "adjacent" as related to proximity to airports. RCW 36.70.547 requires towns, cities, and counties to discourage the siting of incompatible land uses "adjacent" to general aviation airports, but the law does not define what is meant by adjacent. Defining adjacent is an important step in the compatible land use planning process. One option is to map the airport influence area and define adjacent as this area (see information immediately below).

7. Identify the airport influence area

Prepare a map showing the airport influence area and supporting text describing how it was derived. The airport influence area is the geographic area where incompatible land uses are discouraged. It also shows where compatible land uses are encouraged and should be the focus of compatible land use planning. The plan should also discuss which compatibility issues were included in defining the airport influence area (noise, height hazard, safety, etc.). See section 2.3 above and Section 4.9, Step 3, below for more information. In defining the airport influence area, agencies are encouraged to work closely with airport sponsors and draw from the WSDOT Aviation Division's *Airports and Compatible Land Use Guidebook* at: www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm

8. Identify FAR Part 77 requirements

Include a map of FAR Part 77 surfaces and reference FAR Part 77 height standards in zoning ordinances (geography and heights). Federal Aviation Regulation (FAR) Part 77 establishes standards and notification requirements for objects affecting navigable airspace. The FAR Part 77 standards and review process are important elements in maintaining safety around airports.

FAR Part 77 maps for each airport in the PSRC region are included in this report (see Appendix B) and the PSRC website at www.psrc.org/transportation/airtrans/compatible/. Agencies may address FAR Part 77 mapping and other requirements by doing one or more of the following:

- Referencing FAR Part 77 in the zoning code (burden on property owners/developers)
- Adopting a height hazard overlay zone based on FAR Part 77 (burden on agency)
- Incorporating FAA's airspace obstruction and air navigation hazard review process (Form 7460-1: *Notice of Proposed Construction or Alteration*) into the plan, zoning code, and/or development regulations (transfers burden to FAA)

Additional guidance to assist local agencies in planning for an airport's FAR Part 77 surfaces can be found in a new Transportation Research Board (TRB) *Report 38 Understanding Airspace, Objects, and Their Effects on Airports*. This report is available on the TRB website here: http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_038.pdf.

9. Evaluating potential obstructions

Include references to the FAA Form 7460-1 review process. Structures or objects which could potentially be hazards to navigation around airports must be reviewed by the FAA. The FAA's review process is triggered by applicants filing an FAA Form 7460-1 *Notice of Proposed Construction or Alteration*.

For access to the form see:

- Copy of form at http://www.faa.gov/documentLibrary/media/form/faa7460_1.pdf
- Online form at <https://oeaaa.faa.gov/oeaaa/external/portal.jsp>

Upon completing its airspace review based on the information supplied on Form 7460-1, the FAA may determine marking and/or lighting are necessary for aviation safety (see next item below).

10. Obstruction marking and lighting

Reference to the FAA's obstruction marking and lighting standards. FAA [Advisory Circular 70/7460-1K](#), *Obstruction Marking and Lighting*, describes the standards for marking and lighting structures such as buildings, chimneys, antenna towers, cooling towers, storage tanks, supporting structures of overhead wires, etc. After an FAA Form 7460-1 review, if the FAA finds a building, tower, etc., is a hazard to airspace near an airport, the property owner should be informed of the requirements for marking and lighting the building, tower, or other object. The plan should include some reference to the FAA's obstruction marking and lighting standards, which can be found on the FAA's website at:

http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/b993dcdcf37fcdc486257251005c4e21

11. Informing the public

Include information which informs property owners and developers of the requirement to comply with the FAA's Form 7460 review process. The responsibility for compliance with the 7460 review process lies with property owners, developers, and the FAA.

12. Existing and future land use

Include a map or maps showing existing and planned future land use adjacent to the airport (preferably within the airport influence area). This is an essential building block for the airport compatible land use planning process. This information should be of sufficient detail so these existing and future land uses can be assessed as to whether they're compatible with the airport. Key elements of this assessment are land use types and location within the airport influence area.

13. Basic information about the airport

Include information about the airport, such as owner/sponsor, airport classification* and role (commercial, regional, community, etc.), airport size and location, airport facilities (runways and taxiways, landing aids, hangars, aircraft tie-downs, terminal, parking, fuel, aviation-related businesses, etc.), types of users served at the airport (passengers, air cargo, corporate and business aviation, general aviation, training, agricultural spraying, military, charter flights, etc.), level of activity (number and type of based aircraft, annual take-offs and landings, annual passengers, amount of air cargo, etc.), possible changing role, enhanced technology for improved approaches, etc. This requirement is based on the Growth Management Act (RCW 36.70A.070 - Comprehensive plans - Mandatory elements), which requires an inventory of air, water, and ground transportation facilities and services, including transit alignments and general aviation airport facilities.

Also, discuss any major changes at or around the airport (historical or future planned) that give rise to the need for improved planning for airport land use compatibility. This airport-related information can be obtained from the airport sponsor, WSDOT Aviation Division (see state airport information system at www.wsdot.wa.gov/aviation/AirportInformationSystem.htm), and PSRC. Also, if possible, include brief information on how long the airport has existed (this will give a sense of the relationship between the airport and the community as both have developed over time).

14. Airports as essential public facilities

A discussion of airports as Essential Public Facilities as required by the Growth Management Act (Chapter 36.70A.200 RCW – Siting of Essential Public Facilities). The agency should outline its process for siting airports or expanding airports as mandated by GMA and supported by existing case law.

* Airport roles and classification information can be found in planning materials and guidance documents prepared by the Federal Aviation Administration (FAA) and the Washington State Department of Transportation (WSDOT) Aviation Division. For statewide airport classification see the Long-Term Air Transportation Study (LATS) at www.wsdot.wa.gov/aviation/lats/default.htm. For FAA airport classification see the National Plan of Integrated Airport Systems at www.faa.gov/airports/planning_capacity/npis/.

4.3.b Level B - Discretionary Information

Jurisdictions are encouraged to also consider the following information. Inclusion of the information listed below in comprehensive plans, zoning ordinances, and/or development regulations would strengthen local airport compatible land use programs.

1. Airport overlay zoning ordinance and associated map.
2. Airport height hazard zoning ordinance and associated map. This would typically be derived from FAA's FAR Part 77 standards.
3. Airport subarea plan. This may contain a more technical and comprehensive plan for the airport influence area than the main comprehensive plan document. The level of detail contained in airport subarea plans is at the discretion of the local planning agency. If the agency decides to include an airport subarea plan, the plan should include a brief report (similar to the one prepared for the jurisdiction-wide comprehensive plan) that outlines how the plan satisfies Growth Management Act requirements for subarea plans.
4. Reference within the plan to PSRC's Multicounty Planning Policies (MPPs) and how the agency's plan is consistent with regional policy. MPP-DP-51 states: *Protect the continued operation of general aviation airports from encroachment by incompatible uses and development on adjacent land.*
5. Cross-references within the plan elements (transportation, land use, essential public facilities, public facilities, economic development, etc.) relative to airports and compatible land use.
6. Include reference to applicable state and federal statutes and requirements, such as:
 - **RCW 36.70.547** - *General Aviation Airports* (Planning Enabling Act)
 - **RCW 36.70A.510** - *General Aviation Airports* (Growth Management Act)
 - **RCW 14.12** - *Airport Zoning*
 - **RCW 36.70A.200** - *Siting of Essential Public Facilities* (Growth Management Act)
 - **Chapter 365-196-455 WAC** - *Land use compatibility adjacent to general aviation airports*
 - **Chapter 365-196-550 WAC** - *Essential Public Facilities*
 - **Title 14 CFR** - Federal Aviation Regulations (FAR) Part 77 - *Objects Affecting Navigable Airspace*
 - **FAA Form 7460-1** - *Notice of Proposed Construction or Alteration*
 - **FAA Advisory Circular AC 70/7460-1k** - *Obstruction Marking and Lighting*
7. Statement about the airport's role in the community (its importance to the economy, transportation role, access to the nation's air transportation system, emergency response, etc.).

8. Specific airport compatible land use guidelines and criteria for various areas within the airport influence area (this could include the six airport safety areas, noise contours, areas under the FAR Part 77 surfaces, or other geographies). This could include reference to the WSDOT Guidebook, CalTrans guidelines, ACRP Report 27, or other sources.
9. Residential density and land use intensity standards for areas within the airport influence area (these can be derived from WSDOT and FAA). Similar data from other sources, such as California, Oregon, Michigan, and other states, can provide general land use and intensity guidance, but might not be applicable in Washington. Discuss how these standards will help to improve land use compatibility. Make reference to WSDOT or other accepted standards, as appropriate.
10. Airport noise contour maps as appropriate, which should be provided by the airport sponsor. These maps should be developed according to FAA-accepted methodology (FAA's current Integrated Noise Model – INM) and best technical practice (noise contour analysis is needed only if the existing and/or forecast future noise contours extend off airport property, and then only if the contour could affect existing or future noise-sensitive land uses). If existing or forecast airport noise contours are known not to extend off airport property, include a statement to this effect.
11. Detailed information for use by property owners and developers: translation of FAR Part 77 surfaces into specific height limits for existing parcels of land. This information should be provided by the airport sponsor, WSDOT Aviation Division, PSRC, or FAA. To be useful over the long term, this information would need to be updated using building permit information, periodic aeronautical surveys, information from FAA Form 7460 reviews, and other resources.
12. Additional information about the jurisdiction's understanding of risk relative to the agency's land use planning and development responsibility. This information would likely focus on height hazard planning related to FAR Part 77 standards and planning for land use and development within airport safety zones.
13. Include reference to FAA grant assurances 20 (Hazard removal and mitigation) and 21 (Compatible Land Use). These are legal assurances made by airport sponsors as a condition of accepting federal funds for airport improvements. Implementing FAA Grant Assurances, while a formal obligation of the airport sponsor, usually require the participation of local land use agencies. Following is the specific language for grant assurances 20 and 21:

FAA Grant Assurance 20 - Hazard Removal and Mitigation

It [the airport sponsor] will take appropriate action to assure that such terminal airspace as is required to protect instrument and visual operations to the airport (including established minimum flight altitudes) will be adequately cleared and protected by removing, lowering, relocating, marking, or lighting or otherwise mitigating existing airport hazards and by preventing the establishment or creation of future airport hazards.

FAA Grant Assurance 21 - Compatible Land Use

It [the airport sponsor] will take appropriate action, to the extent reasonable, including the adoption of zoning laws, to restrict the use of land adjacent to or in the immediate vicinity of the airport to activities and purposes compatible with normal airport operations, including landing and takeoff of aircraft. In addition, if the project is for noise compatibility program implementation, it will not cause or permit any change in land use, within its jurisdiction, that will reduce its compatibility, with respect to the airport, of the noise compatibility program measures upon which Federal funds have been expended.

14. Include a description of the agency's consultation with airport owners and managers, private airport operators, general aviation pilots, ports, and the aviation division of the department of transportation, as required by Chapter 36.70.547 RCW. In addition, the plan should document that the agency sent their plan to WSDOT for review at least 60 days before plan adoption. For more information on consultation, see the WSDOT guidance materials at www.wsdot.wa.gov/NR/rdonlyres/F5915126-E11C-4FEA-8EC9-97BCF4A8F895/0/AppendixA.pdf.
15. Ground access: identify major routes serving the airport and issues which need to be addressed by the airport sponsor, the local agency, or both (congestion, emergency access, planned improvements, etc.).
16. Include a statement about how the airport master plan has been considered as part of the agency's comprehensive plan – existing airport facilities and activity, future demand forecasts, future airport improvements, airport impacts on surrounding areas, and how this may change over time. Also, the agency should indicate whether the airport master plan has been shared with adjoining jurisdictions. PSRC does not review or certify airport master plans, and cannot require airport sponsors to submit them to PSRC for review. However, PSRC encourages airport sponsors to take a long-range approach to their airport master plans (20 years if possible) and work with local jurisdictions to provide the basis for sound compatible land use planning for airports and surrounding communities.
17. The comprehensive plan, zoning ordinance, and/or development regulations should outline a planning and design review process which is triggered by land use, development, and/or construction proposals within the airport influence area. This process should make reference to the FAR Part 77 surfaces and should provide for the FAA Form 7460 review process.
18. Describe what the airport and the local agency are doing to raise the public's awareness of the airport(s) and to inform them about the importance of planning for airport compatible land use.

4.4 Washington Administrative Code (WAC)

Chapter 365-196 Washington Administrative Code (WAC) contains procedural criteria for adopting comprehensive plans and development regulations. Chapter 365-196 WAC was prepared to help local agencies implement their responsibilities under the Growth Management Act. Chapter 365-196-455 WAC - *Land use compatibility adjacent to general aviation airports* outlines administrative procedures to assist local agencies respond to the airport compatible land use planning requirements contained in the Growth Management Act and the Planning Enabling Act. Following is the complete text of this WAC chapter. It is provided here for the convenience of local planning agencies.

365-196-455 – Land use compatibility adjacent to general aviation airports

(1) Requirements:

(a) Counties and cities in which there is located a general aviation airport operated for the benefit of the general public must, through their comprehensive plans and development regulations, discourage the siting of incompatible uses adjacent to such an airport.

(b) Comprehensive plans or development regulations that affect lands adjacent to a general aviation airport may only be adopted or amended after formal consultation with the following: Airport owners and managers, private airport operators, general aviation pilots, ports, and the aviation division of the Washington State Department of Transportation.

(c) All proposed and adopted plans and regulations must be filed with the aviation division of the Washington State Department of Transportation within a reasonable time after release for public consideration and comment, but at least sixty days before adoption. See WAC [365-196-630](#) regarding notice to state agencies.

(d) General aviation airports are essential public facilities. Counties and cities must also ensure that proposed changes to comprehensive plans and development regulations are consistent with policies governing siting essential public facilities adopted under RCW [36.70A.200](#). See WAC [365-196-550](#) regarding essential public facilities.

(2) Recommendations for requirements:

(a) Counties and cities should invite formal consultation for any proposed change to the comprehensive plan or development regulations that may affect airport operations. This should include: Any comprehensive plan or development regulation proposal that may affect land uses within the airport traffic pattern and approach in ways that may be incompatible with airport operations; and any proposal that may create an airspace hazard or obstruction.

(b) Counties and cities should coordinate closely with the aviation division of the Washington State Department of Transportation, and consider technical assistance materials, including airport master plans, airport layout plans, and other resources made available by the aviation division. Counties and cities are encouraged to contact the aviation division of the Washington State Department of

Transportation early in the process of drafting development regulations and comprehensive plan policies that implement RCW [36.70.547](#).

(c) Counties and cities may, in coordination with the airport owner, conduct an evaluation of compatible and incompatible land uses adjacent to the airport. In most instances an evaluation would include a radius of at least one mile around the airport and the approach. This evaluation and related planning processes may address the following:

- (i) Incompatibly issues of residential encroachment;
- (ii) High intensity uses such as K-12 schools, hospitals and major sporting events;
- (iii) Airspace and height hazard obstructions;
- (iv) Noise and safety issues; and
- (v) Other issues unique to each airport, such as topography and geographic features.

[Statutory Authority: RCW [36.70A.050](#) & [36.70A.190](#). 10-03-085, § 365-196-455, filed 1/19/10, effective 2/19/10.]

4.5 Suggested Actions to Address Airport Compatible Land Use Issues

Local agencies have the authority to plan for and issue permits for development around airports. They also have limited authority to impose conditions on building approvals. Local governments may use capital improvement programs and facility investment strategies as a vehicle to encourage compatible land use patterns around airports. The following are suggested actions which could be taken by local planning agencies to address existing incompatible uses and prevent the introduction of future incompatible land uses.

4.5.a Addressing Noise Compatibility

- Noise compatibility program actions could be tailored to meet localized needs.
- In fully developed areas, promote noise insulation programs, aviation easements, and/or acquisition/insulation/resale with easements.
- In transitional areas: encourage redevelopment to compatible uses (this could include acquisition and redevelopment programs; however, funding for such programs is limited).
- In undeveloped areas, establish land use plans and zoning to avoid the development of incompatible uses (this could include acquisition and redevelopment programs).
- Incorporate airport influence area into city zoning code/maps.
- Provide guidelines/standards/requirements in building and development codes regarding noise insulation for incompatible uses inside noise contours. Match insulation needs with noise levels (achieve specified indoor levels, e.g., 45 dBA). If your airport qualifies for the FAA's FAR Part 150 Noise program, work with the airport sponsor and FAA to provide residents with information about

noise insulation, aviation easements, purchase programs, and other noise abatement measures available to reduce the impacts of airport noise.

- Make noise exposure information available to developers, real estate agents, and general public.
- Update comprehensive plan and zoning maps to provide for compatible land uses within airport noise contours. Coordinate with airport sponsor, FAA, PSRC, and the WSDOT Aviation Division in planning for areas affected by airport noise.
- Consider property acquisition and redevelopment programs to implement land use plans.

4.5.b Addressing Height Hazard, Obstructions, and Air Navigation Safety

- Incorporate the airport's Part 77 height limitations into city zoning code/maps or establish "airport zoning" as provided under RCW 14.12. Provide for appropriate technical review of building permits and applications for "structures" covered under the FAR Part 77 regulations.
- Create a review and approval process for communication towers (cellular phone, radio, TV, digital TV, etc.) to incorporate the airport's Part 77 surfaces, runway protection zones (RPZs), and runway approaches. Include reference to the FAA's 7460 process for review of potential airspace obstructions.
- Coordinate with airport sponsors and FAA in reviewing permits for uses or structures which could affect the airport's Part 77 surfaces or impact the safety of aircraft during take-off or landing.
- Monitor land use, ownership, demographic, market, and neighborhood character trends within airport noise contours and air navigation zones. *[Air navigation zones include runway protection zones (RPZs), approach transitional zones, and land within the airport's FAR Part 77 areas.]*
- Incorporate height hazard and air navigation safety review criteria into city review and approval process for development proposals and building permits. Develop a list of potential uses which would trigger reviews. Bring appropriate staff from WSDOT Aviation Division, airport sponsor, FAA, or aviation consultants into the review process to insure adequate coordination and input. Consider the following in developing review criteria:
 - Limits on land uses (such as wetlands and sanitary landfills) that could attract birds.
 - Limits on the use of lighting that could affect aircraft during landing and takeoff.
 - Limits on land uses that could generate smoke, steam, dust, or other airborne material that could affect aircraft during landing and takeoff.
 - Height limits for all land uses, structures, and vegetation affecting FAR Part 77 surfaces.
 - Provisions for marking and lighting of objects which fall under the provisions of FAR Part 77 and are determined to be obstructions (see item 10 in Level A required information above).

4.5.c Addressing Safety and Potential Risk and Liability

Identify and map the locations around airports where potential safety and liability risks exist. These include runway protection zones (RPZs), runway approaches, and airport safety zones. This information can be obtained from the airport sponsor, the FAA, or WSDOT Aviation Division. In addition, safety and risk information can be obtained from sources located in the PSRC Airport Compatible Land Use Planning Resource Center. See also the *Compatible Land Use Planning Resources Bibliography* at www.psrc.org/transportation/airtrans/compatible/biblio. In particular, see the *Airport Land Use Planning Handbook*, prepared by the California Department of Transportation (CalTrans) Division of Aeronautics, 2003, which is listed in the bibliography and available in its entirety in PSRC's Information Center. Additional resources are available on the WSDOT Aviation Division web page at www.wsdot.wa.gov/aviation/Planning/default.htm#LandUse.

Hold meetings and workshops with local planners, commissioners, council members, and risk managers to discuss the relative risks and liability involved in approving plans, zoning ordinances and maps, and building permits for incompatible land uses in known airport safety zones. Contact organizations for municipal and county attorneys and the WSDOT Aviation Division to ask for technical and legal advice on these issues.

4.6 Suggested Comprehensive Plan Provisions

Local comprehensive plans should include goals and policies that discourage the siting of incompatible uses near airports in conformance with RCW 36.70.547 and RCW 36.70A.510. For sample goals and policies, visit WSDOT Aviation at www.wsdot.wa.gov/aviation/Planning/CompPlanPolicyExamp.htm. Additional resources, studies, and reference materials can be found on the WSDOT Aviation Division website at www.wsdot.wa.gov/aviation/Planning/references.htm. In addition, the plan and implementing zoning code and development regulations should include provisions to protect airspace around the airport (use FAR Part 77 as a basis for technical regulations to protect airspace). Information and policy language should be included as appropriate in the plan, including the land use element, transportation element, capital facilities element, etc. The plan should include a combination of policies and provisions that address height hazard, safety, and noise, such as:

- Define the meaning of “incompatible land use and incompatible development” within the context of your local comprehensive plan, and develop policies and provisions to address those uses. Incompatible land uses may include height hazards, areas of public assembly and/or concentrations of people, single family housing, multi-family or high-density residential, shopping centers, convention centers, hotel/motels, churches, schools, hospitals, daycare, senior citizen housing, manufactured housing and trailer parks, hazardous/explosive chemical storage areas, and uses that produce dust or smoke.

- Identify the geographic areas of concern on and around the airport where airport noise, height hazard, and safety issues need to be addressed. Noise-affected areas can be defined using standard noise analysis, which produces noise contour maps. Height hazard areas should be defined using information from the airport master plan and FAR Part 77 data. Safety areas can be defined using information from the airport master plan as well as information from the WSDOT Aviation Division at www.wsdot.wa.gov/aviation/Planning/default.htm#LandUse. Additional resources can be found at the California Department of Transportation (CalTrans) Aeronautics Division at www.dot.ca.gov/hq/planning/aeronaut/.
- Develop plan provisions to discourage incompatible uses and/or activities that could affect the present and/or future use and expansion of airport facilities and operations. PSRC has prepared a bibliography of resources on airport compatible land use. This material can be reviewed at PSRC's Information Center and is listed on the PSRC web site at www.psrc.org/transportation/airtrans/compatible/biblio. Examples of plan goals and policies, zoning code provisions, airport zoning overlay ordinances, development regulations, height hazard zone diagrams, and other data are available from the WSDOT Aviation Division at www.wsdot.wa.gov/aviation/Planning/default.htm#LandUse.
- Coordinate land use planning near the airport with adjoining jurisdictions by developing consistent plan policy and implementing regulations.
- Where possible, preserve large open space tracts, resource lands, and recreation areas in the vicinity of airports, especially along the extended runway centerline and in other areas within the airport accident safety zones. Size, shape, and location examples of safety zones can be found in WSDOT Aviation Division's *Airports and Compatible Land Use – Volume I* handbook, as well as the 2011 *Washington State Airports and Compatible Land Use Guidebook – Appendix E*. An incentive-based system can be used to encourage development of significant, contiguous open space tracts while discouraging smaller tracts that do not provide functional open space needs for aircraft.
- In the area around airports, real estate title/disclosure statements should be encouraged. These documents disclose whether property is adjacent to an airport and may experience low overhead flights, odor, vibrations, noise and other similar aviation impacts. This provision should be encouraged for all new or substantial improvements to property in the airport vicinity.
- Discourage siting of uses adjacent to airports that attract birds or create visual hazards. Also discourage uses that might discharge particulate matter that could alter atmospheric conditions or emit transmissions that could interfere with aviation communications and/or instrument landing systems, obstruct/conflict aircraft patterns, or result in potential hazards to aviation.
- Encourage the adoption of development regulations that prevent height hazards by developing a Height Overlay District that will prohibit building or structure penetration or obstructions to the Federal Aviation Regulations (FAR) Part 77 "Imaginary Surfaces." Include reference to FAA's Form 7460.

- Ensure the airport is preserved and allowed to expand to serve existing and future demand by incorporating the siting guidelines for essential public facilities as enumerated in the Growth Management Act (RCW 36.70A.200). Recognize the airport as an essential public facility, and provide a process for the siting and/or expansion of the airport.

4.7 Information from Airport Sponsors

Airport master plans, airport layout plans, airport FAR Part 77 drawings, and other airport-related documents are an essential resource for use in compatible land use planning. These documents are usually the best source of accurate and up-to-date information about existing conditions and the airport's future plans. Although PSRC does not review or certify airport-related documents, it is imperative that airport sponsors develop and share this information with local agency planners as they prepare local comprehensive plans, plan amendments, zoning ordinances, and development regulations. Because local comprehensive plans provide a long-range view of a community's future, local land use planners need the best information available on the airport's long-range plans. For this reason, airport sponsors sharing their airport plans with local agency planners should be one aspect of the consultation process required by state law (see below). Without a reliable and realistic airport master plan, local jurisdictions cannot effectively promote land use compatibility with future airport facilities and operations. Although it is not currently mandated by state law, it is prudent and advisable for airport sponsors to consult with local jurisdictions as long-range airport facility and operations plans are developed.

While the GMA contains requirements related to local agency comprehensive plans, airport sponsors are subject to a different set of planning requirements. Airport master plans are generally prepared following FAA planning guidance contained in FAA Advisory Circular 150/5070-6B – Airport Master Plans. A key element of the Airport Master Plan is the Airport Layout Plan, a set of drawings which depict the specific airport facility improvements contained in the master plan. Airport layout plans generally identify investments planned for at least a five-year time frame, and at large air carrier airports the Airport Layout Plan (ALP) may identify airport improvements for up to 20 years or more. In the long run, airport land use compatibility planning efforts would be more successful if airport sponsors and local planning agencies alike took a long term approach to planning for future growth, and share this planning information with one another. Airport master plans can be obtained from airport sponsors. In addition, some airport master plan documents can be obtained by accessing the WSDOT Aviation Division's airport information system website at www.wsdot.wa.gov/aviation/AirportInformationSystem.htm.

4.8 Consultation Process

Local jurisdictions are required by RCW 36.70.547 to formally consult with WSDOT Aviation, airport owners, managers, private airport operators, general aviation pilots, and ports prior to adoption of comprehensive plan policies or development regulations that may affect property within the airport influence area of a publicly owned or privately owned public use airport. These comprehensive plan submittal guidelines ask local planning agencies to include information about their consultation process, but do not dictate the actual process. This is the responsibility of the local agency. However, the Washington State Department of Transportation – Aviation Division has developed guidelines to assist

local agencies in their consultation process. For more information about the state's recommended consultation process, see the *Airports and Compatible Land Use Program Guidebook, Chapter 2: Airport Land Use Compatibility Planning Step by Step* and *Appendix A – Formal Consultation*. These resources can be found on-line at www.wsdot.wa.gov/aviation/Planning/ACLUguide.htm.

4.9 Airport Compatible Land Use Planning – Step by Step

The following discussion and chart (Figure 4-1) outline a simplified series of steps in the local agency comprehensive plan development and update process, focusing on issues affecting airports. The process is consistent with and guided by WSDOT's 2010 *Washington State Airports and Compatible Land Use Guidebook*. This suggested series of steps should be viewed within the context of PSRC's overall policy and plan review process, of which airport compatible land use is only one component. These steps are meant to provide basic guidance to local agencies. Figure 4-1 below also lists key resources available to local planning agencies, as well as a brief list of the information PSRC is suggesting they include in their comprehensive plans.

Step 1 - Develop background information

The goal of step 1 is to establish an understanding of the basic issues of airport compatible land use: noise, height hazard, and safety. Using the many resources available, local planners are encouraged to document background information and key issues to support their airport compatible planning efforts. Planners should review applicable state and federal laws and regulations, most of which are referenced within this chapter (see section 4.10). This step should also include a local agency review of their role in relation to the airport. In some cases the local airport may be owned and operated by local government, which may facilitate coordination and sharing of information between land use planners and airport staff.

Step 2 - Collect airport information

Coordinate with airport sponsor to collect and document information about the airport, including the owner/sponsor, classification and role (commercial, regional, community, etc.), airport size and location, airport facilities (runways and taxiways, landing aids, hangars, aircraft tie-downs, terminal, parking, fuel, aviation-related businesses, etc.), types of users served at the airport (passengers, air cargo, corporate and business aviation, general aviation, training, agricultural spraying, military, charter flights, etc.), level of activity (number and type of based aircraft, annual take-offs and landings, annual passengers, amount of air cargo, etc.), possible changing role, enhanced technology for improved approaches, etc. To assist in long-range land use planning around the airport, local planners should work with airport sponsors to document existing and forecast conditions at the airport (particularly changing aircraft fleet mix and operations forecasts) as specified in an adopted airport master plan.

Step 3 - Identify airport influence area

A key step in the planning process is defining the “airport influence area,” the geographic area where incompatible land uses are discouraged and where compatible land uses are encouraged (see also Section 2.3 above). This area should be a key focus of compatible land use planning. Local agency planners should prepare a map showing the boundaries of the airport influence area and its relation to the airport and runways. The local agency should also prepare supporting text describing how the airport influence area was derived. The plan or other supporting documents should also discuss which compatibility issues were included in defining the airport influence area (noise, height hazard, safety, etc.). Although the issues of noise, height hazard, and safety are generally related to proximity to the runway, land use compatibility is not the same throughout the airport influence area. For this reason local planners may want to subdivide the airport influence area into smaller areas. For example, when addressing the issue of land use and safety, the agency may want to use the six airport compatibility zones as discussed in WSDOT’s land use guidebook (see Appendices E and F for more information). When addressing height hazard and airspace protection, local agencies should coordinate with airport sponsors to use Federal Aviation Regulation (FAR) Part 77: *Obstructions to Navigation*, which provides detailed methodologies for defining and mapping the Primary, Approach, Horizontal, Conical, and Transitional surfaces. For information about these FAR Part 77 surfaces, see Chapter 1 (section 1.2.c.). For more detailed information preparing FAR Part 77 drawings for your local airport, see Appendix E (Methodology for Drawing FAR Part 77 Surfaces).

For busier airports serving larger aircraft, noise may be an important issue in planning for airport land use compatibility, and therefore may be a factor in defining the airport influence area. At these airports the airport sponsor may need to prepare noise contours using the FAA’s Integrated Noise Model. These noise contours will show the areas most impacted by noise, and where compatible land use planning may be needed to address those impacts. In defining the airport influence area, agencies are encouraged to work closely with airport sponsors and draw from the WSDOT Aviation Division’s *Airports and Compatible Land Use Guidebook* at: www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm.

Step 4 - Evaluate compatibility within the airport influence area

This step will evaluate existing and planned future land use in the airport influence area and assess compatibility within this area (or sub-areas). The local agency will likely need to use criteria, such as land use types, land use density, population density, or other measures, to assess compatibility within the airport influence area. Examples of criteria can be found in Appendix E and F of the most recent WSDOT Land Use Guidebook (see website link in Step 3 above). The adopted or proposed land use plan, zoning code, and development regulations may permit homes, schools, or churches in close proximity to an airport runway, or may permit tall structures along the extended runway centerline. This analysis is intended to identify concerns which could be addressed in the local planning process. Analysis of the airport master plan or airport layout plan may show growth in airport activity, airport expansion projects, or plans for larger aircraft. This information should be used to help inform the local comprehensive plan.

Step 5 - Develop strategies to address issues

PSRC recommends local agencies use a proactive approach to addressing airport compatible land use issues. PSRC encourages local planners to work closely with PSRC staff and other agencies as appropriate (such as airport sponsors and WSDOT Aviation) in addressing issues during preparation of plans and regulations. Once these issues and concerns have been identified, local planners can develop strategies tailored to fit their local situation. A wide range of strategies are available, such as:

- New goals or policies to support compatible land use
- Zoning code provisions to limit density within parts of the airport influence area
- Height hazard zoning to protect approaches to runways
- Building code provisions to reduce noise inside homes in areas exposed to high airport noise
- Sub-area plans around airports to address specific issues which may not be relevant to an entire city
- Incorporate FAA's FAR Part 77 Height Hazard and Obstruction standards into local ordinances and codes
- Incorporate FAA's obstruction lighting and marking standards at the local level
- Incorporate FAA's 7460 Notice of Proposed Construction or Alteration process into local building permit process

For more information about possible strategies, please see section 4.10 (Technical Resources) below.

Ongoing – Working with PSRC during policy and plan review

The detailed information provided in steps 1 through 5 is designed to help local jurisdictions consider all aspects of compatible land use planning adjacent to airports. PSRC staff is available to provide assistance to local jurisdictions throughout their planning process. As part of the policy and plan review process, local plans are reviewed by PSRC to ensure that compatible land use planning has occurred. Jurisdictions are encouraged to begin working with PSRC staff when a plan update or amendment is first initiated. The three-step process for reviewing local planning provisions is described in the following section (see also Figure 4-1).

In addition to reviewing comprehensive plans as part of the Policy and Plan Review process, PSRC staff also will review specific issues periodically as part of its monitoring program. This includes review of local planning provisions relating to airport compatible land use. A summary of the most recent review (completed in 2010) can be found in Section 3.0 of this report. These reviews may result in PSRC staff making comments, requesting meetings, or possibly recommending changes to local plans. For more information about the policy and plan review process, visit PSRC's Plan Review web page at www.psrc.org/growth/planreview.

Brief Summary - Plan Review Process**Phase 1: Work Starts on Comprehensive Plan Update or Amendments**

- Agency or planning body contacts PSRC regarding scope and schedule.
- Use the *Plan Review Manual* to identify issues and topics to be addressed.
- PSRC Support: PSRC staff is available as material is drafted for review and assistance.
- As work progresses on draft plan provisions: craft a VISION 2040 statement to be included in the final adopted set of policies or plan.
- Use the checklist in the reporting tool to ensure key provisions have been addressed.

Phase 2: Final Review Before Plan is Adopted

- If not previously provided, a completed draft of the reporting tool should be provided to PSRC staff for review, along with the draft plan revisions, 60 days prior to final adoption. (Note: This corresponds with state agency review of draft amendments.)
- Work with PSRC comments to finalize policies or plan.

Phase 3: After Plan is Adopted

- Agency submits adopted plan or policies to PSRC.
- If changes were made to draft policies and plans as part of adoption, then any related revisions to the reporting tool should also be submitted to PSRC.
- PSRC staff drafts a Plan Review Report and certification recommendation – which is first made available to the submitting agency for review and comment.
- Plan Review Report is revised (as needed) and transmitted to PSRC's boards for action.

Figure 4-1 Airport Compatible Land Use Planning Process – Step by Step

Resources – Information available to local planning agencies to assist in planning to address airport compatible land use:

- PSRC Airport Compatible Land Use Program materials and Plan Review Manual
- WSDOT Airports and Compatible Land Use Guidebook and program
- Other airport compatible land use materials (CalTrans, Oregon, etc.)
- RCW, WAC, other laws (GMA, Planning Enabling Act, Airport Zoning Act, etc.)
- FAA materials (Part 77, Form 7460, FAR Part 150, Airport Design, grant assurances, etc.)
- Airport Master Plan (MP)
- Airport Layout Plan (ALP)

PSRC requested materials – Used to assist in local planning and by PSRC during plan review and certification:

- Airport inventory
- Land use analysis
- Map of airport influence area
- Criteria (define what's compatible in what locations)
- Plan provisions (goals, policies, maps, strategies, actions, etc.)
- Airport sub-area plan or aviation sub-element
- Airport overlay zone / height hazard zoning (reference to FAR Part 77 surfaces)
- Process for siting essential public facilities (GMA req't)
- Other – including any other guidance or planning information

Step 1 – Collect and document background information:

- Understanding basic issues related to airport compatible land use (noise, airspace protection, safety, aircraft over-flights)
- GMA and other planning requirements
- Local agency roles (land use, zoning, permits)
- Key issues and tools and approaches to address issues

Step 2 – Collect airport information (review Airport Master Plan):

- Airport role/classification – existing and forecast
- Airport property boundary
- Facilities - existing and planned
- Aircraft fleet mix (based aircraft) – existing and forecast
- Activity (take-offs and landings) – existing and forecast

Step 3 – Identify airport influence area:

- Area affected by airport noise (contour)
- Height hazard areas (Part 77)
- Airport safety zones
- Area affected by aircraft over-flights

Step 4 – Evaluate compatibility within airport influence area:

- Define compatible and incompatible uses (set land use criteria)
- Evaluate existing land use, height hazards, safety concerns
- Assess future planned land use re: criteria
- Identify existing and potential future conflicts (noise sensitive land use, height hazards, safety concerns)

Step 5 – Develop strategies to address issues:

- Goals and policies
- Zoning ordinance, development regulations
- Land use compatibility criteria (noise, height, safety, etc.)
- Development review process (including FAA Form 7460)
- Land use plan / airport sub-area plan / aviation element
- Height hazard zoning / airport overlay zone
- Other (avagation easement, buyers program, noise ordinance, building code)

Ongoing – Working with PSRC for plan review and certification:

- Agency works with PSRC **during** drafting of plan provisions
- Agency submits final draft of plan to PSRC prior to adoption
- PSRC provides comments
- Agency adopts plan, transmits to PSRC, with information on any changes made to the final draft
- PSRC certification report prepared for board consideration and action

4.10 Technical Resources

4.10.a PSRC Technical Resources and Guidelines to Support Compatible Land Use Planning

Numerous sources of technical information are available to local planning agencies to support planning for airport compatible land use, including the following websites:

- **PSRC Air Transportation Planning**
www.psrc.org/transportation/airtrans/
- **PSRC Plan Review**
www.psrc.org/growth/planreview
- **WSDOT Aviation Division**
www.wsdot.wa.gov/aviation/Planning/ACLUGuide.htm
- **Joint Base Lewis McChord Growth Coordination Plan**
www.jblm-growth.com/plan.php
- **Transportation Research Board**
http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_027v1.pdf
Title: "Enhancing Airport Land Use Compatibility"
- http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_038.pdf
Title: "Understanding Airspace, Objects, and Their Effects on Airports"
- **CalTrans Aeronautics**
www.dot.ca.gov/hq/planning/aeronaut/landuse.html
- **Federal Aviation Administration**
[www.faa.gov/airports/environmental/land use/](http://www.faa.gov/airports/environmental/land_use/)

The following additional resources are available at the PSRC Information Center to assist local agencies interested in compatible land use planning around airports:

- ***A Model Zoning Ordinance to Limit Height of Objects Around Airports***
FAA Advisory Circular (AC) 150/5190-4A, Federal Aviation Administration, December 14, 1987.
- ***Airport Compatible Land Use Design Handbook***
Denver Regional Council of Governments, May 1998.
- ***Airport Land Use Planning Handbook***
California Department of Transportation (CalTrans) Division of Aeronautics, December 1993.

- ***Airport Noise Regulations -- Planning Advisory Service Report Number 437***
American Planning Association, May 1992.
- ***Chapter 35.63 RCW - Planning Commissions***
Revised Code of Washington, Washington State Department of Transportation Aeronautics Division.
- ***Chapter 35A.63 RCW - Planning and Zoning in Code Cities***
Revised Code of Washington, Washington State Department of Transportation Aeronautics Division.
- ***Chapter 36.70 RCW - Planning Enabling Act***
Revised Code of Washington, Washington State Department of Transportation Aeronautics Division.
- ***Chapter 36.70A and Chapter 36.70A.070 RCW - Growth Management – Planning by Selected Counties and Cities***
Revised Code of Washington, Washington State Department of Transportation Aeronautics Division.
- ***Land Use Compatibility - A Guide to Local Control of Land Use Around Airports***
The Cutler & Stanfield Guide Series, Cutler & Stanfield, L.L.P., May 1998.
- ***Land Use Encroachment - Technical Assistance***
Washington State Department of Transportation, Aviation Division, 1996.
- ***Land Use Guidelines Study***
Volume VIII of the Washington State Airport System Plan, Washington Department of Transportation Aeronautics Division, March 1991.
- ***Model Airport Overlay Zone Ordinance***
Regional Airport System Plan (Appendix B), Puget Sound Regional Council, September 1988.
- ***Noise Control and Compatibility Planning for Airports***
FAA Advisory Circular AC 150/5020-1, Federal Aviation Administration, August 5, 1983.
- ***Objects Affecting Navigable Airspace (14 CFR Part 77)***
This federal regulation, implemented by the Federal Aviation Administration, establishes standards for determining obstructions in navigable airspace (including guidance in the design and construction of airports), sets forth requirements for notice to the [FAA] Administrator of certain proposed construction or alteration, provides for aeronautical studies of obstructions to air navigation, to determine their effect on the safe and efficient use of airspace, provides for public hearings on the hazardous effect of proposed construction or alteration on air navigation, and provides for establishing antenna farm areas. Part 77 establishes a series of “imaginary surfaces” with relation to each airport and each runway. FAR Part 77.25 applies to civil airports and FAR Part 77.28 applies to military airfields.

- **Substitute Senate Bill 6422 - Chapter 239, Laws of 1996 (General Aviation Facilities – Protection from Incompatible Land Uses).** Passed by Washington State Legislature, effective date: 6/6/96. See also RCW chapters listed above, which were amended by SSB-6422.
- **Washington State Aeronautics Laws and Regulations**
Sections of the Revised Code of Washington (RCW) and the Washington Administrative Code (WAC) pertaining to aviation in Washington state), Washington State Department of Transportation Aeronautics Division, December 1990 [in particular, see Chapter 14.13 RCW -- Airport Zoning; and Chapter 12-24 WAC -- Obstruction Marking and Lighting].

4.10.b Washington State Department of Transportation Aviation Division Resources

The WSDOT Aviation Division has many resources available on their website, which is found at www.wsdot.wa.gov/aviation/Planning/default.htm#LandUse. These resources include:

- Airport Land-Use Compatibility: *Airports and Compatible Land Use Guidebook* (2010)
- Land Use Compatibility Program Overview
- *Airports and Compatible Land Use – Volume 1* (1999)
- *Long Term Air Transportation Study* (LATS)
- *Washington State Aviation System Plan* Executive Summary
- WSASP Airport Data Conditions Assessment Database: Information on the airport that includes owner and manager, length of runway, approach plate, obstructions, etc.
- *Economic Impacts of Washington Airports: Latest Findings – Airports Create Jobs and Money*
- Airport Land Use Compatibility Program - Summary Update
- Public Use Airports by County
- Land-use compatibility presentation
- Aviation Land Use Compatibility Program Information
- 20-Year Aviation System Plan
- Example Airport Land Use Compatibility Scope of Work
- Reference Materials
- Example Comprehensive Plan Goals and Policies
- Model Policy Language & Regulations
- Overview of Height Obstruction/FAR Part 77 Basics
- What is FAR Part 77 “Imaginary Surfaces”
- Height Hazard Video
- Height Hazard Airspace Zones Diagram
- Civil Airport Imaginary Surfaces Diagram
- *Reminga v. United States*
- FAR Part 77 Obstructions to Navigation Paper, Virginia Tech
- FAR Part 77 Obstruction Evaluation
- FAA Form 7460-1 – Notice of Proposed Construction or Alteration
- FAA Form 7480-1 – Notice of Landing Area Proposal

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APPENDIX A

Sample Avigation Easement

AVIGATION AND HAZARD EASEMENT

WHEREAS, (full name of property owner(s)) hereinafter called the Grantors, are the owners in fee of that certain parcel of land situated in the City of _____, County of _____, State of _____, more particularly described as follows:

(full description of property to be covered by easement)

hereinafter called "Grantors' property," and outlined on the attached map (Exhibit 1);

NOW, THEREFORE, in consideration of the sum of _____ dollars (\$_____) and other good and valuable consideration, the receipt and sufficiency of which is hereby acknowledged, the Grantors, for themselves, their heirs, administrators, executors, successors, and assigns, do hereby grant, bargain, sell, and convey unto (owner and operator of airport, i.e., City of _____) hereinafter called the Grantee, its successors and assigns, for the use and benefit of the public, as easement and right of way, appurtenant to (full name of airport) or the unobstructed passage of all aircraft, ("aircraft" being defined for the purpose of this instrument of any contrivance now known or hereafter invented, used, or designed for navigation of or flight in the air) by whomsoever owned and operated.

In the air space above Grantors' property above an imaginary plane rising and extending in a general (i.e., Easterly) direction over Grantors' property, said imaginary plane running from approximately (i.e., 25) feet Mean Sea level above Point A on Exhibit 1 at the rate of one foot vertically for each (i.e., 50) feet horizontally to approximately (i.e., 55) feet Mean Sea level above Point B on Exhibit 1, to an infinite height above said imaginary plane,

(OR USE THE FOLLOWING)

in the air space above Grantors' property above a Mean Sea level of (i.e., 150) feet, to an infinite height above said Mean Sea level of (i.e., 150) feet,¹

(OR USE THE FOLLOWING)

in all air space above the surface of Grantors' property, to an infinite height above said Grantors' property.

Together with the right to cause in all air space above the surface of Grantors' property such noise, vibrations, fumes, dust, fuel particles, and all other effects that may be caused or may have been caused by the operation of aircraft landing at, or taking off from, or operating at or on said (full name of airport).

The easement and right of way hereby granted includes the continuing right in the Grantee to prevent the erection or growth upon Grantors' property of any building, structure, tree, or other object, extending into the air space above the aforesaid imaginary plane,

(OR USE THE FOLLOWING)

extending into the air space above the said Mean Sea level of (i.e., 150) feet,¹

¹ Alternative language depending upon desired coverage of easement

(OR USE THE FOLLOWING)

extending into the air space above the surface of Grantors' property;¹

and to remove from said air space, or at the sole option of the Grantee, as an alternative, to mark and light as obstructions to air navigation, any such building, structure, tree or other objects now upon, or which in the future may be upon Grantors' property, together with the right of ingress to, egress from, and passage over Grantors' property for the above purposes.

TO HAVE AND TO HOLD said easement and right of way, and all rights appertaining thereto unto the Grantee, its successors, and assigns, until said (full name of airport) shall be abandoned and shall cease to be used for public airport purposes.

AND for the consideration hereinabove set forth, the Grantors, for themselves, their heirs, administrators, executors, successors, and assigns, do hereby agree that for and during the life of said easement and right of way, they will not hereafter erect, permit the erection or growth of, or permit or suffer to remain upon Grantors' property any building, structure, tree, or other object extending into the aforesaid prohibited air space, and that they shall not hereafter use or permit or suffer the use of Grantors' property in such a manner as to create electrical interference with radio communication between any installation upon said airport and aircraft, or as to make it difficult for flyers to distinguish between airport lights and others, or as to impair visibility in the vicinity of the airport or as otherwise to endanger the landing, taking off, or maneuvering of aircraft, it being understood and agreed that the aforesaid covenants and agreements shall run with the land.

In consideration of the premises and to assure Grantee of the continued benefits accorded it under this Easement, (name of mortgagee), owner and holder of a mortgage dated _____ and recorded _____ covering the premises above described, does hereby covenant and agree that said mortgage shall be subject to and subordinate to this Easement and the recording of this Easement shall have preference and precedence and shall be superior and prior in lien to said mortgage irrespective of the date of the making or recording of said mortgage instrument².

IN WITNESS WHEREOF, the Grantors have hereunto set their hands and seals this _____ day of _____, 20_____.

Signed, sealed, and delivered in the presence of:

_____ (SEAL)

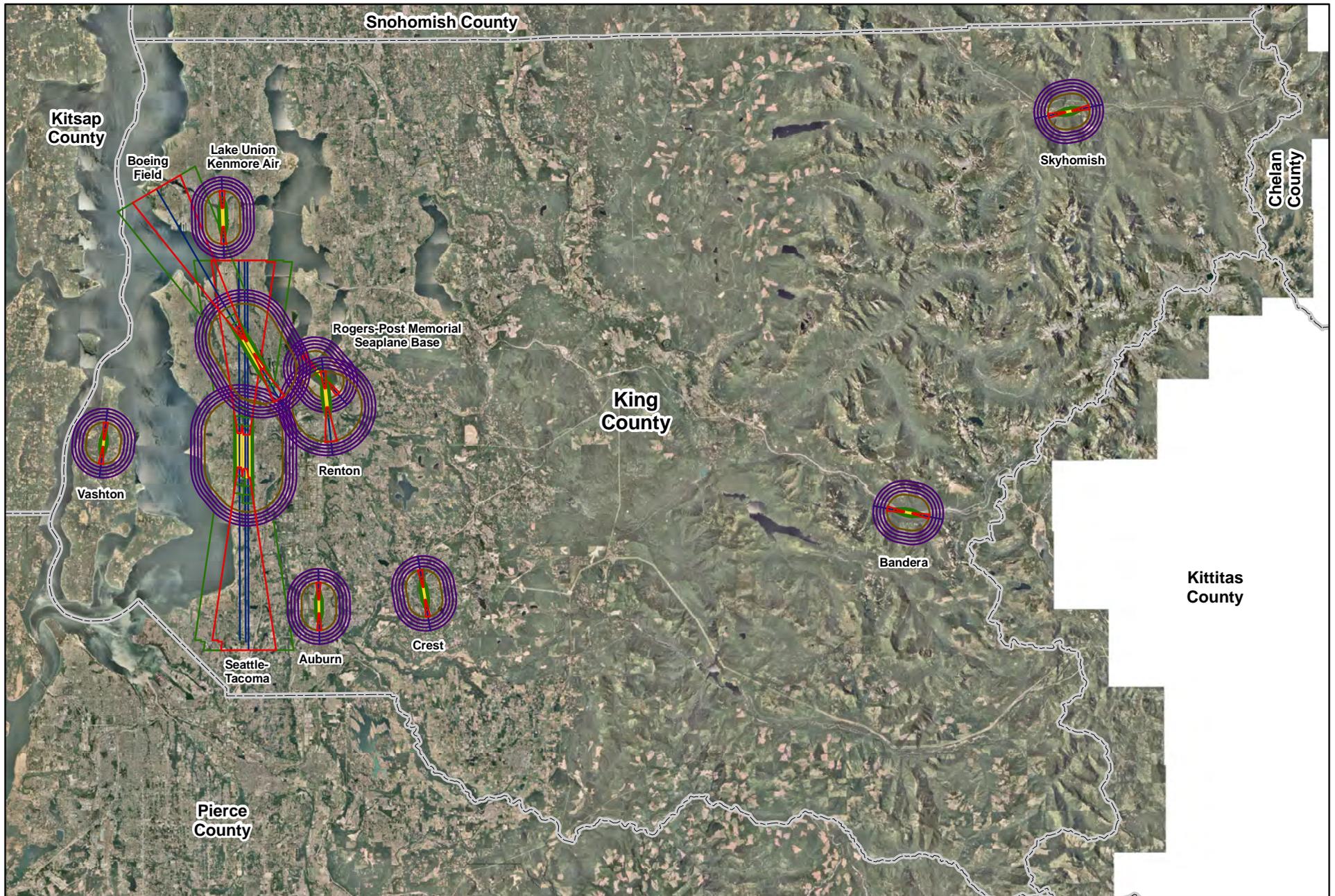
_____ (SEAL)

¹ Alternative language depending upon desired coverage of easement.

² Local recordation and subordination practices must also be met. If subordination is necessary, in which case the mortgagee must join in the agreement, the above language is suggested.

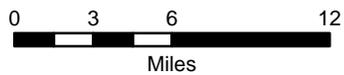
APPENDIX B

FAR Part 77 Drawings for Airports

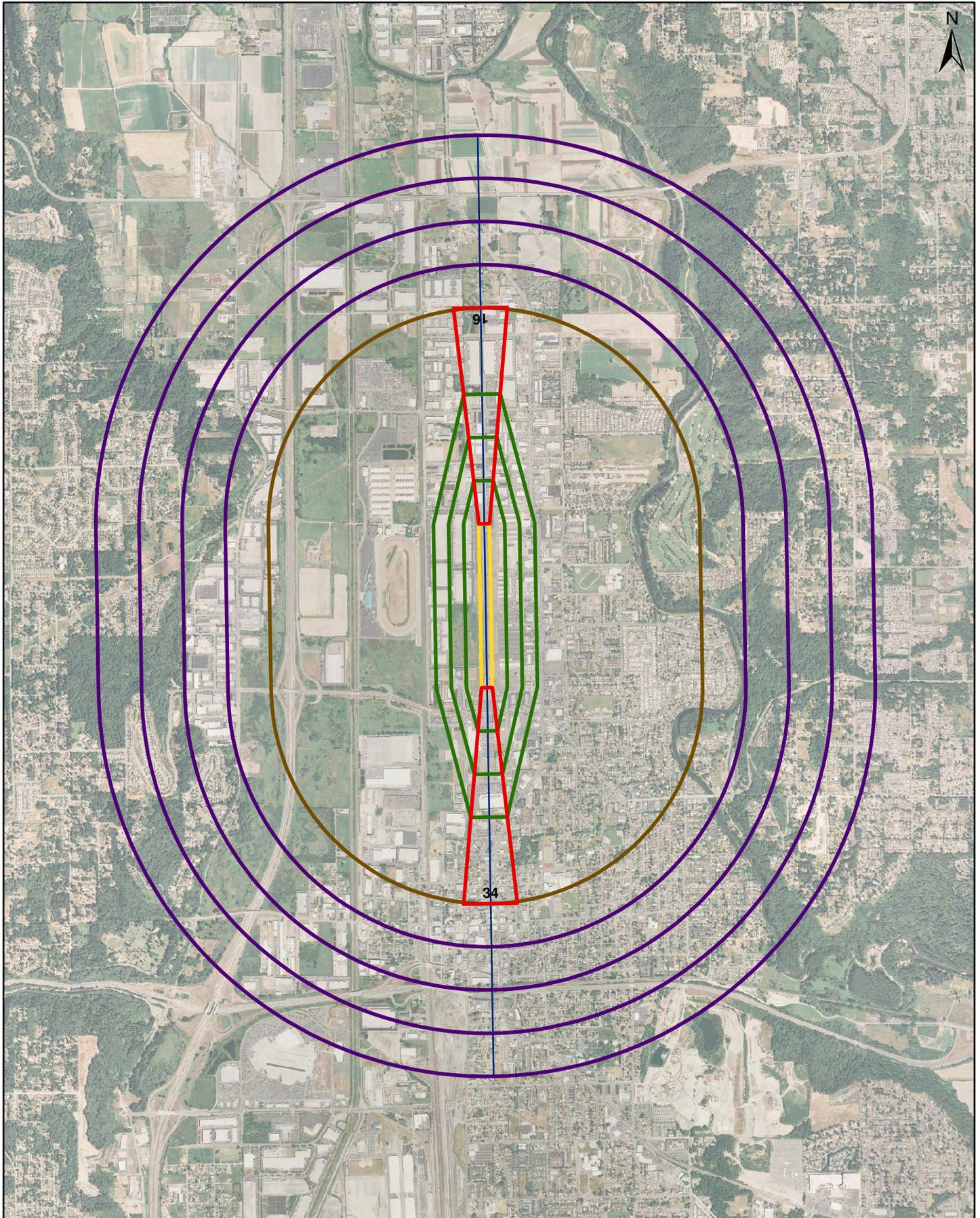


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline

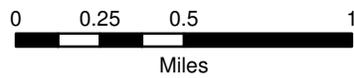


**Part 77 Surfaces
King County, Washington**

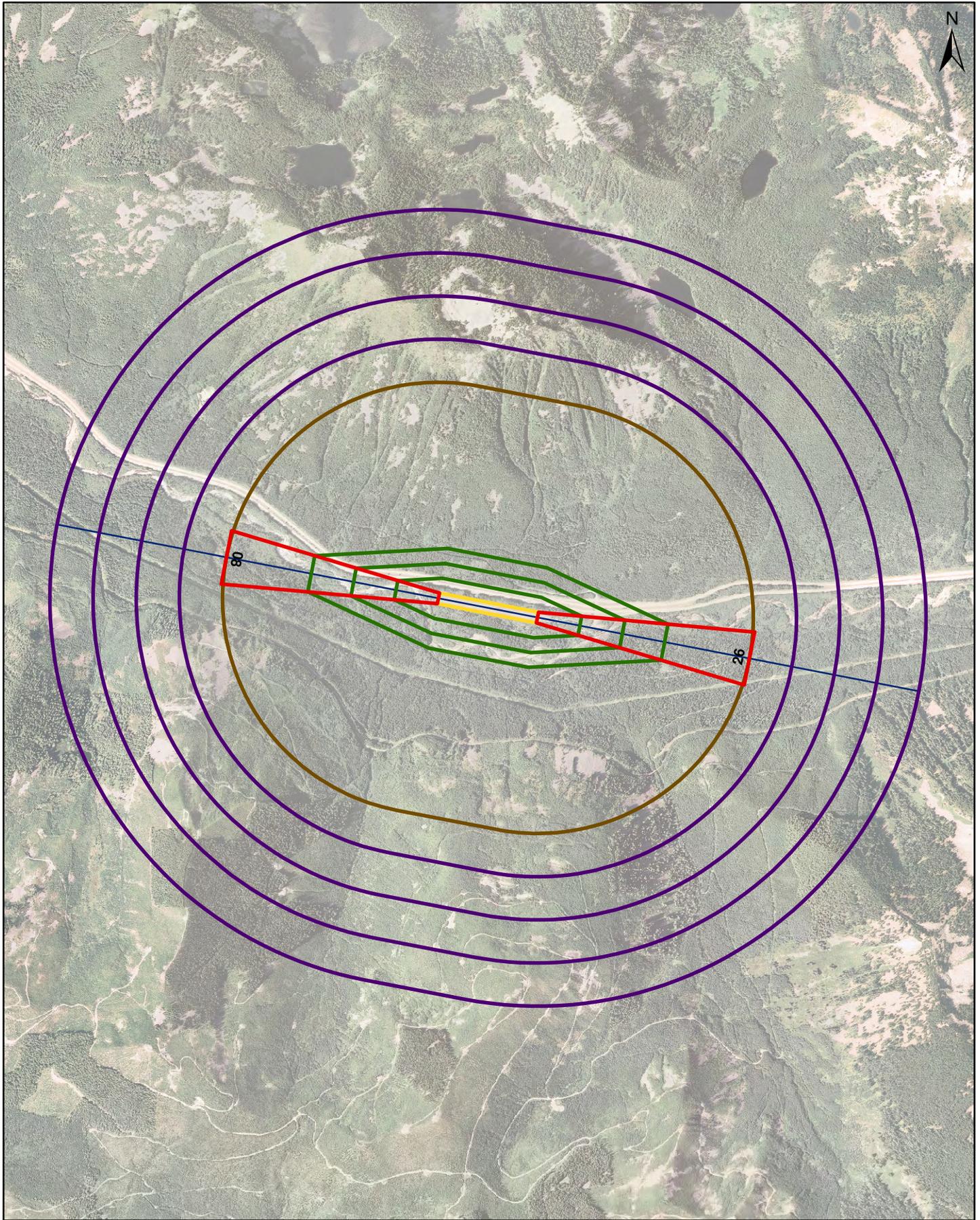


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



**Part 77 Surfaces
Auburn Municipal Airport
King County, Washington**

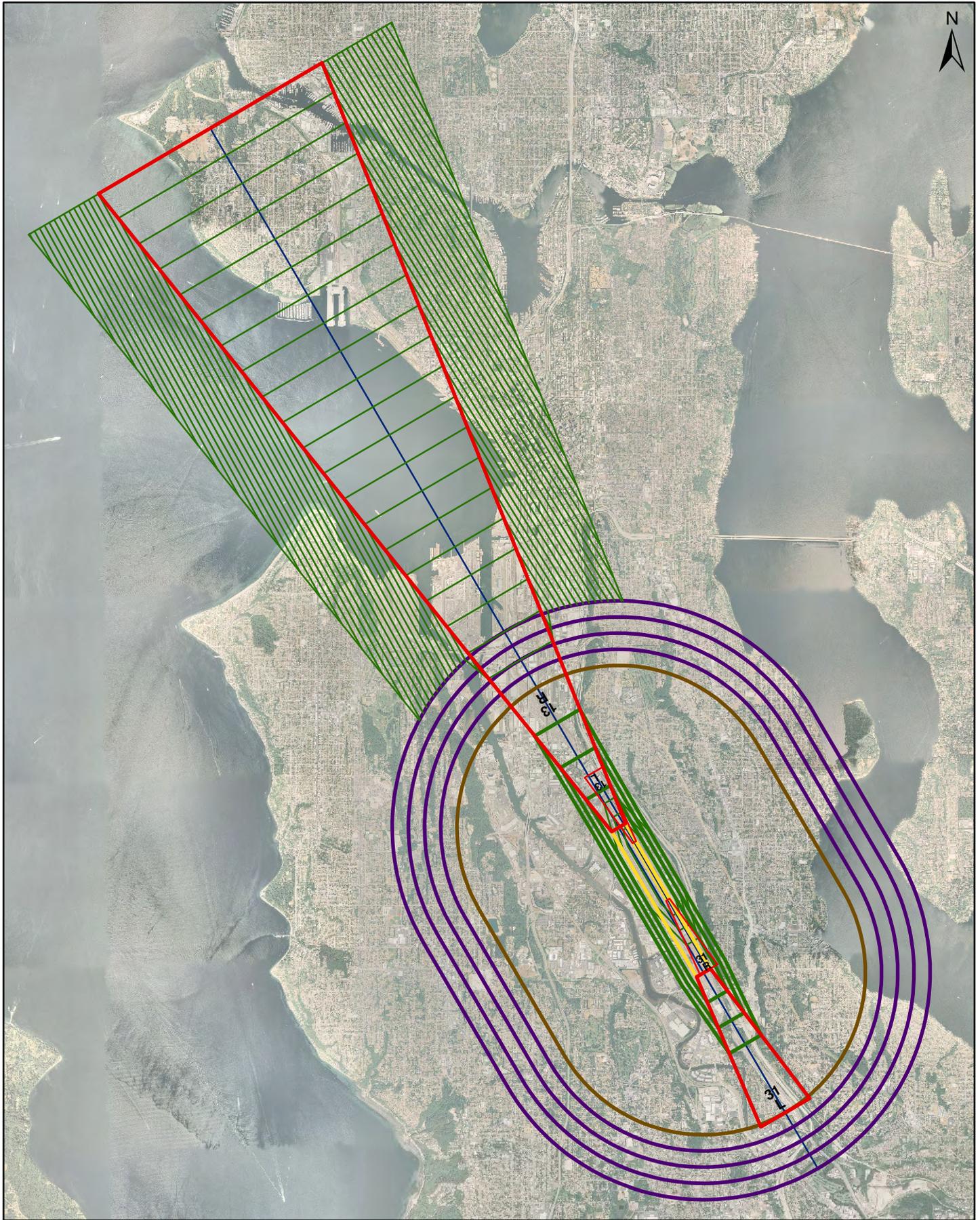


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



**Part 77 Surfaces
Bandera State Airport
King County, Washington**

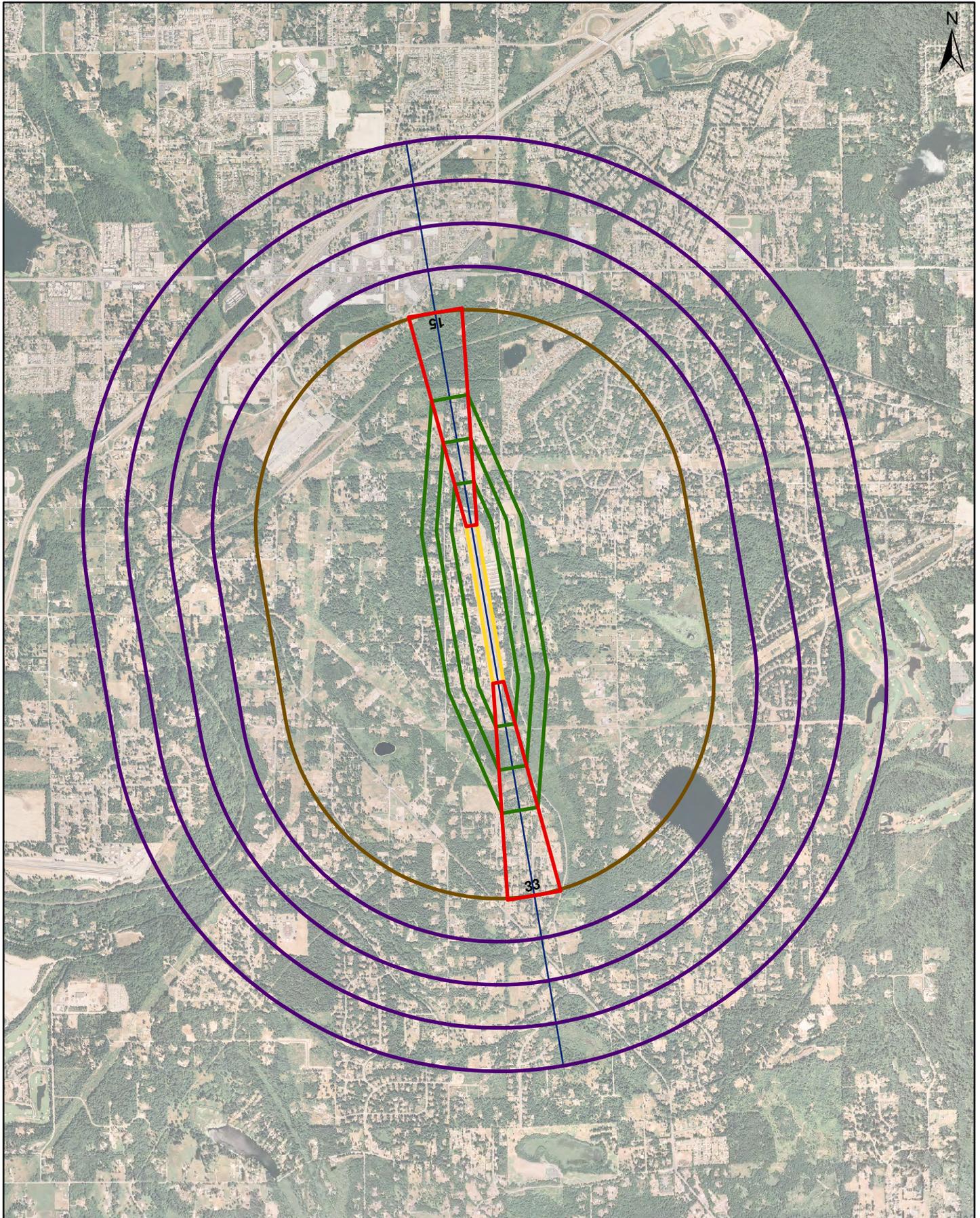


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

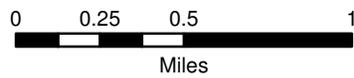


**Part 77 Surfaces
Boeing Field Airport
King County, Washington**

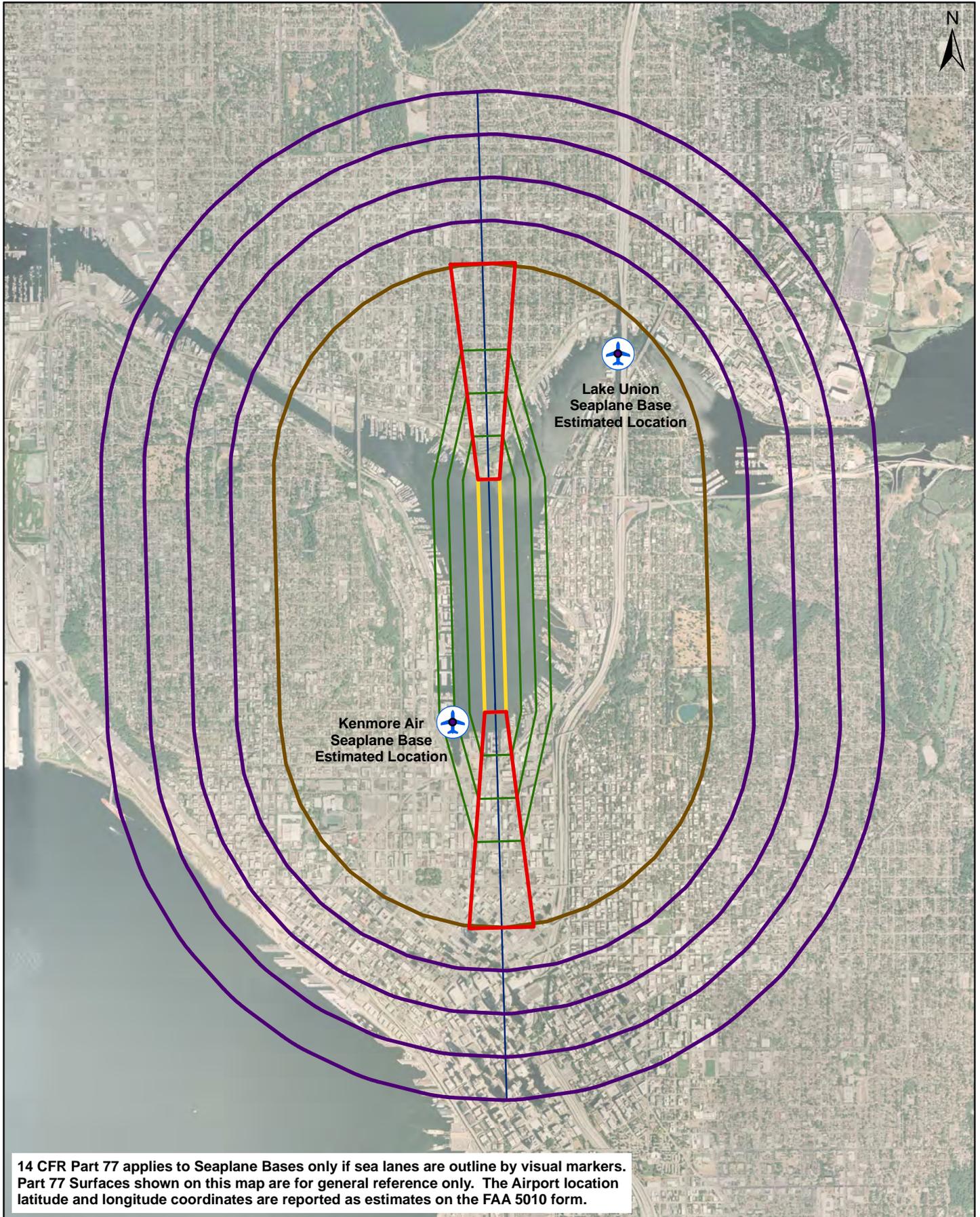


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



**Part 77 Surfaces
Crest Airpark Airport
King County, Washington**



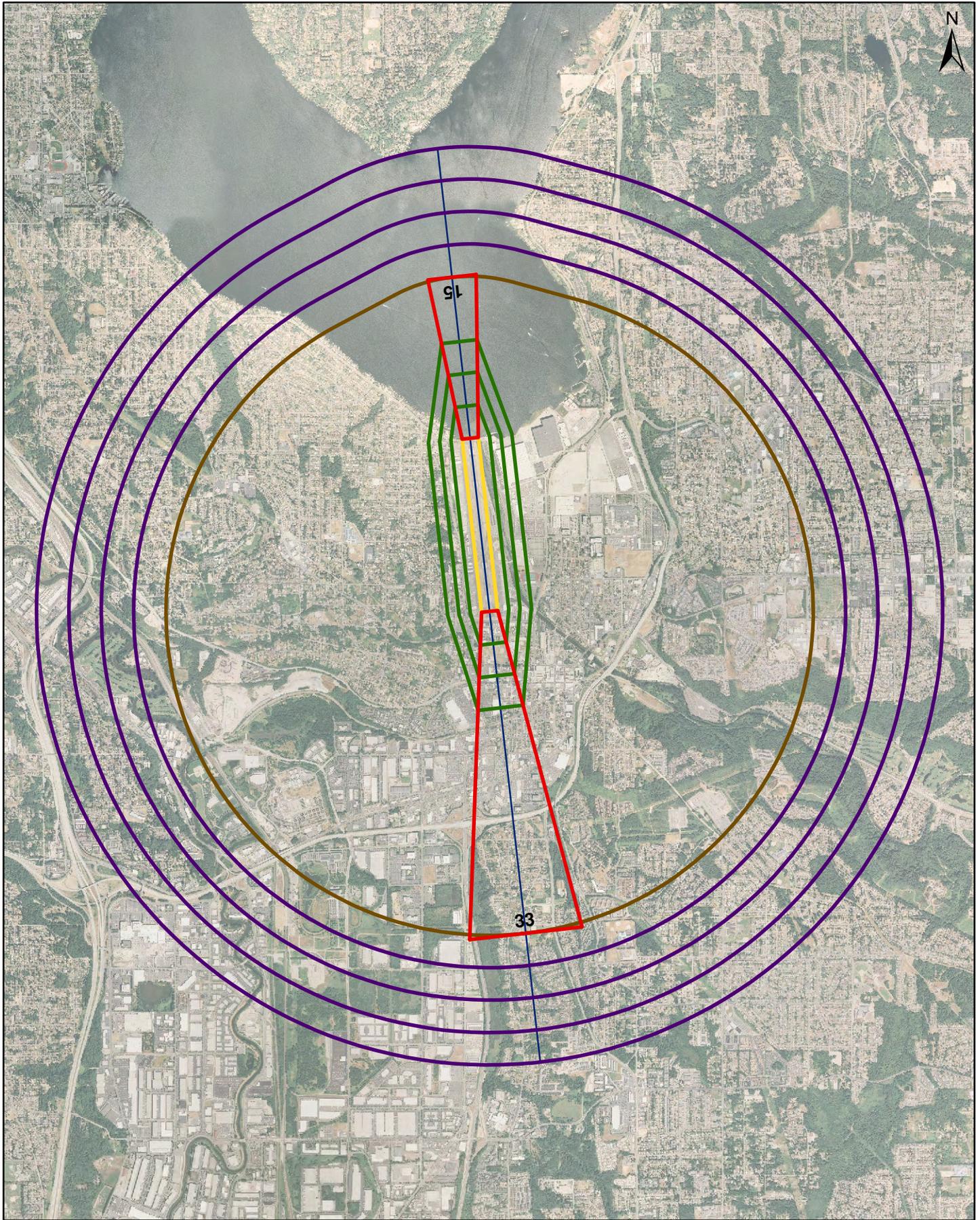
14 CFR Part 77 applies to Seaplane Bases only if sea lanes are outline by visual markers. Part 77 Surfaces shown on this map are for general reference only. The Airport location latitude and longitude coordinates are reported as estimates on the FAA 5010 form.

Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

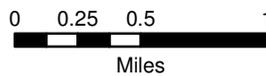


Part 77 Surfaces
Lake Union/Kenmore Air Seaplane Base
King County, Washington

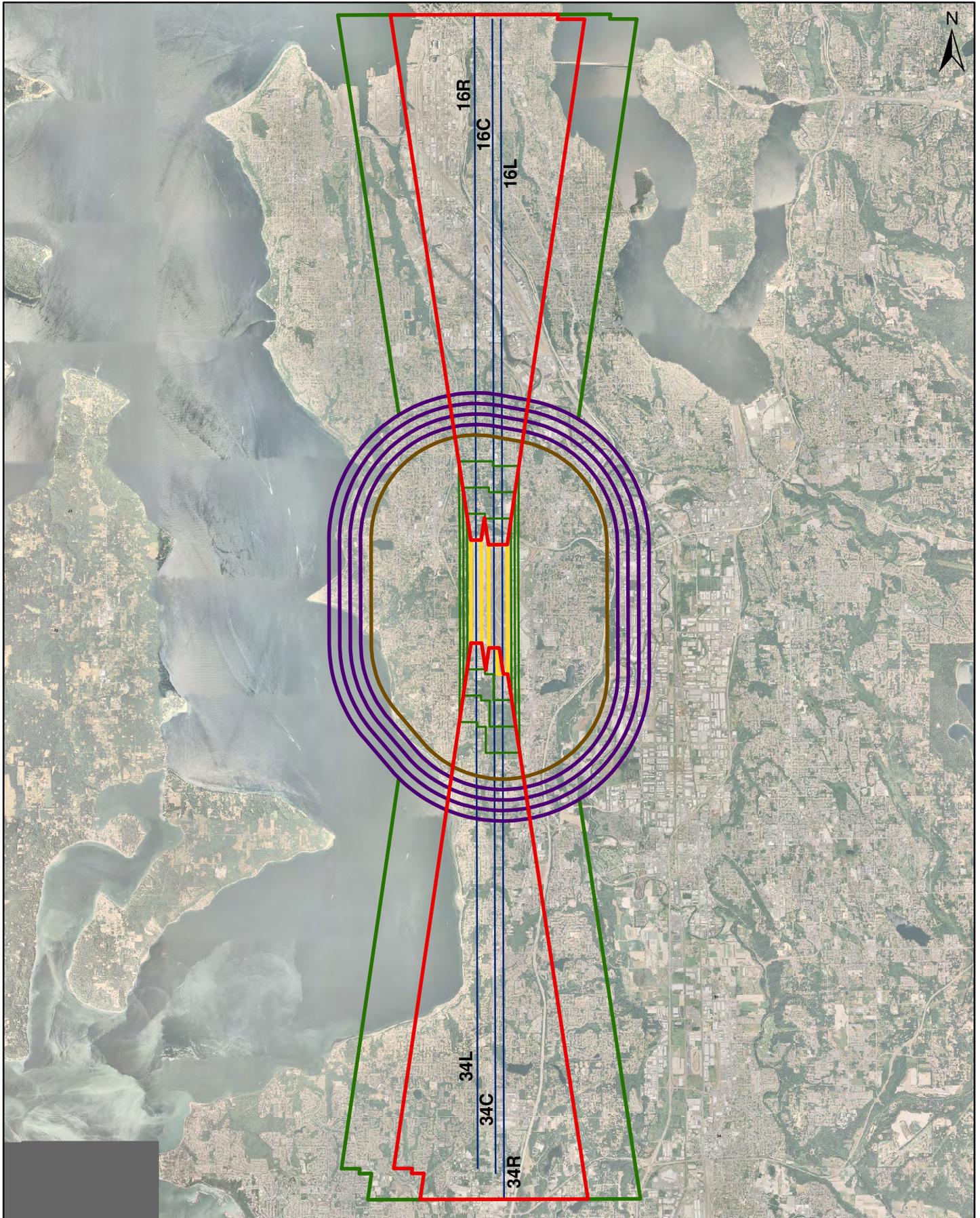


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

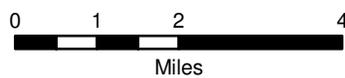


**Part 77 Surfaces
Renton Municipal Airport
King County, Washington**

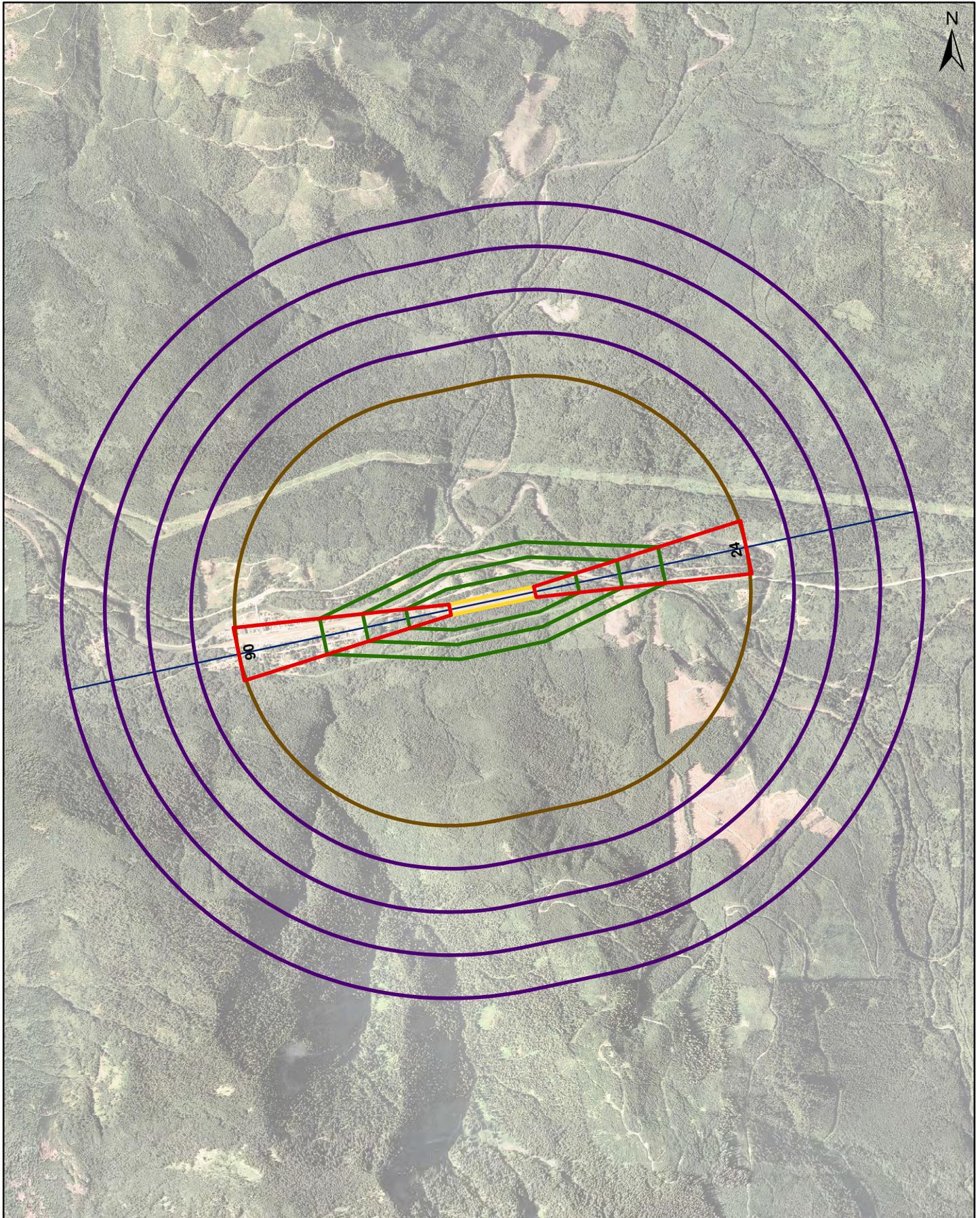


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline

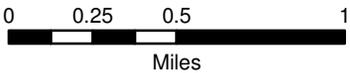


Part 77 Surfaces
Seattle-Tacoma International Airport
King County, Washington

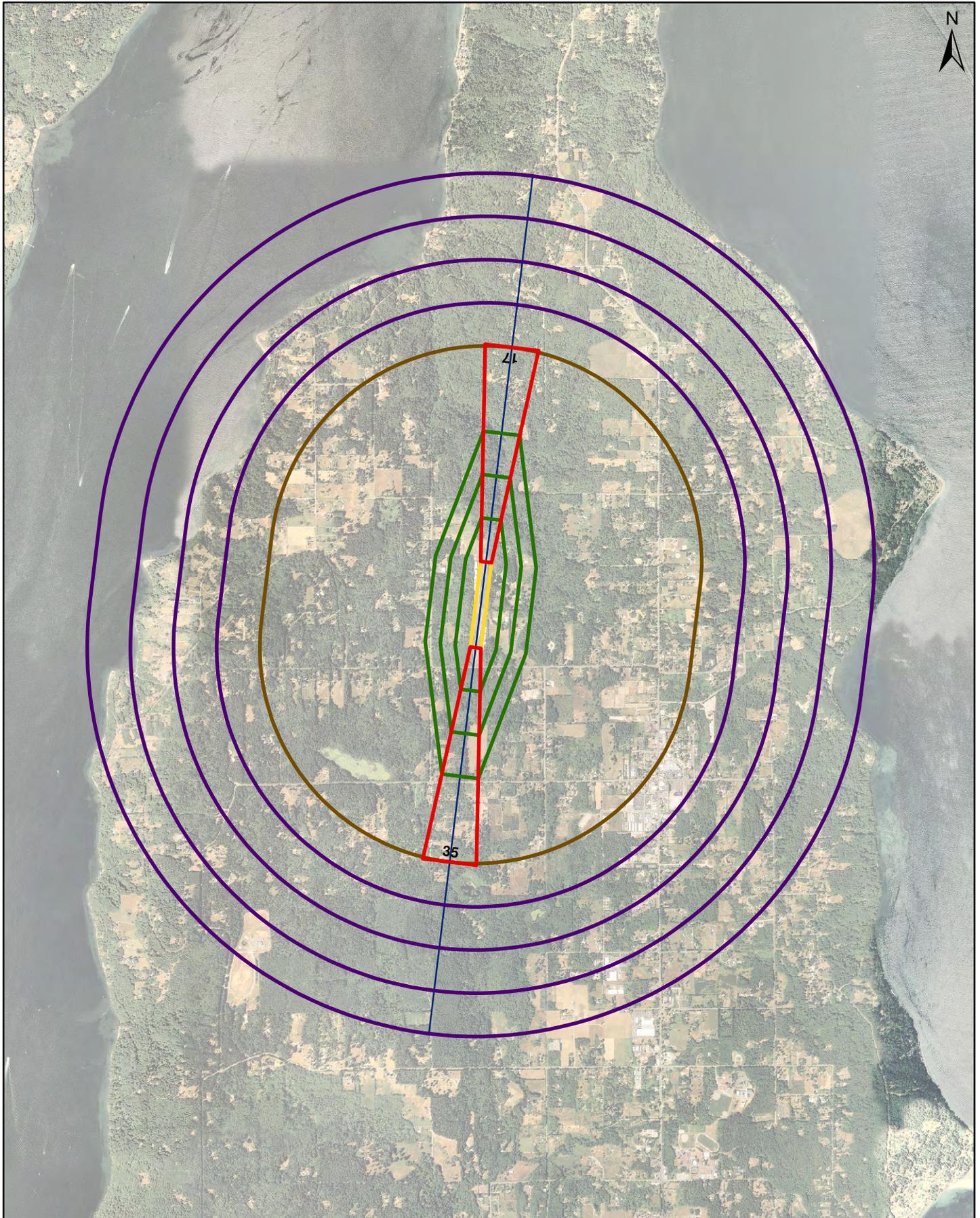


Part 77 Surfaces

 Approach	 Transitional	 Conical
 Primary	 Horizontal	 Centerline

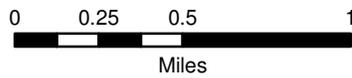


Part 77 Surfaces
Skykomish State Airport
King County, Washington

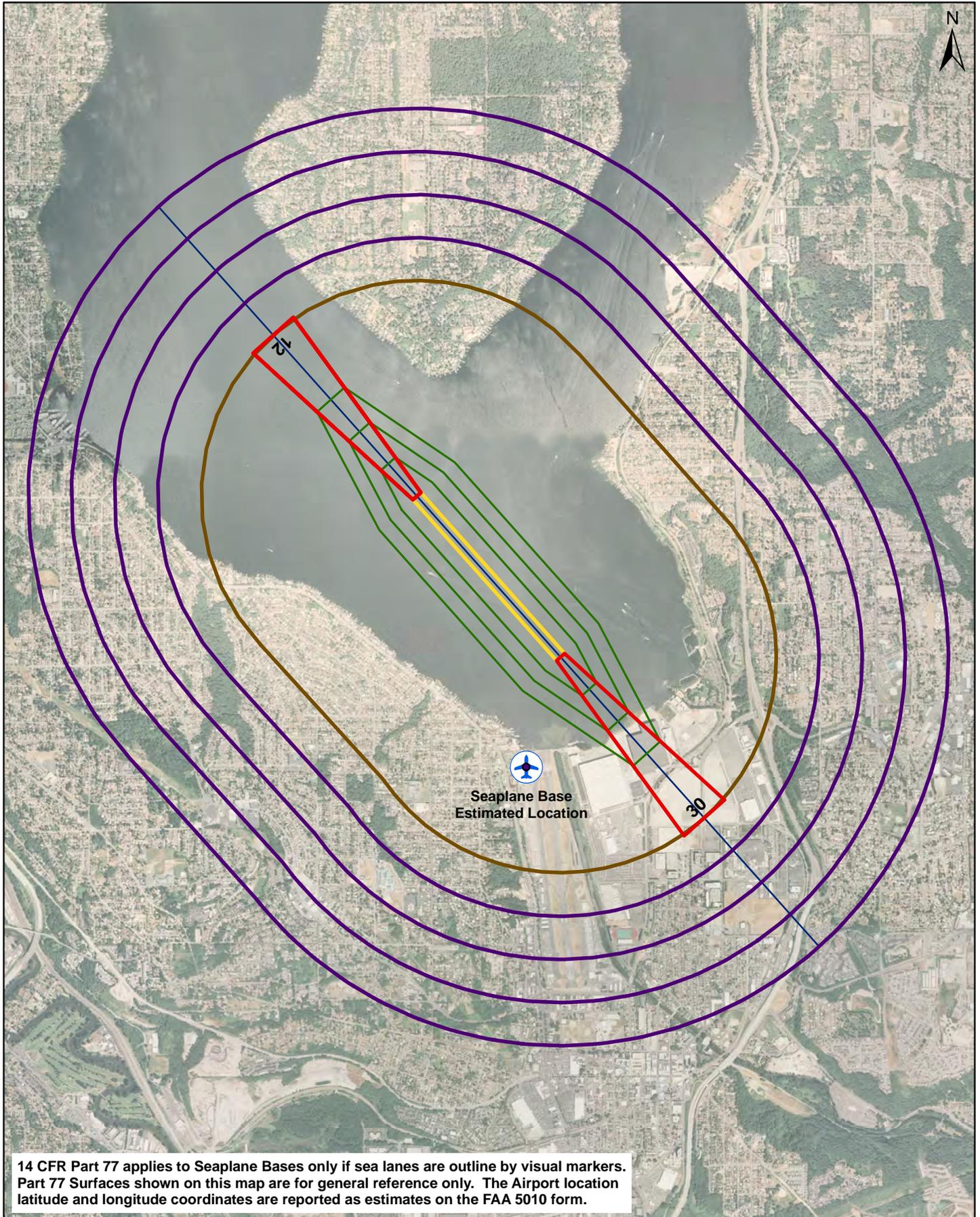


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

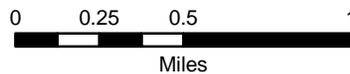


Part 77 Surfaces
Vashon Island Airport
King County, Washington

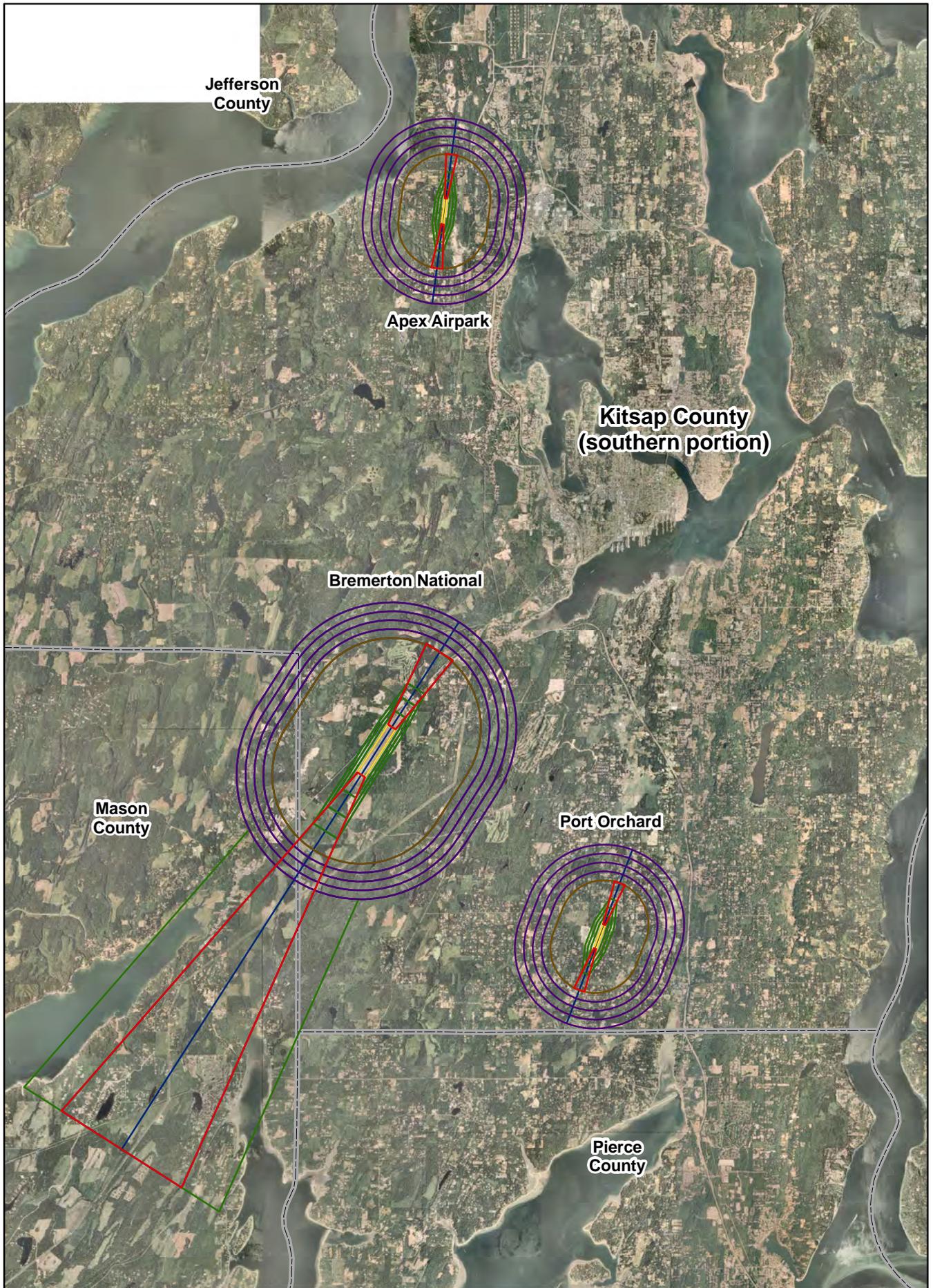


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



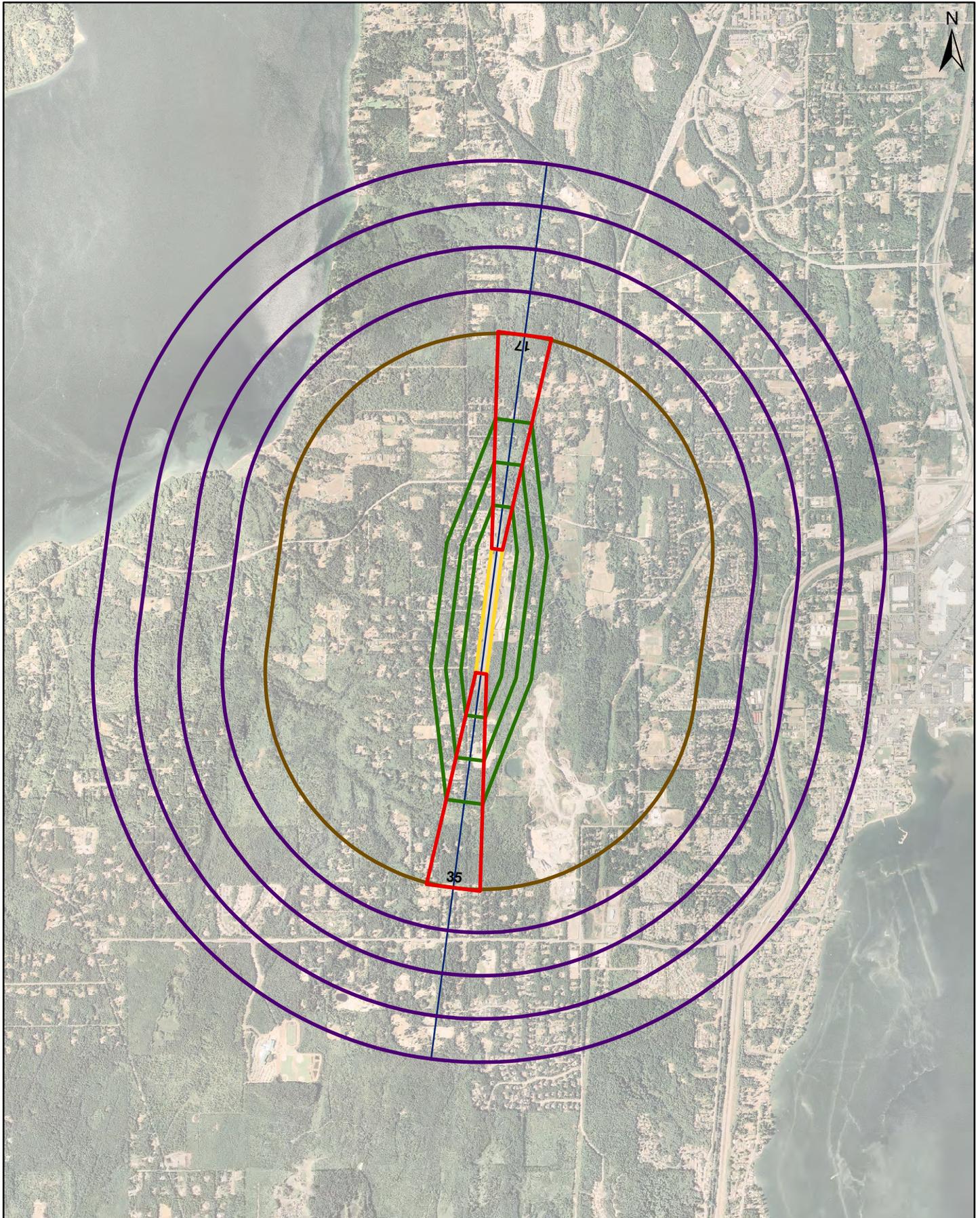
Part 77 Surfaces
Rogers-Post Memorial Seaplane Base
King County, Washington



Part 77 Surfaces

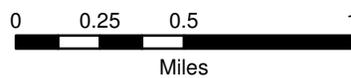
- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



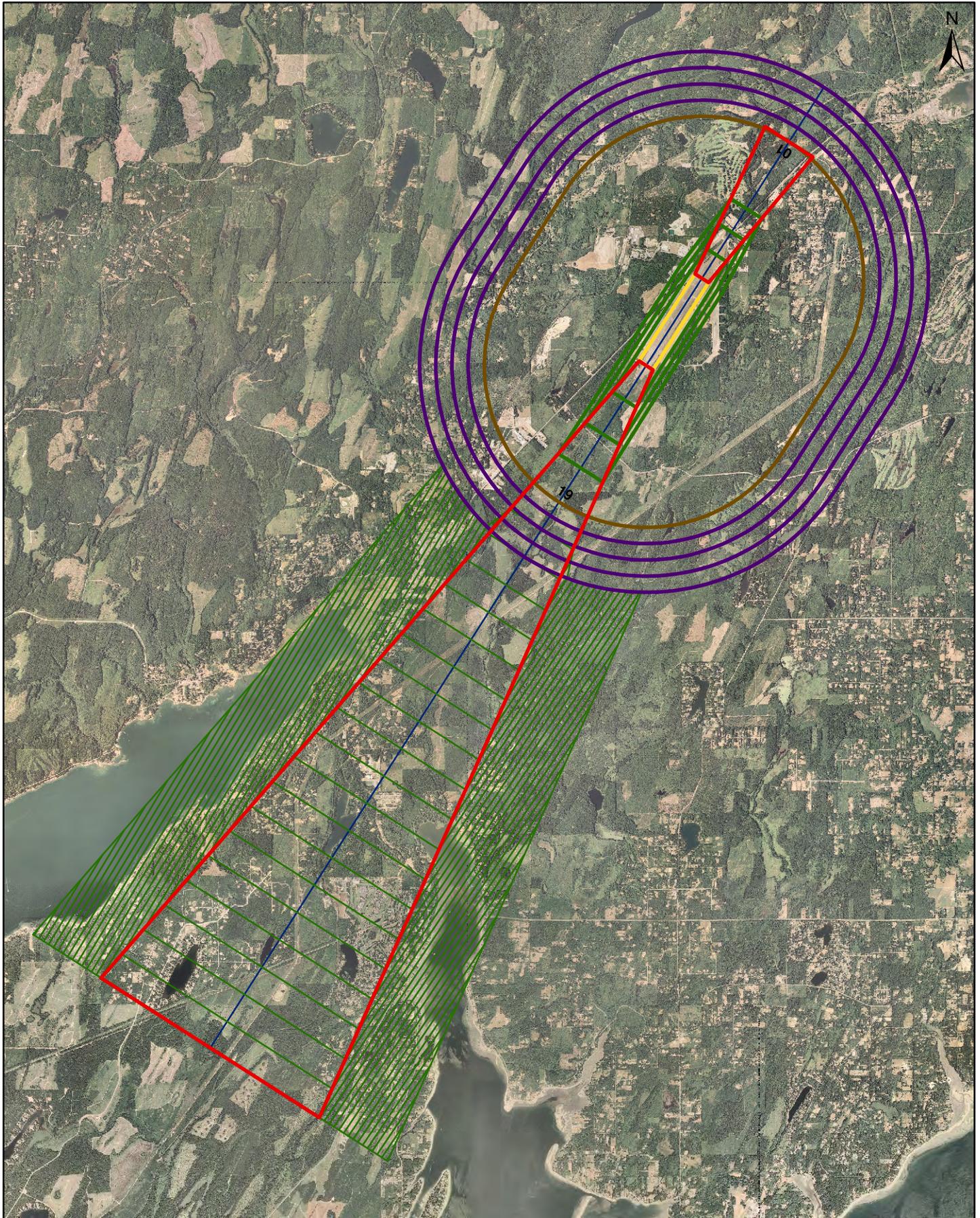


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



Part 77 Surfaces
Apex Airpark
Kitsap County, Washington

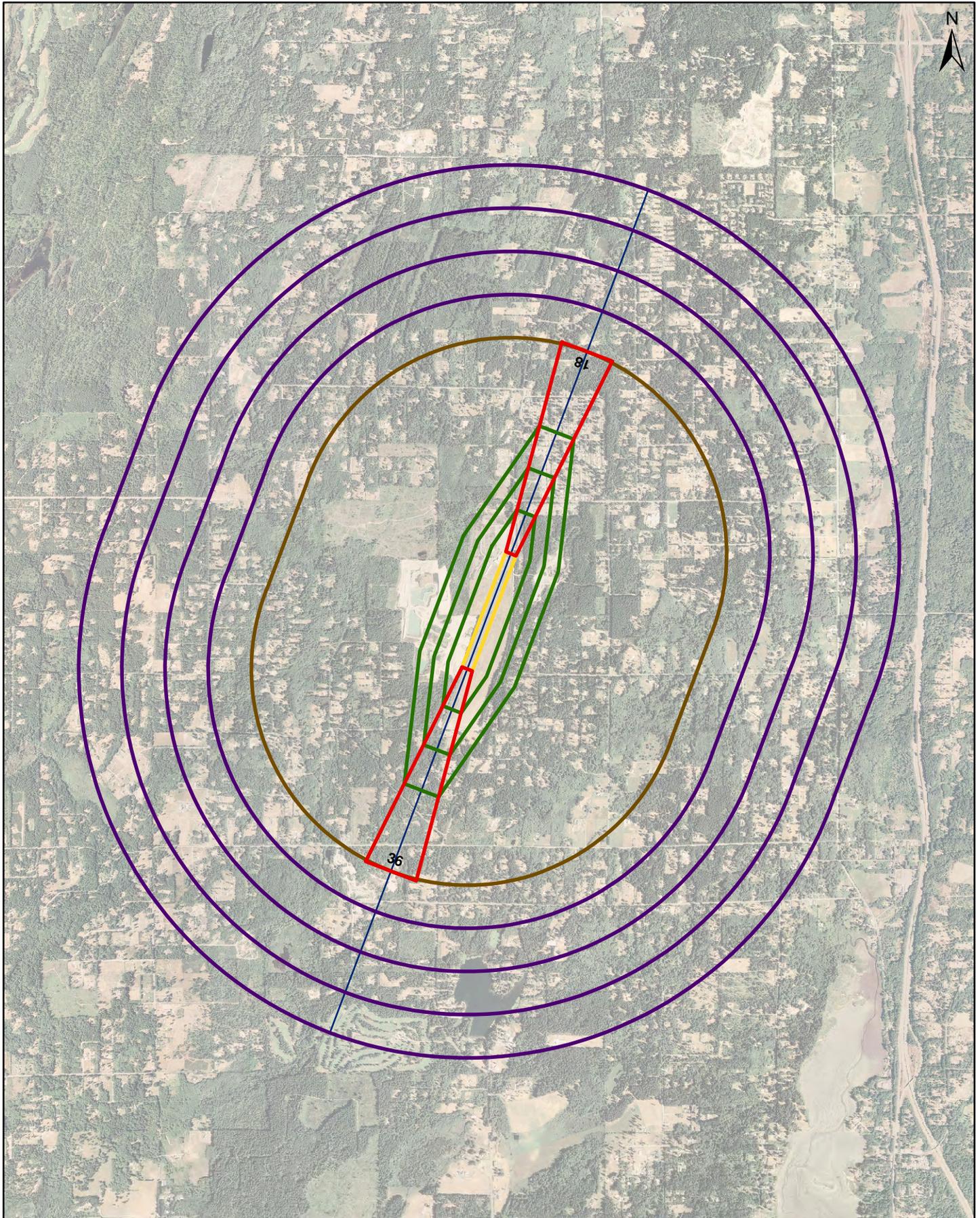


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



**Part 77 Surfaces
Bremerton National Airport
Kitsap County, Washington**



Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



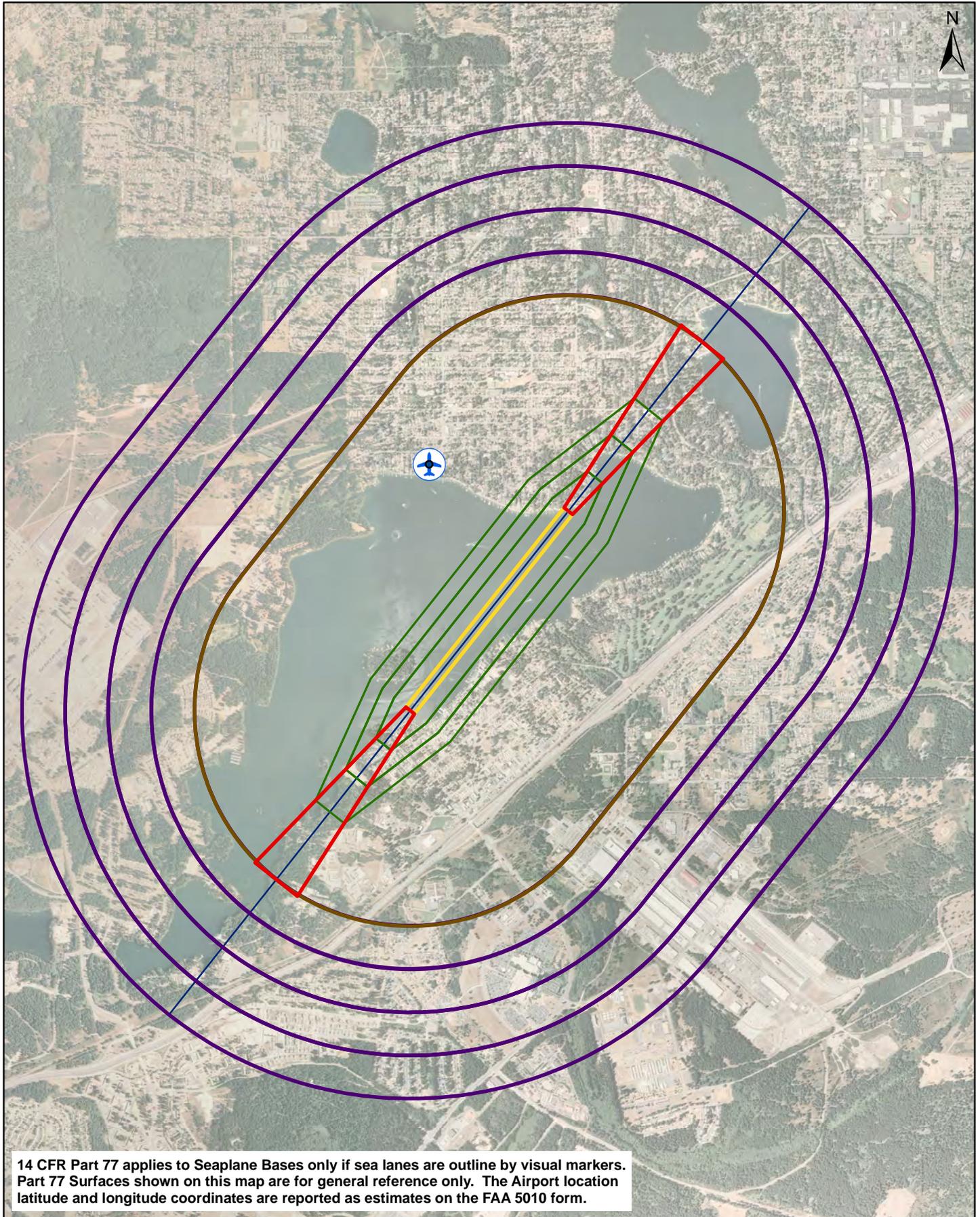
**Part 77 Surfaces
Port Orchard Airport
Kitsap County, Washington**



Part 77 Surfaces

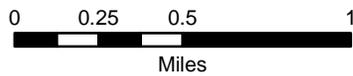
- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



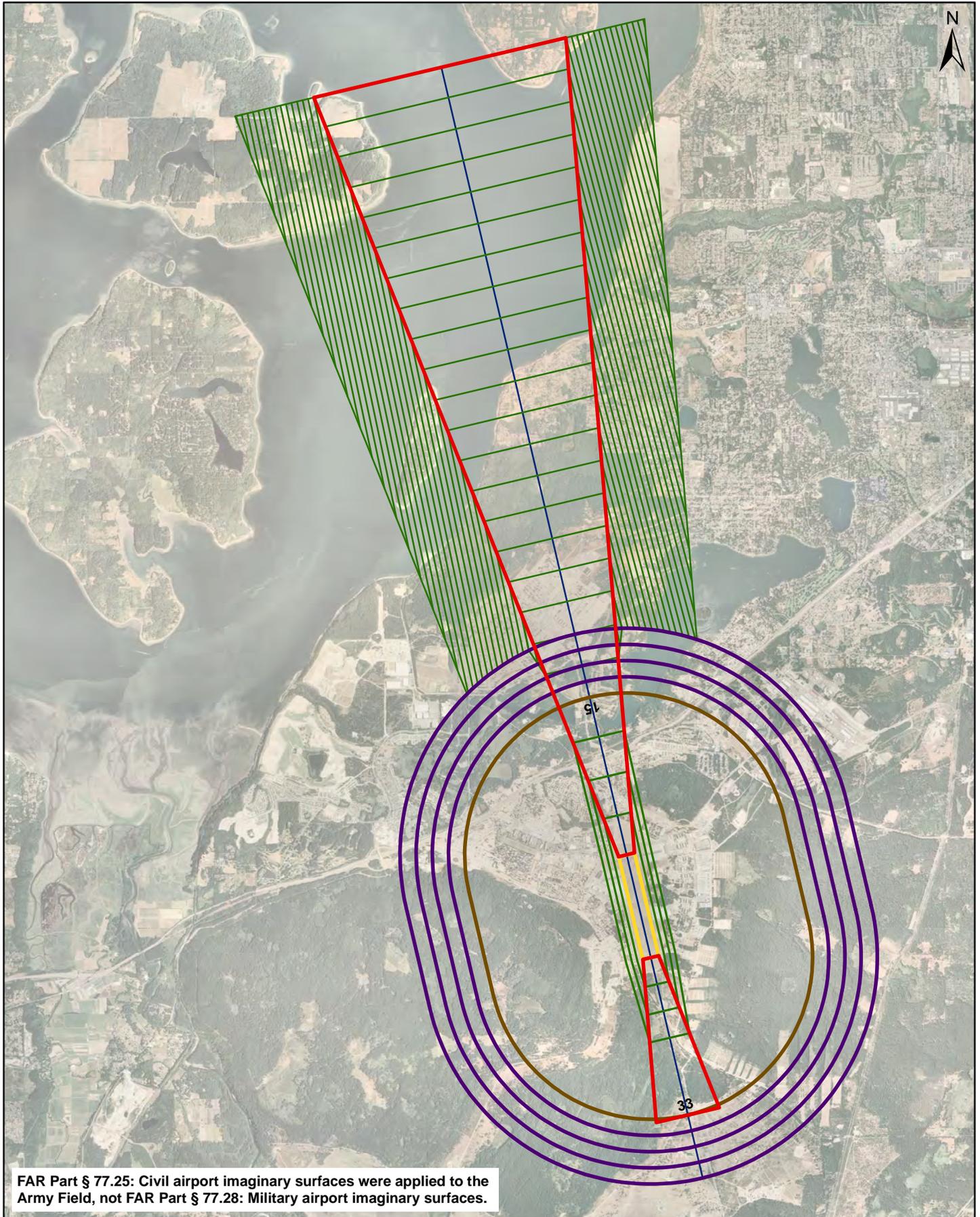


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



**Part 77 Surfaces
American Lake Seaplane Base
Pierce County, Washington**



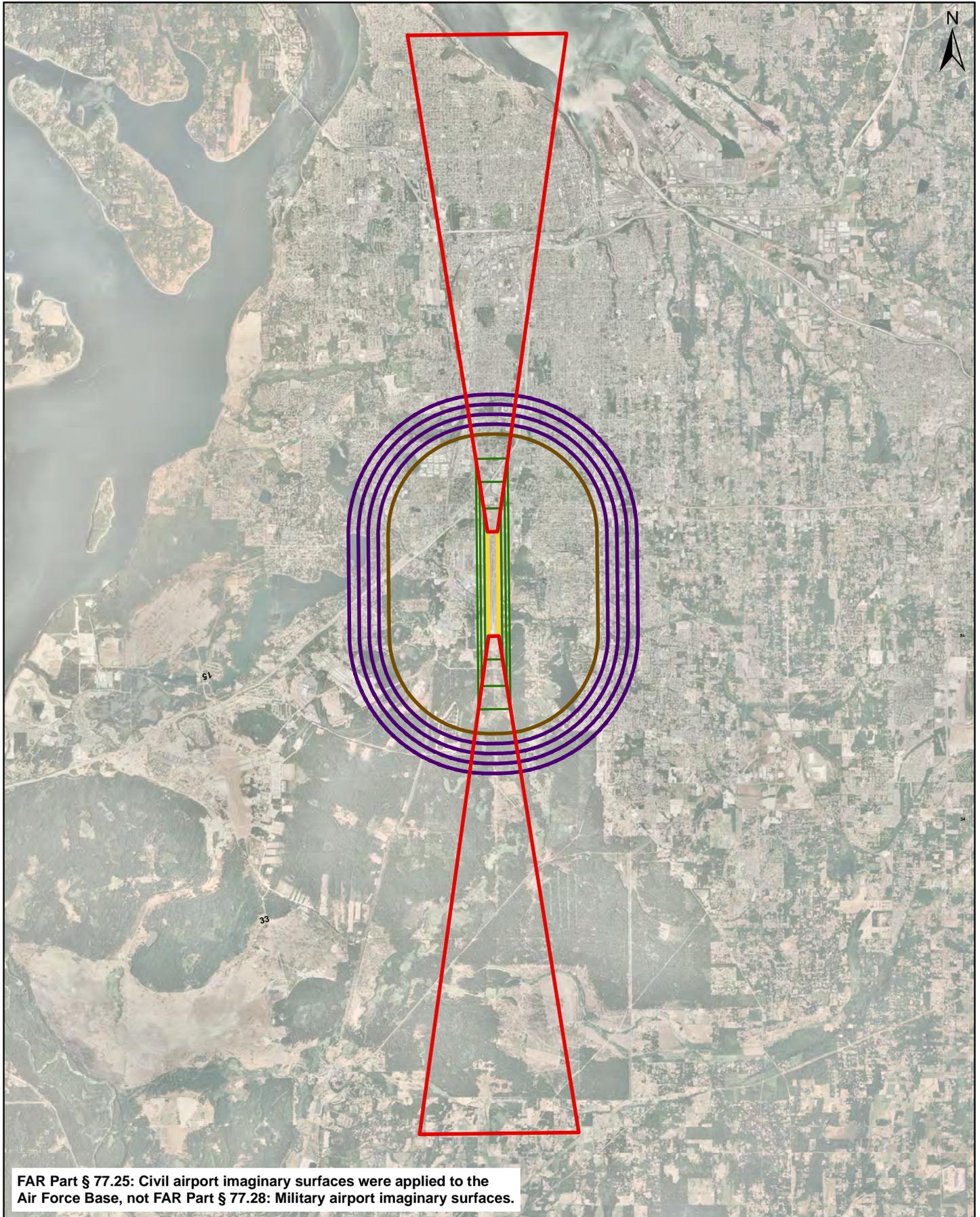
FAR Part § 77.25: Civil airport imaginary surfaces were applied to the Army Field, not FAR Part § 77.28: Military airport imaginary surfaces.

Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



Part 77 Surfaces
Gray Army Field
Pierce County, Washington



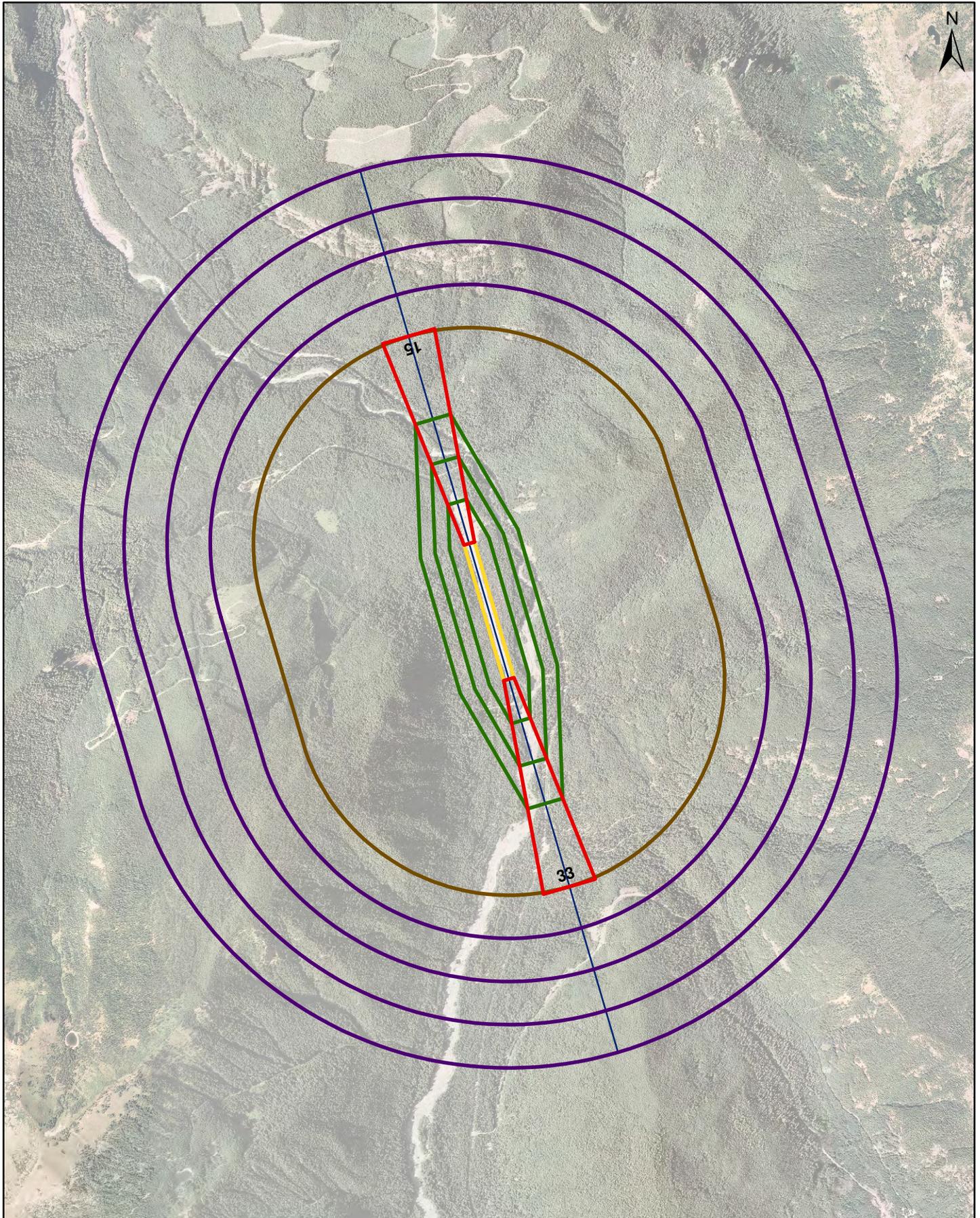
FAR Part § 77.25: Civil airport imaginary surfaces were applied to the Air Force Base, not FAR Part § 77.28: Military airport imaginary surfaces.

Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



Part 77 Surfaces
McChord Air Force Base
Pierce County, Washington

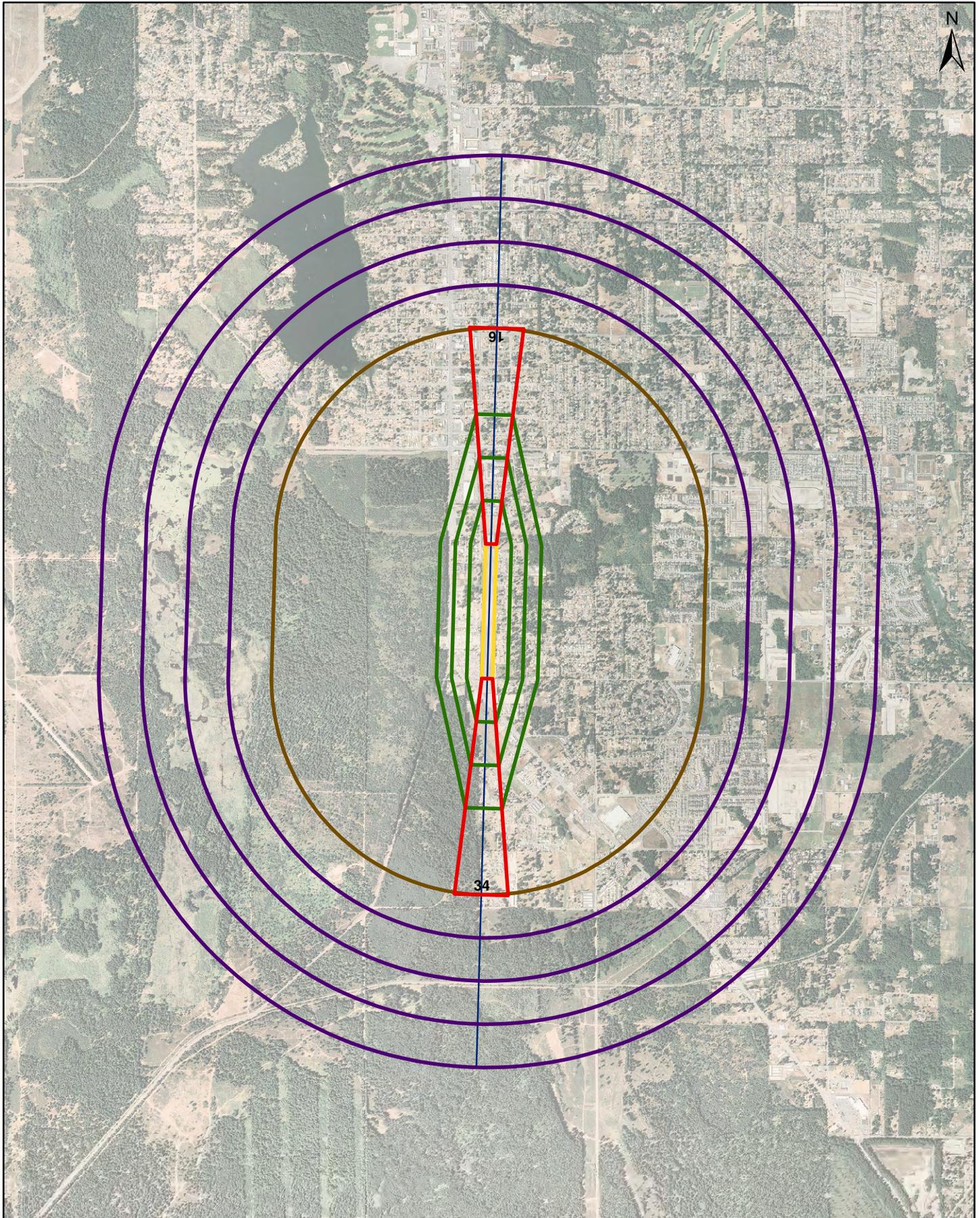


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

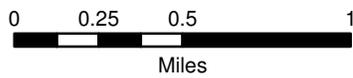


**Part 77 Surfaces
Ranger Creek State Airport
Pierce County, Washington**

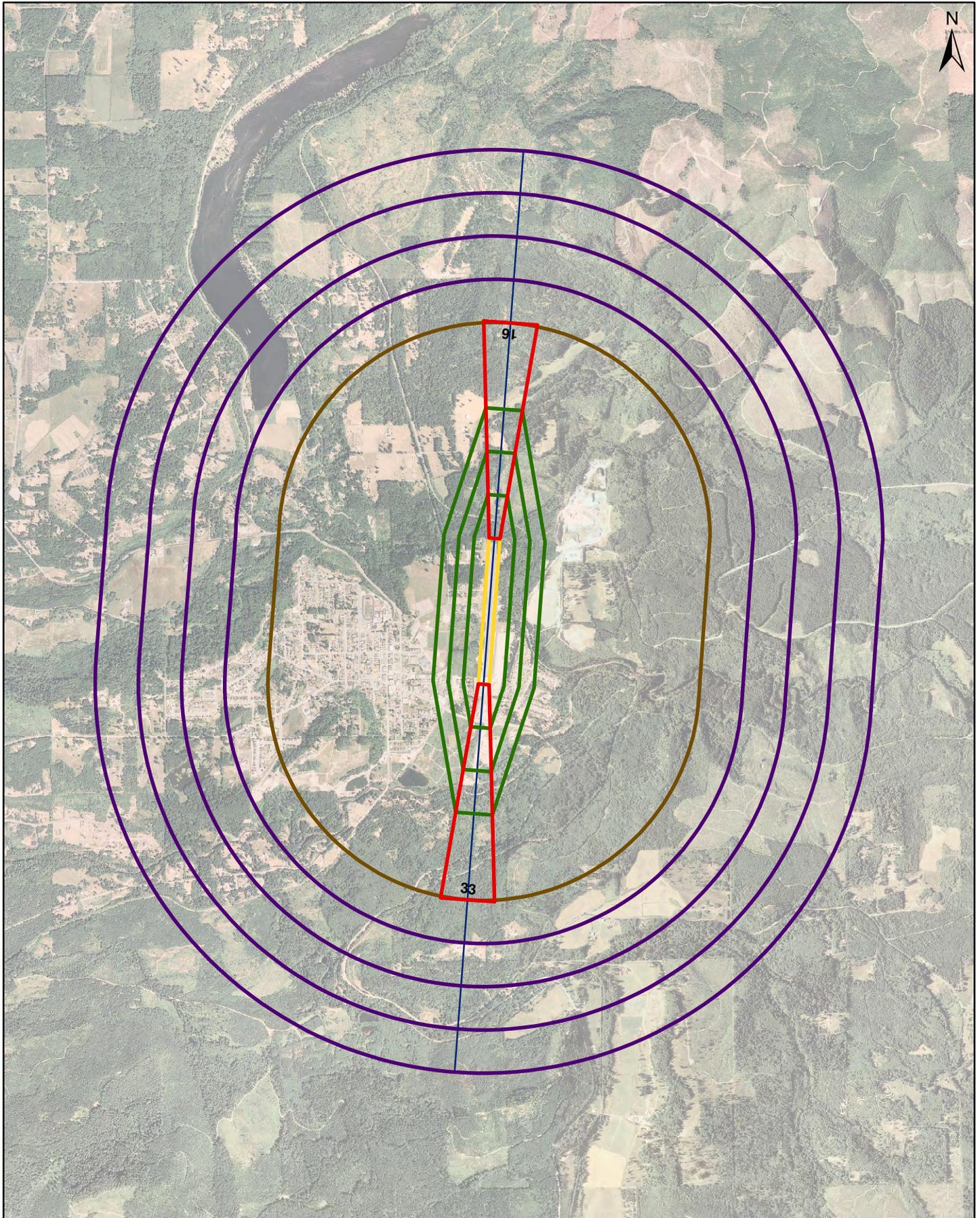


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



**Part 77 Surfaces
Spanaway Airport
Pierce County, Washington**

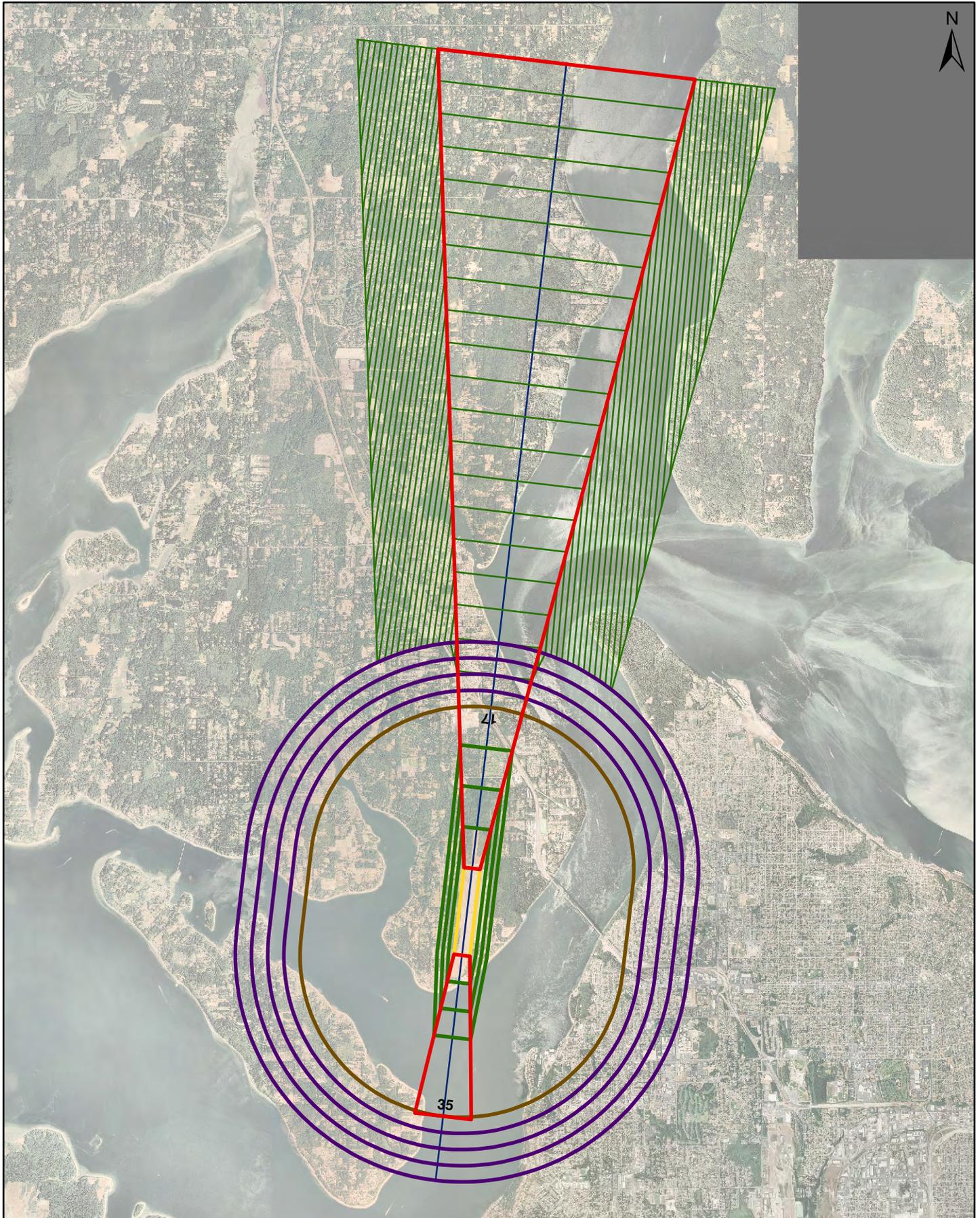


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



**Part 77 Surfaces
Swanson Field
Pierce County, Washington**

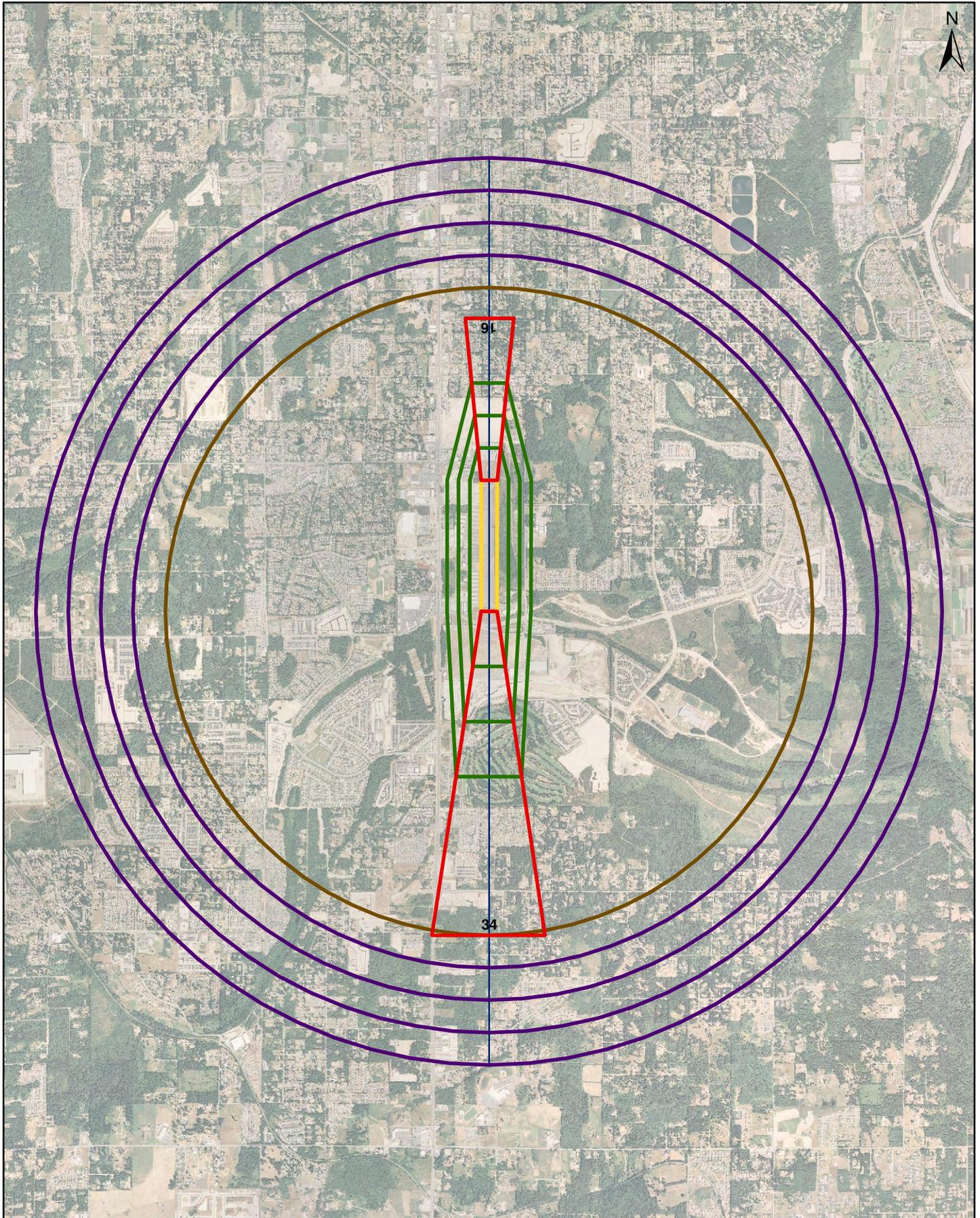


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline

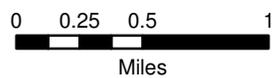


**Part 77 Surfaces
Tacoma Narrows
Pierce County, Washington**



Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

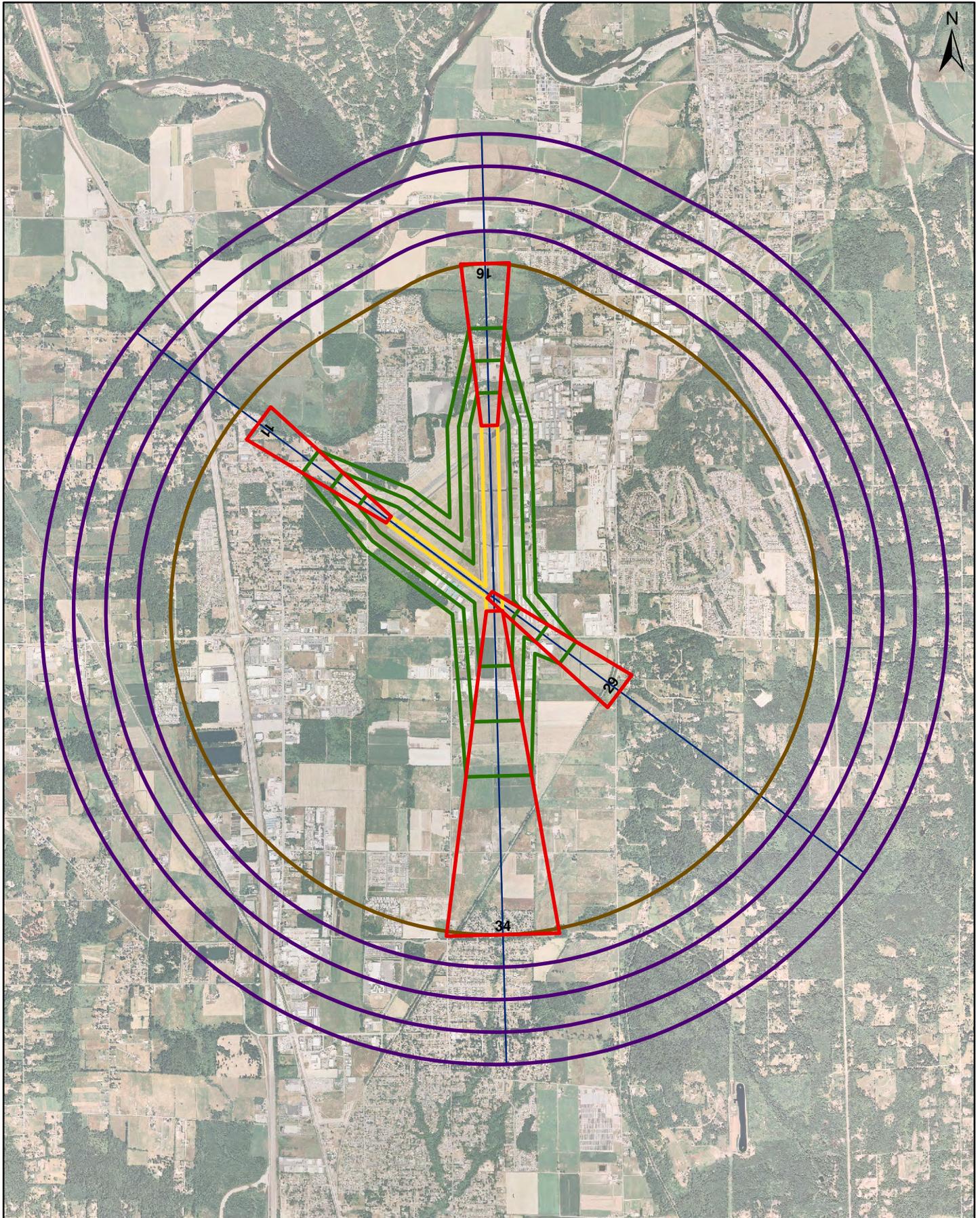


Part 77 Surfaces
Pierce County - Thun Field
Pierce County, Washington



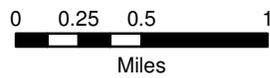
- Part 77 Surfaces**
- ▭ Approach
 - ▭ Primary
 - ▭ Transitional
 - ▭ Horizontal
 - ▭ Conical
 - Centerline



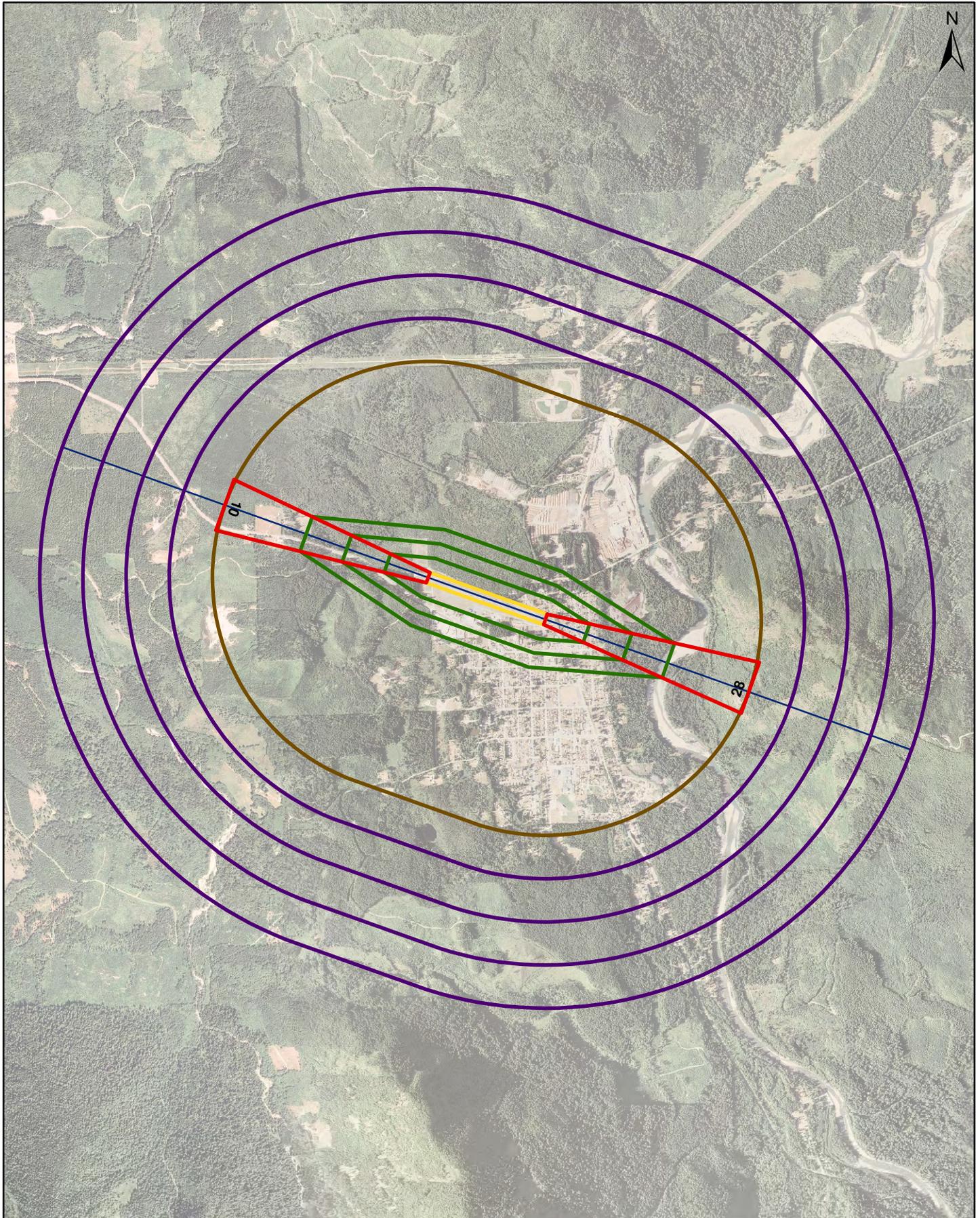


Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline

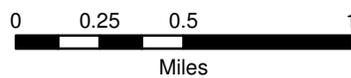


Part 77 Surfaces
Arlington Municipal Airport
Snohomish County, Washington

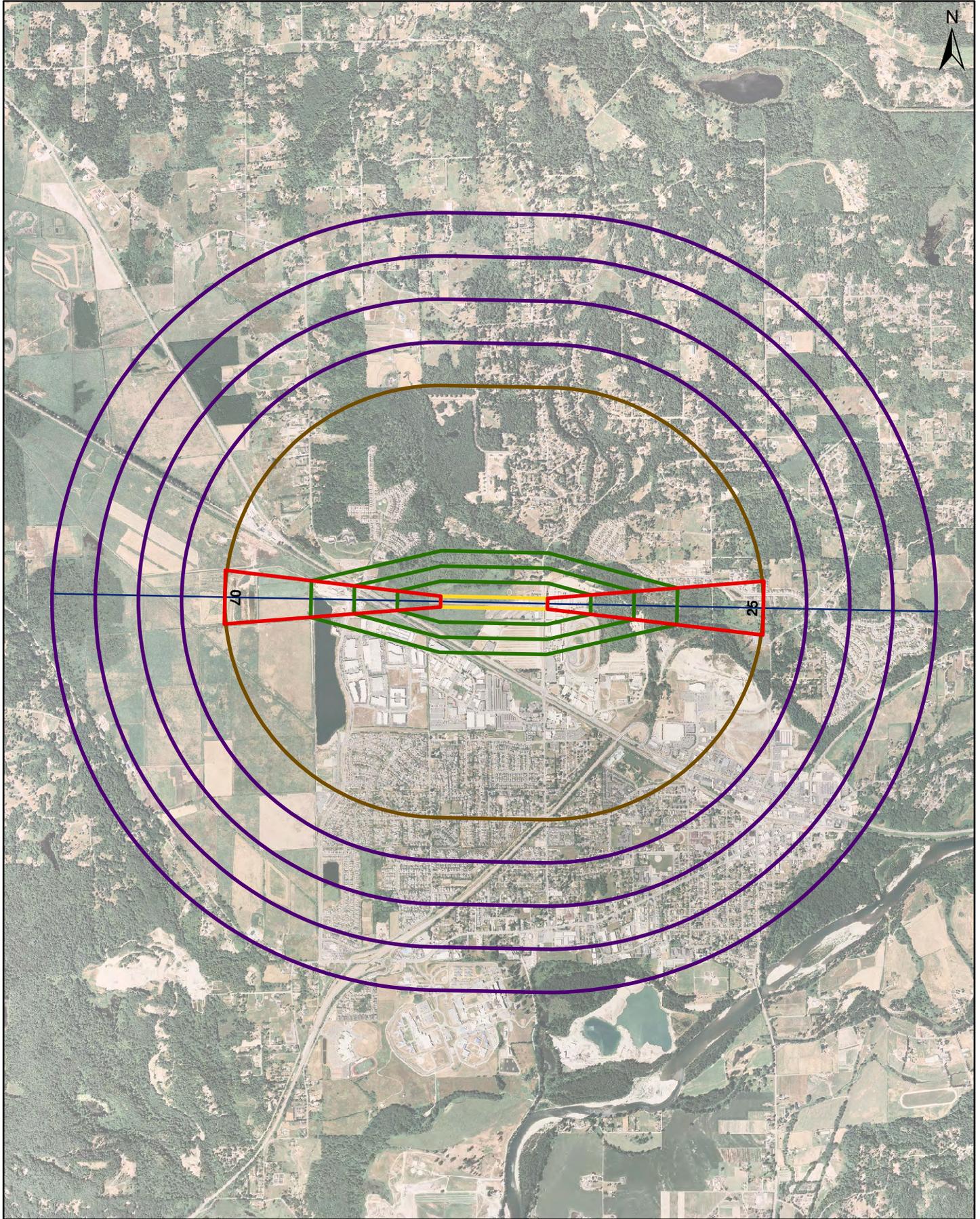


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline

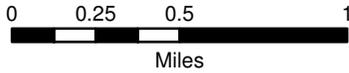


Part 77 Surfaces
Darrington Municipal Airport
Snohomish County, Washington

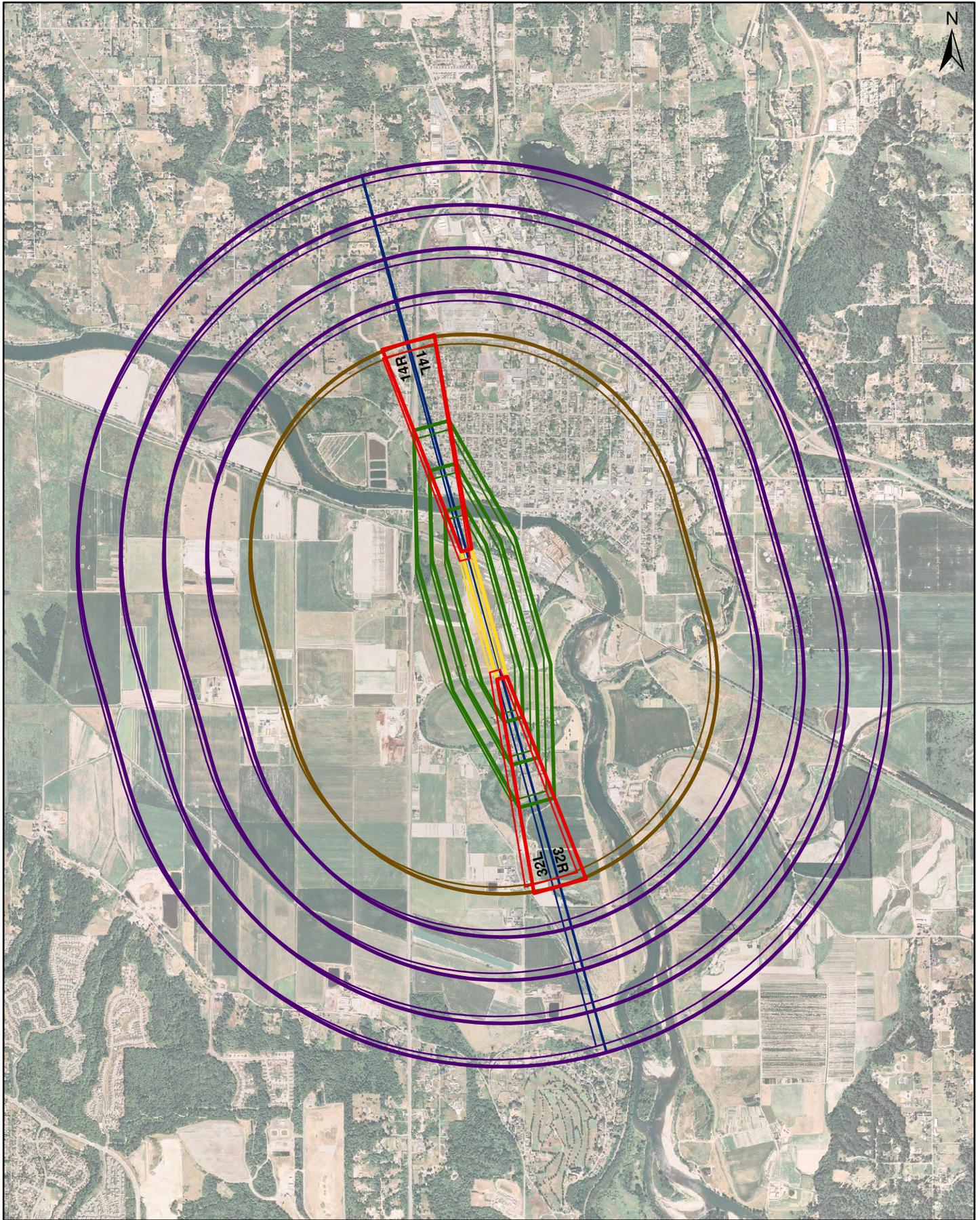


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline

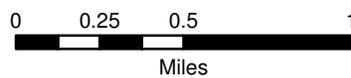


**Part 77 Surfaces
Firstair Field
Snohomish County, Washington**

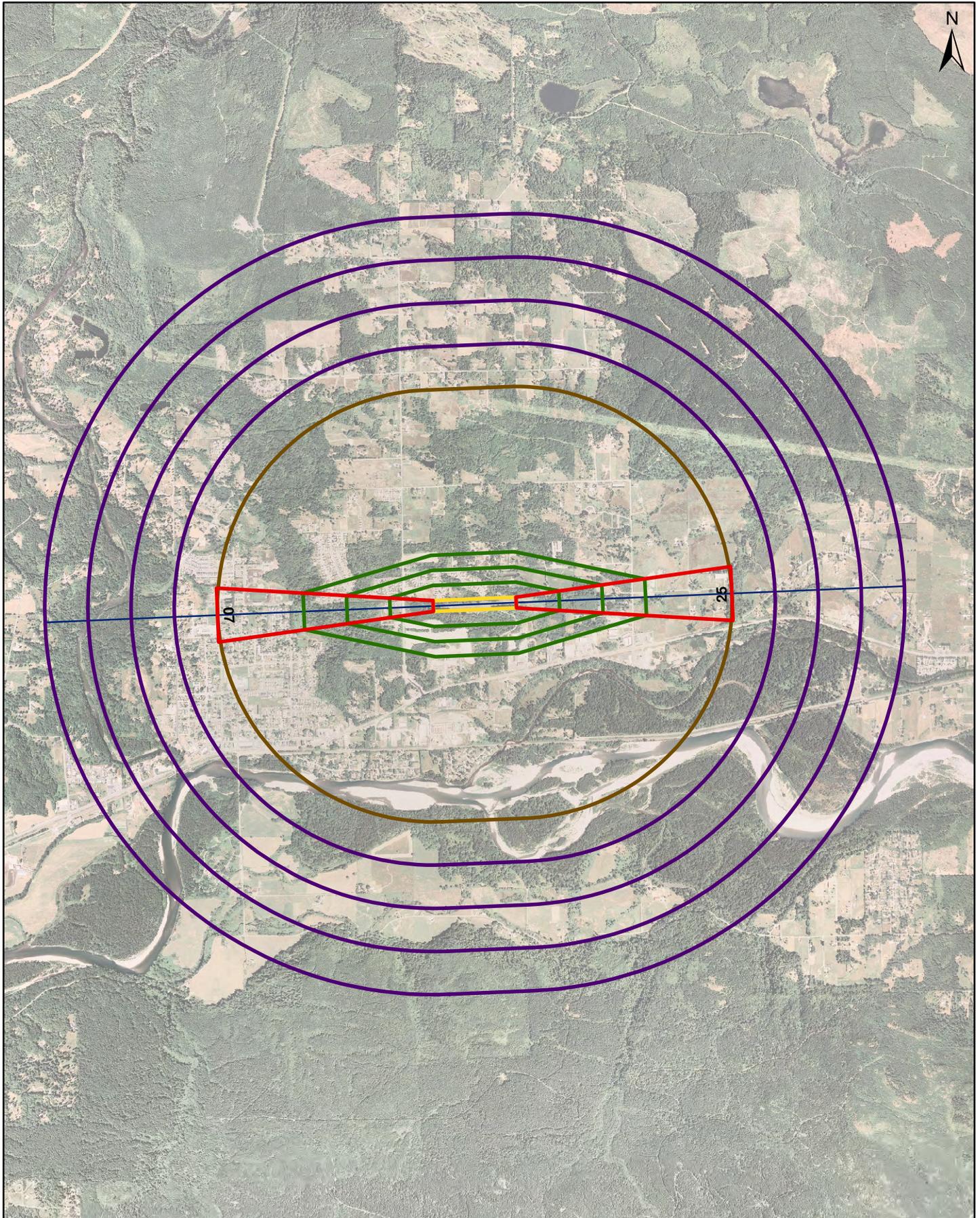


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



**Part 77 Surfaces
Harvey Field
Snohomish County, Washington**

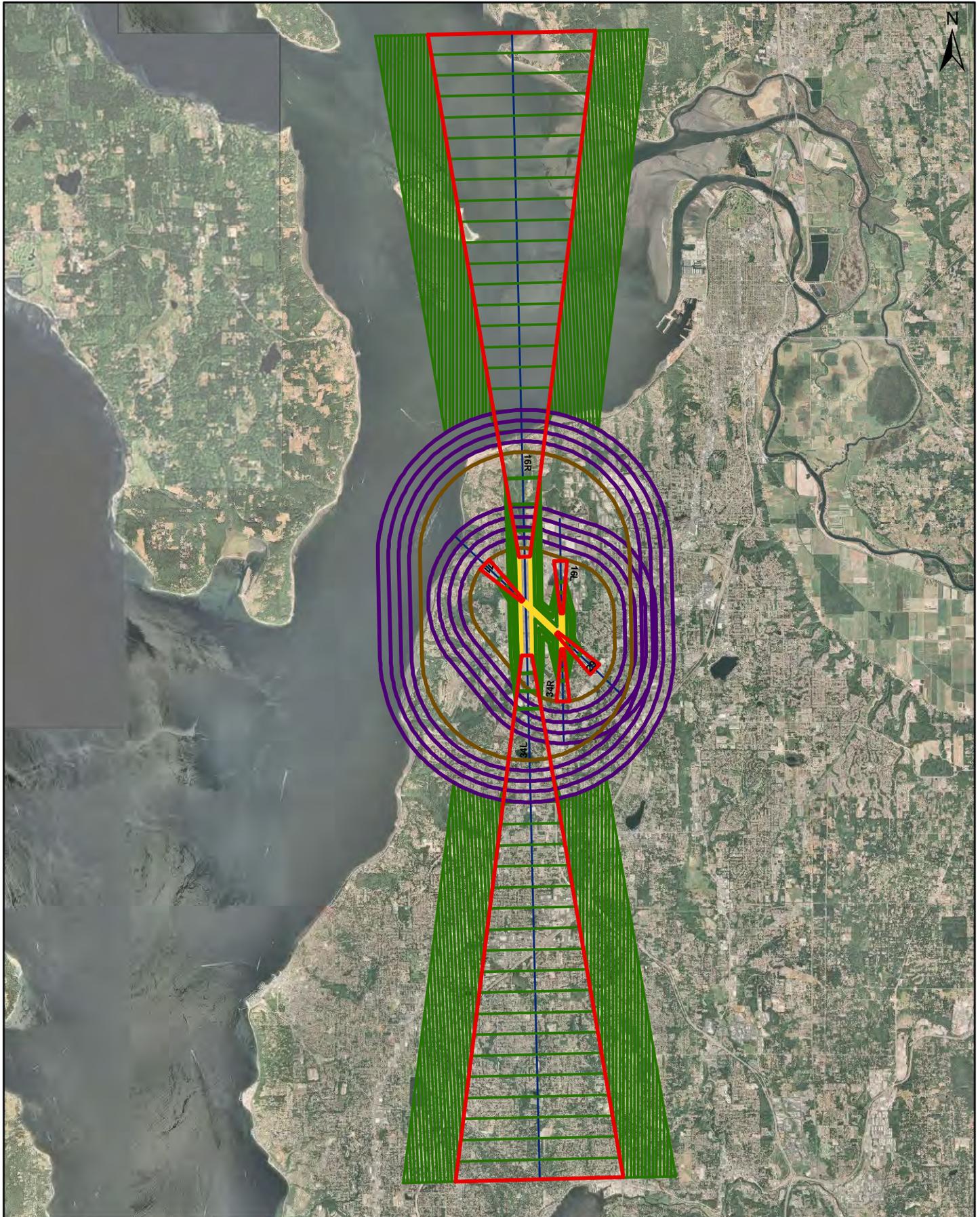


Part 77 Surfaces

- ▭ Approach
- ▭ Transitional
- ▭ Conical
- ▭ Primary
- ▭ Horizontal
- Centerline



Part 77 Surfaces
Sky Harbor Airport
Snohomish County, Washington



Part 77 Surfaces

- Approach
- Transitional
- Conical
- Primary
- Horizontal
- Centerline



**Part 77 Surfaces
Snohomish County - Paine Field
Snohomish County, Washington**

APPENDIX C

Case Study Summary Reports - Bremerton National and Pierce County Airport /Thun Field

Summary of Bremerton National Airport Land Use Compatibility Meetings

Consulted Parties Include:

Kitsap County

Larry M. Keeton	Director, Department of Community Development
Jeff Smith	County Planner

Port of Bremerton

Fred Salisbury	Director, Airport/Industrial Operations
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City of Bremerton

Andrea Spencer	Director of Community Development
Phil Williams	Director of Public Works and Utilities
Lindsey Sehmel	Long Range Planner

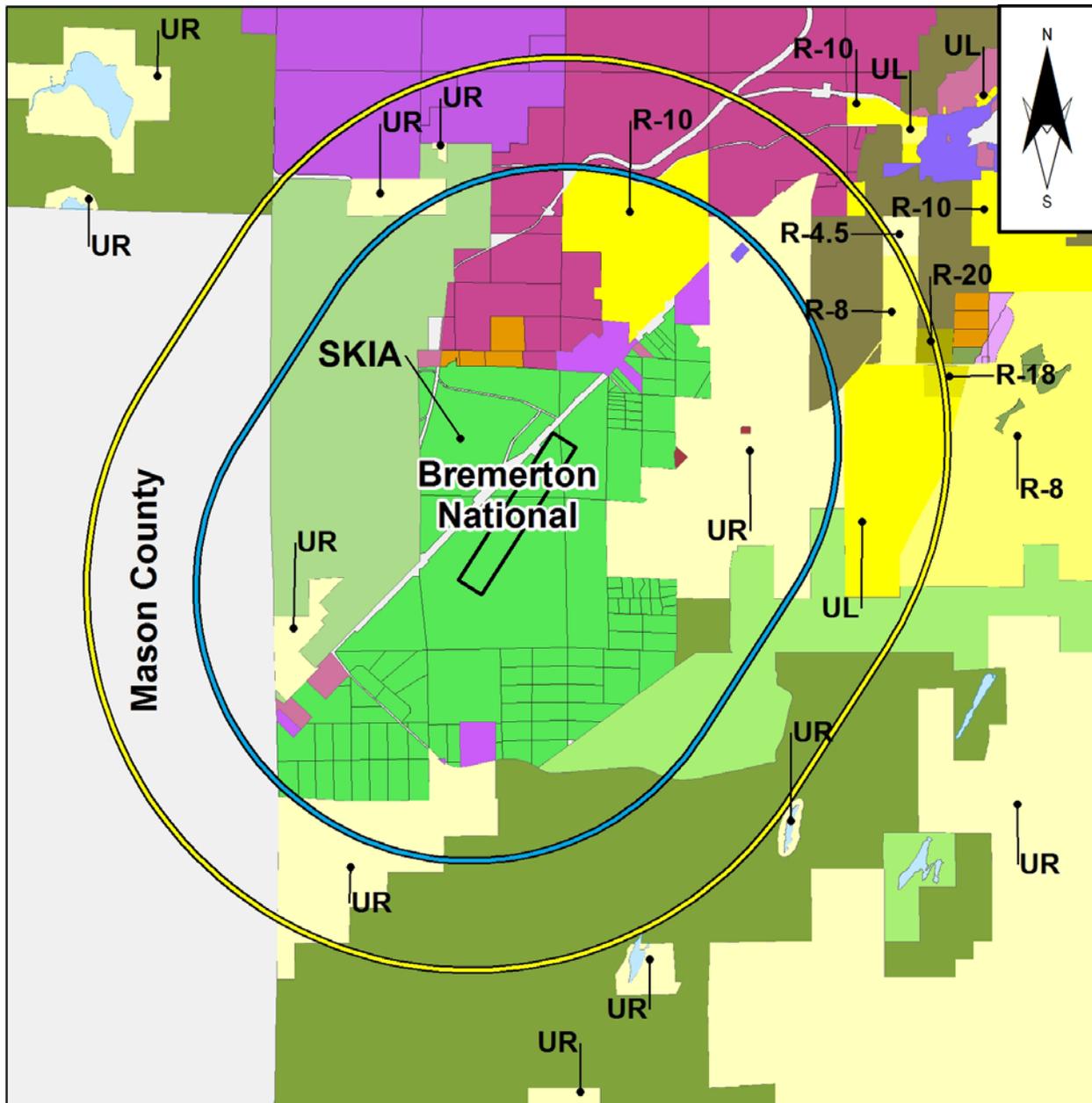
City of Port Orchard

James Weaver	City Development Director
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Introduction and Overview

Bremerton National Airport is part of the South Kitsap Industrial Area (SKIA) that was recently annexed by the City of Bremerton from Kitsap County. The area surrounding the Airport is largely undeveloped, with exception of an industrial park to the north. Parcels within the SKIA were zoned as general industrial upon their annexation by the City of Bremerton. The intent is to complete a sub-area plan which will address intended development of the SKIA in the near future and include land use concerns noted by the Airport such as density, light, dust, and glare. The general consensus among interested parties at this point is that future of the SKIA revolves around it being an employment center for the region.

Under Kitsap County management, the Airport received the support it needed to grow as demand increased. It appears the Port of Bremerton and the City of Bremerton have created a relationship that will allow the Airport to continue to grow. Port Orchard (a bedroom community), Bremerton, and Kitsap County all see the Airport as an economic development tool and a regional asset. The city of Port Orchard and the City of Bremerton coordinate their planning efforts, with help from the Kitsap Regional Coordinating Council, to protect the valuable economic resource. Officials from these governments report the Airport is a good neighbor and is perceived well by the public. The Airport enjoys some anonymity in light of the noise and activity generated by the naval facilities in Bremerton and Bangor to the northwest. It is the opinion of the consulted officials that residents of this area see aircraft activity as a way of life.



- Residential 20 (R-20): 20 Dwelling Units/ Acre Maximum**
- Urban Medium Residential (UM): 18 Dwelling Units/Acre Maximum**
- Low Density Residential (R-10): 10 Dwelling Units/Acre Maximum**
- Urban Low Residential (UL): 9 Dwelling Units/ Acre Maximum**
- Residential 8 (R-8): 8 Dwelling Units/Acre Maximum**
- Residential 4.5 (R-4.5): 4.5 Dwelling Units/Acre Maximum**
- Urban Restricted (UR): 1 Dwelling Unit/ 5 Acres Maximum**

Source: City of Bremerton: Title 20, Land Use, passed December 2, 2009
 City of Port Orchard: Title 16, Land Use Regulatory Code
 Kitsap County: Title 18, Zoning Ordinance, passed October 21, 2009

Future Development and Compatibility Strategies

All parties involved have different strategies about ensuring airport land use compatibility. While airport activities such as noise or over-flight may impact some areas more than others, local planning agencies recognize the importance of protecting and promoting the Airport in regards to the economic success of the region.

For communities less impacted by day to day activities at the Airport, some planning strategies include:

- Incorporating the airport's location into transportation plans. This action recognizes the employment potential that the airport currently has, and will continue to have with development of the SKIA.
- Collaborating planning efforts with other communities in the region to ensure communities grow in support of the region rather than competing against one another which could jeopardize the Airport's future development.

Communities more directly impacted by the Airport have to undertake additional steps to ensure land use compatibility. Some of the steps that these communities have undertaken include:

- Including avigation easements in land titles for properties within the airport's approach corridors to prevent property owners from building in such a way that would jeopardize safe operations in and out of the Airport.
- Initiating a public outreach program during the most recent airport master plan update to involve and inform the public about the Airport's future development.
- Limiting density on land near the Airport that has residential zoning to one unit over several acres.
- Imposing height restrictions on rural land which will prevent structures from penetrating the airport's surfaces and becoming hazards to navigation (such as the 35 foot height restriction on County land).
- Using the FAA's 7460 obstruction analysis for structures such as water towers and antennas.
- Using the height of a proposed construction project as a trigger for analyzing whether it would impact the Airport.
- Modifying real estate laws to include notices in the titles of houses to notify potential buyers of the existence of the Airport, and possible effects.

Potential Strategies that May Help Protect Airports

Consulted governments had several ideas about tools and strategies that could help make their jobs easier. These ideas ranged from public and inter-governmental outreach and education to creation and distribution of airport related data. All members consulted agreed an online GIS system that could analyze the relationship between a proposed building or structure and the Airport's critical surfaces at a known location would be of tremendous value.

Overall, the governments that surround the Airport are able to act proactively about land use as the Airport is in a largely undeveloped area. At this time, the sub-area plan for the SKIA has not been completed so it is unknown to what extent land use will be regulated. What is known is that there is dialogue between the communities in the area and that they all understand the economic benefit that the Airport brings to the region, thus they will be more likely to protect it from incompatible development.

Summary of Thun Field Land Use Compatibility Meetings

Consulted Parties Include:

Pierce County

Dan Cardwell	Planner 3, Advance Planning Division
Deidre Wilson	Planner 3, Current Planning Selection
Michael Esher	Airport and Ferry Administrator

City of Puyallup

Tom Utterback	Planning Director/ Assistant Development Director
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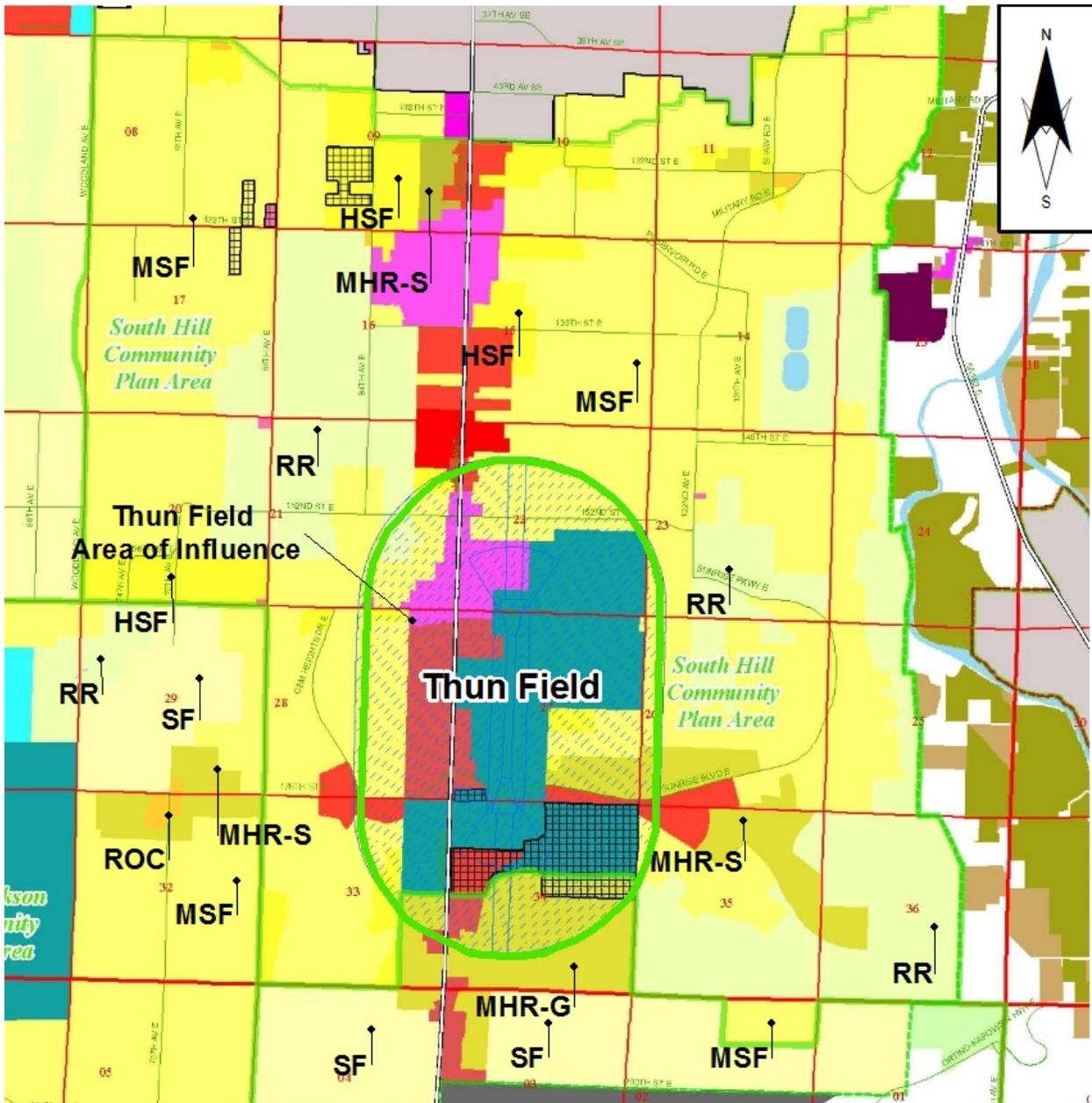
Introduction and Overview

Thun Field is owned and managed by Pierce County. The Airport is landlocked by development on all sides and has limited property to expand. Tension exists between the Airport and the surrounding community due to the presence of extensive residential development in the vicinity; however relations have been improving lately. The county has regulations in place to protect the airport, yet despite these regulations, historical development has still placed incompatible land uses around the airport.

Existing regulations pertaining to land use compatibility focus on reducing density, being more conducive to single family residential than multifamily residential, for example. Additional regulations pertain to the amount of open space required on a property or the number of parking spaces allowed, which are used to control the density of a given parcel. As a result, developers have been able to tailor their developments to the regulations, which while limiting density, has not protected the Airport from incompatible development. Evidence of this can be seen by the scale of single family housing development that surrounds the Airport.

Additional protections in place include height restrictions within the different zones. Local governments believe that these height restrictions keep development out of the Airport's Part 77 surfaces, and that the FAA's 7460 process, which is a hazard evaluation for tall structures, has protected the Airport from incompatibly tall land uses.

In turn with protection from local agencies, the airport has taken steps to be a good neighbor. The Thun Field Advisory Commission (TFAC) has been created as a liaison between the airport and the county. It consists of members from aviation and non-aviation backgrounds, and leaders of local communities. The TFAC reviews land use permits on and near the Airport (within 1,000 feet), while also working towards minimizing the Airport's impact on the surrounding area, such as publishing noise abatement procedures



Moderate High Density Residential (MHR-S): 20 Dwelling Units/Acre Maximum
Moderate High Density Residential (MHR-G): 15 Dwelling Units/Acre Maximum
High Density Single Family (HSF): 12 Dwelling Units/Acre Maximum
Residential Office Civic Zone (ROC) 12 Dwelling Units/Acre Maximum
Moderate Density Single Family (MSF): 6 Dwelling Units/Acre Maximum
Single Family Residential (SF): 4 Dwelling Units/ Acre Maximum
Residential Resource: 3 Dwelling Units/Acre Maximum

Source: Title 18A, Pierce County Development Regulations - Zoning
 Pierce County Zoning Map, Effective June 1, 2009

Future Development and Compatibility Strategies

The majority of future compatibility plans stem around maintaining the Airport's image as a good neighbor and minimizing the impacts that future development will have on the airport. The Airport is seen as an economic engine for the region and has recently undergone a land use study on its property. This study provided a dollar amount that the Airport adds to the region's economy, as well as highlighting how it serves as a search and rescue base and its potential to be utilized in the event of an emergency. Local regulatory agencies have the following strategies to protect the Airport:

- Improve communication and coordination between county planning and aviation departments.
- Expanding the 1,000 foot buffer around the airport, within which the TFAC reviews land use permits to allow the airport to have a greater voice in local development.
- Reinforce the development objectives found in the South Hill community plan and ensure that these development objectives are followed during development review.
- Educating members of development boards and advisory committees about the importance of the Airport and also about land use compatibility.
- Incorporating the airport master plan into the South Hill master plan, which opens the Airport's planning process to greater public exposure.

Potential Strategies that May Help Protect Airports

Local governments agree that better education of their staff is vital to both the protection of the Airport and the acceptance of the Airport within the community. It was stated that local planners understand there are rules and regulations pertaining to development near the Airport, but many lack the experience that provides them with why these regulations exist. Also discussed was the need to educate real estate agents and land developers on building and living near airports, along with updating development practices to be more sensitive to the type of land use versus the density at which the use is occurring.

Review of the policies surrounding disclosure notices for property owners may have a positive impact on the type of development that occurs around the Airport. All developers receive these notices but they are not obligated to pass them on to their customers unless the property is within the 65 DNL noise contour, which mostly occurs on Airport property. During the single family residential boom of the 1980's and 1990's, the area saw a surge in residential development which has since created tension between the Airport and the community.

Not all of the issues surround local land use can be solved at the local level. Comprehensive planning at a regional level must occur to ensure long term viability of airports. Furthermore, local governments hope that solutions to these problems can be facilitated through a point of contact at the FAA that can consult and educate government staff. A major concern about reaching out to the FAA at this point in time is that the response is often not quick enough to meet the County's deadlines with developers. The individuals that participated in this discussion believed that a point of contact with the FAA would be beneficial in developing and modifying regulations, as well as consultation during development proceedings.

One potential tool that generated interest amongst the parties consulted was an online geographical information system (GIS) that placed airport Part 77 surfaces on a map. Consulted parties agreed that a GIS system would speed up their work and allow them to make more informed decisions about land use. This system would enable planners to plot a point and height, then run a report which revealed the possible extent of a structures impact on the Airport. Although several governments have the Part 77 surfaces outlines on their maps, they are not three dimensional. Planners are looking for a tool that will enable them to see how much space is available between the ground and the surface so they get a more accurate sense of the scale of Part 77. Up to this point, the common practice has been for developers to use the 7460 form to run this analysis, but the local governments would also like the ability to do so.

APPENDIX D

Land Use Analysis Maps for Airports

Auburn Municipal Airport – King County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Compatible (Industrial/warehouse) except for outer approach of Runway 34.

Transitional Surface: Industrial/warehousing/commercial. Current level of development acceptable, recommend easement to stop taller development.

Horizontal Surface: Low density residential development to east may be impacted by noise. Recommend easement on existing property, and transfer of development rights on undeveloped property. Recommend providing property owners with disclosure notices.

Conical Surface: Agricultural lands to the north. Recommend conservation easement. Residential to east and southeast, recommend disclosure notice. Properties may be too far from airport to be adversely impacted. Other uses compatible.

Future Land Use

City of Auburn: Comprehensive plan indicates potential annexation from county north of runway 16 approach surface. Land is currently residential. There is significant potential for commercial and industrial development west of airport within horizontal surface as indicated on zoning maps.

Source: City of Auburn Zoning Map, City of Auburn Potential Annexation Areas and Growth Impact Areas Map, Nov. 9th, 2007 Satellite Imagery (Google Earth).

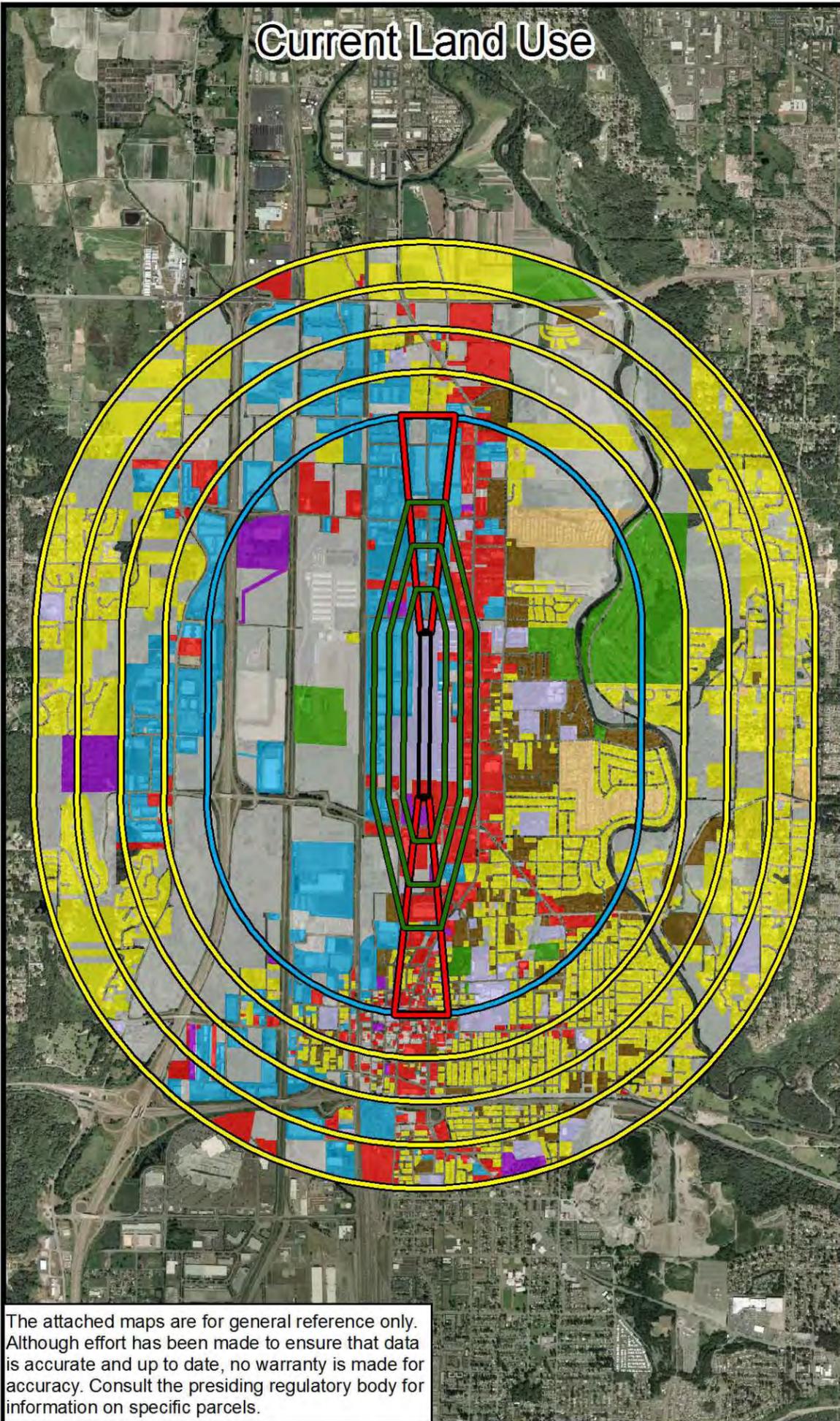
City of Kent: Includes the northern edge of conical surface. Comprehensive plan indicates “urban separator,” and “agricultural support”.

Source: City of Kent Comprehensive Plan (08/2007), Nov. 9th, 2007 Satellite Imagery (Google Earth).

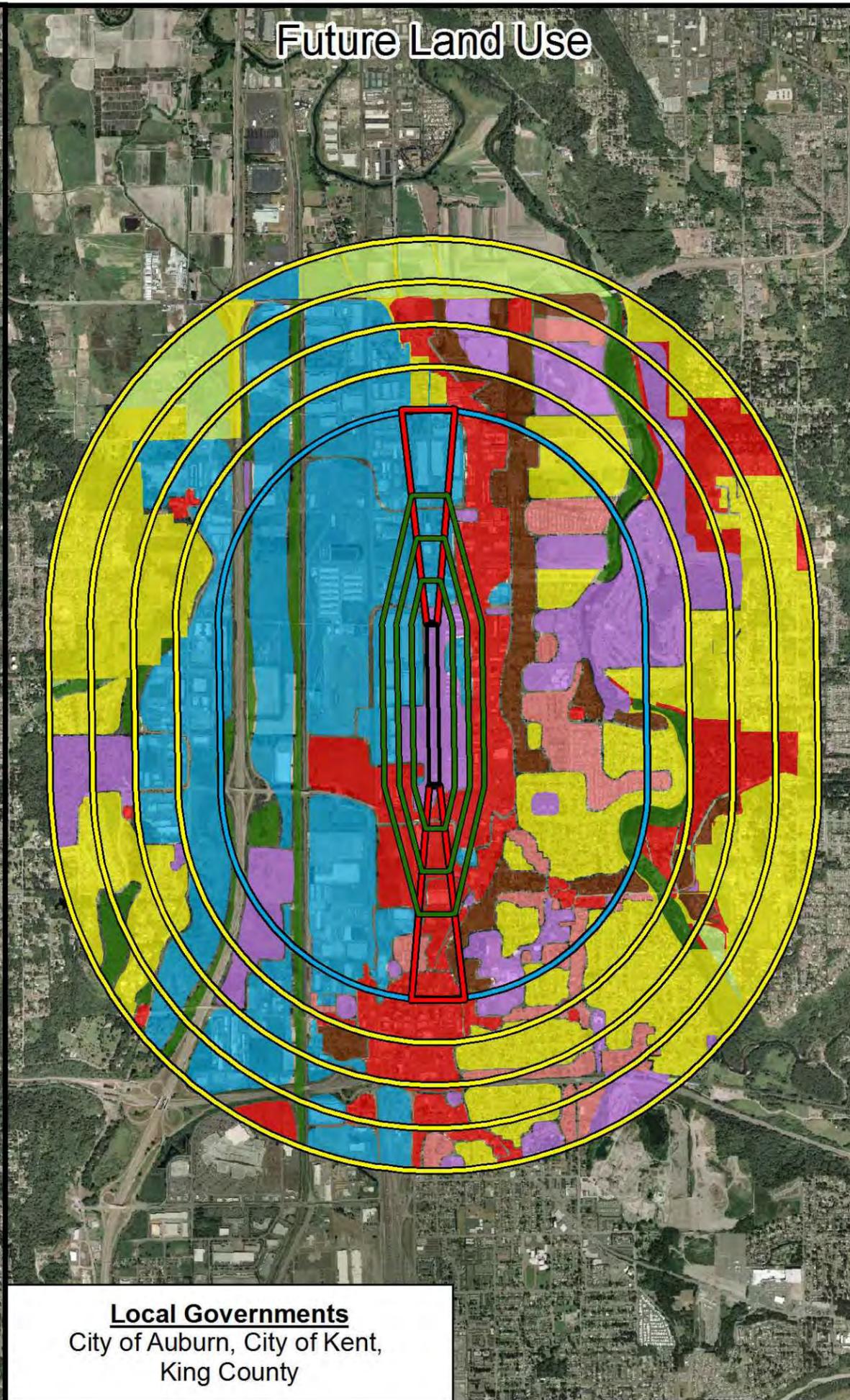
King County: Comprehensive plan indicates agricultural land use in outer northern conical surface. Southeastern area of conical surface indicated as agricultural with 4 parcels of residential in both comprehensive plan map and zoning map.

Source: King County Land Use Atlas, King County Parcel Viewer, Nov. 9th, 2007 Satellite Imagery (Google Earth).

Current Land Use



Future Land Use



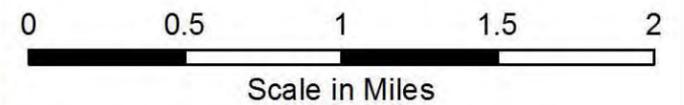
Auburn Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: King County Online GIS (2005)

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

Local Governments
 City of Auburn, City of Kent,
 King County

Bandera State Airport – King County

Current Land Use

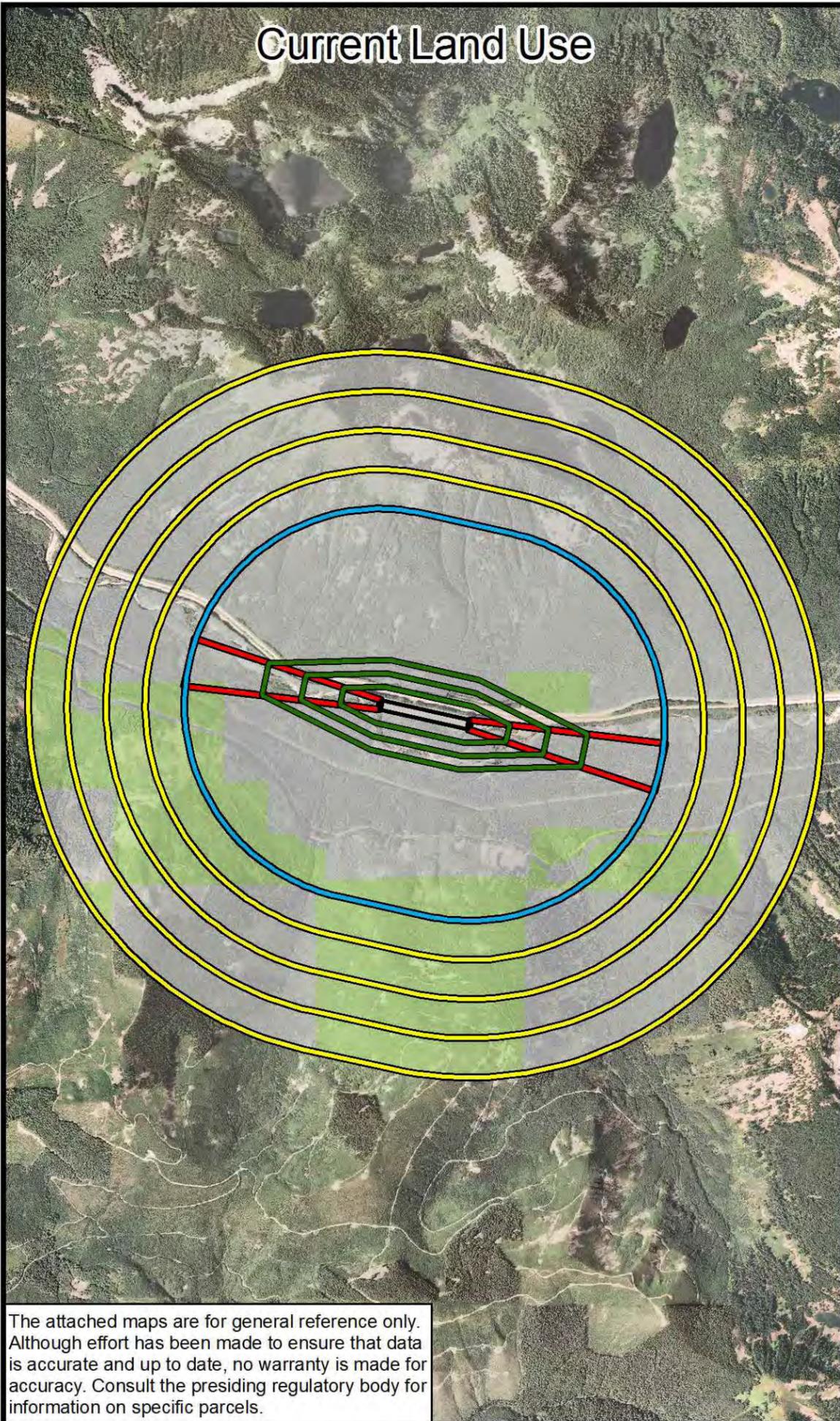
Airport is rural and surrounded by forest. No development was spotted.

Future Land Use

King County: General plan indicates all land use will remain “forestry” or “other parks/wilderness.”

Source: King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use



Future Land Use



Bandera Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture
 Imagery Program (2006)

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Local Governments
 King County

Boeing Field – King County

Current Land Use

There are heavy industrial, residential and commercial uses within the vicinity of the airport.

Primary Surface: On airport property.

Approach Surface: 31R approach mostly located on airport property. Single family residential (SFR) at 31L end, recommend disclosure notices and avigation easements to protect precision ILS approach. Approaches into 13L overfly industrial/warehousing and commercial. Current zoning should limit future development. SFR near runway end 13R, recommend fee simple acquisition. Recommend avigation easement on other properties to protect precision ILS approach.

Transitional Surface: SFR, as mentioned in the approach section. Fee simple acquisition is recommended. Additional single family housing on other side of I-5 on northeast and southeast ends, recommend avigation easement and/ or disclosure notice.

Horizontal Surface: Great number of different land uses. Recommended avigation easement should properties have potential to grow in height, and disclosure notices for properties near the airport. Fee simple acquisition is not financially feasible here.

Conical Surface: No mitigation techniques necessary here. Land is already highly developed.

Future Land Use

City of Burien: Comprehensive plan shows moderate density residential and some intersection commercial in southwestern conical surface, in line with current land use. Extreme eastern edge of city is classified as “Northeast Special Planning Area.”

Source: City of Burien Comprehensive Plan Map, Jan. 2, 2009, Nov. 9th, 2007 Satellite Imagery (Google Earth).

City of Mercer Island: Outer eastern conical area that touches slightly over fifty parcels is developed as residential. The comprehensive plan map indicates no changes.

Source: City of Mercer Island Interactive GIS, Mercer Island Comprehensive Plan Land Use Map, 2008.

City of SeaTac: Southern portion of the conical area. Eastern part is low-density residential, western part is part of North SeaTac park, which, according to the SeaTac comprehensive plan map, is protected until 2041 under agreement by King County, Port of Seattle, and SeaTac.

Source: SeaTac Comprehensive Plan Map, March, 2009.

City of Seattle: Approach areas are and are planned to remain industrial and harbor. Most development already exists. Most open space remains as open space in the comprehensive plan.

Source: City of Seattle Future Land Use Map

City of Tukwila: Most of the southern portion of the airfield falls under Tukwila’s jurisdiction. Comprehensive plan map is from 2007, and planned land uses coincide with current land uses, as does zoning.

Source: City of Tukwila Comprehensive Plan Map, 12/03/07, City of Tukwila Zoning Map, 12/03/07.

King County: Comprehensive plan downzones several areas in the southwest conical area from “residential” and “community business” to King County owned open space. In southeastern conical surface, comprehensive plan downgrades some high density residential zoning to community business.

Source: King County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005, Nov. 9th, 2007 Satellite Imagery (Google Earth).

Current Land Use

Future Land Use

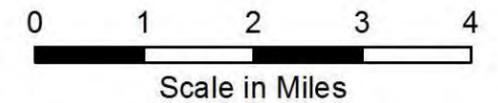
Boeing Field

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:

Land use data: Puget Sound Regional Council (2009)
Aerial Photo: King County Online GIS (2005)

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

Local Governments

City of Burien, King County,
City of Mercer Island City of Seatac,
City of Seattle, City of Tukwila

Crest Airpark – King County

Current Land Use

Primary Surface: On airport property.

Approach Surface: SFR at far end of runway 33 approach. Recommend avigation easement and disclosure notice. Recommend transfer of development rights for undeveloped parcels. Similar issue exists for approaches into runway 15.

Transitional Surface: Recommend avigation easements for developed properties. Recommend conservation easements for undeveloped properties.

Horizontal Surface: Due to airport size and extent of surrounding development, no mitigation will be necessary.

Conical Surface: Due to airport size and extent of surrounding development, no mitigation will be necessary.

Future Land Use

City of Covington: Most of the northern portion of the protected surfaces falls over the city of Covington. The northern conical area covers Covington's entire downtown commercial zone. The airport seems protected by this clause in the Covington zoning code: "18.30.220 Height – Limits near airports. No building or structure shall be erected nor shall any tree be allowed to grow to a height in excess of the height limit established by the local airport height maps. (Ord. 42-02 § 2 (21A.12.190))."

Source: City of Covington Municipal Code, Title 18 "Zoning," City of Covington Zoning Map, August, 2008.

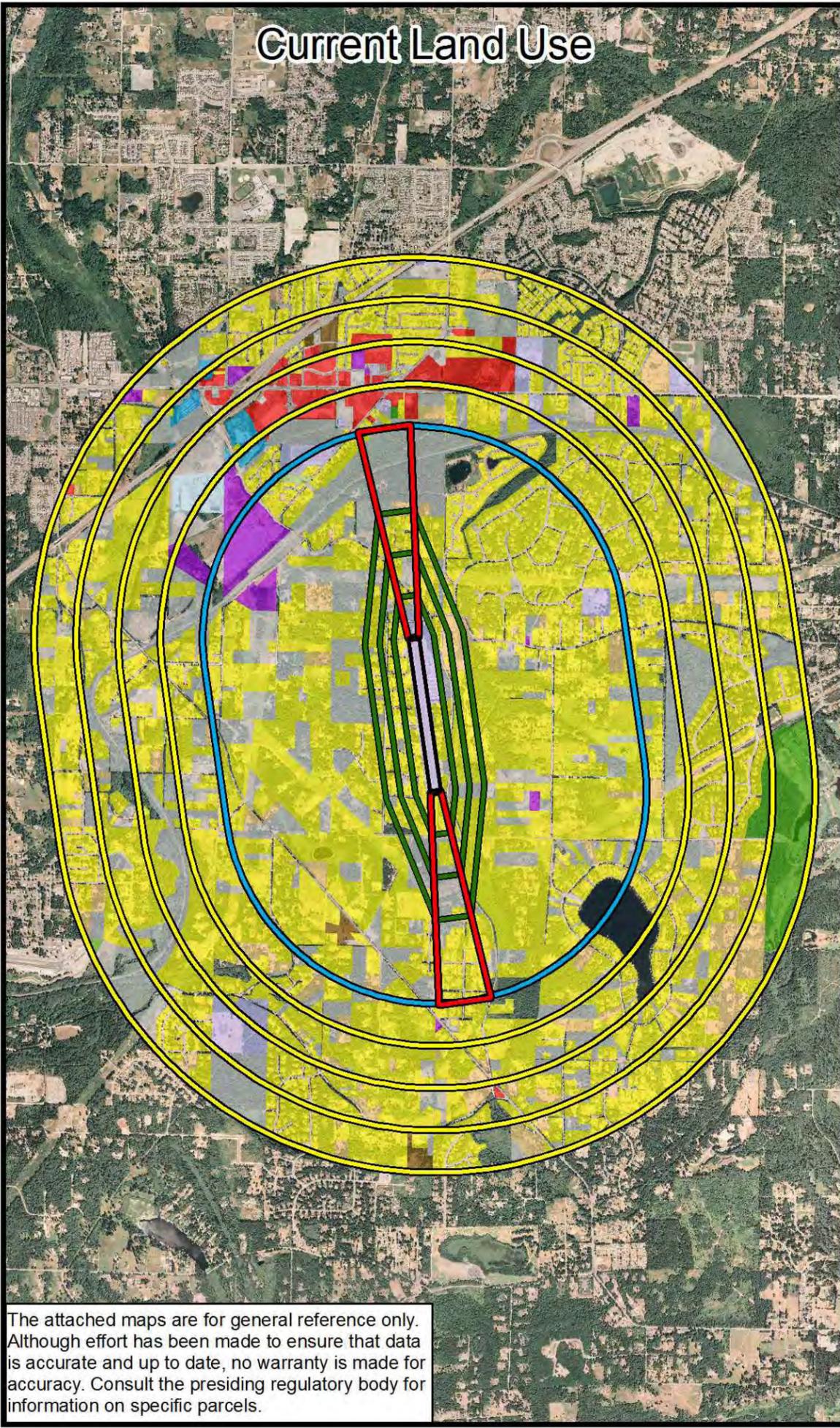
City of Kent: Area in outer northwest conical area currently zoned for low density single family is planned to remain as an urban separator in the comprehensive plan.

Source: City of Kent Zoning Map, August 2007, City of Kent Comprehensive Plan Map, August 2007.

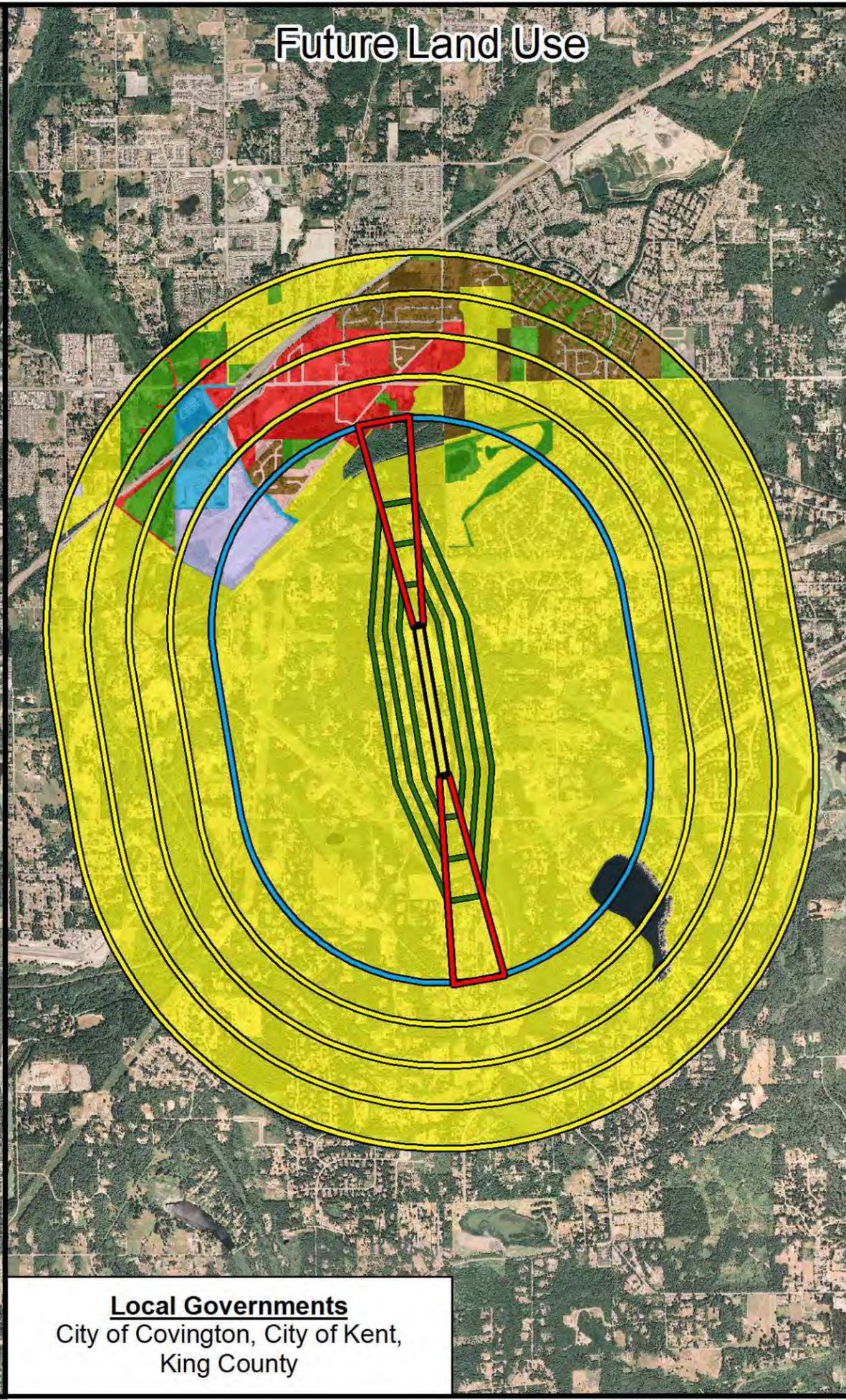
King County: Most of the land in the southern areas of the protective surfaces is under the jurisdiction of King County. Current land use and comprehensive plan both indicate continuation of rural residential land use.

Source: King County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use



Future Land Use



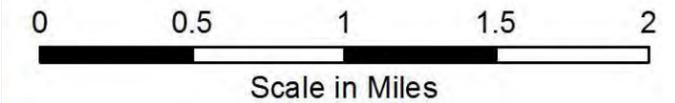
Crest Airpark

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006)

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Local Governments
 City of Covington, City of Kent,
 King County

Lake Union/Kenmore Air Seaplane Base - King County

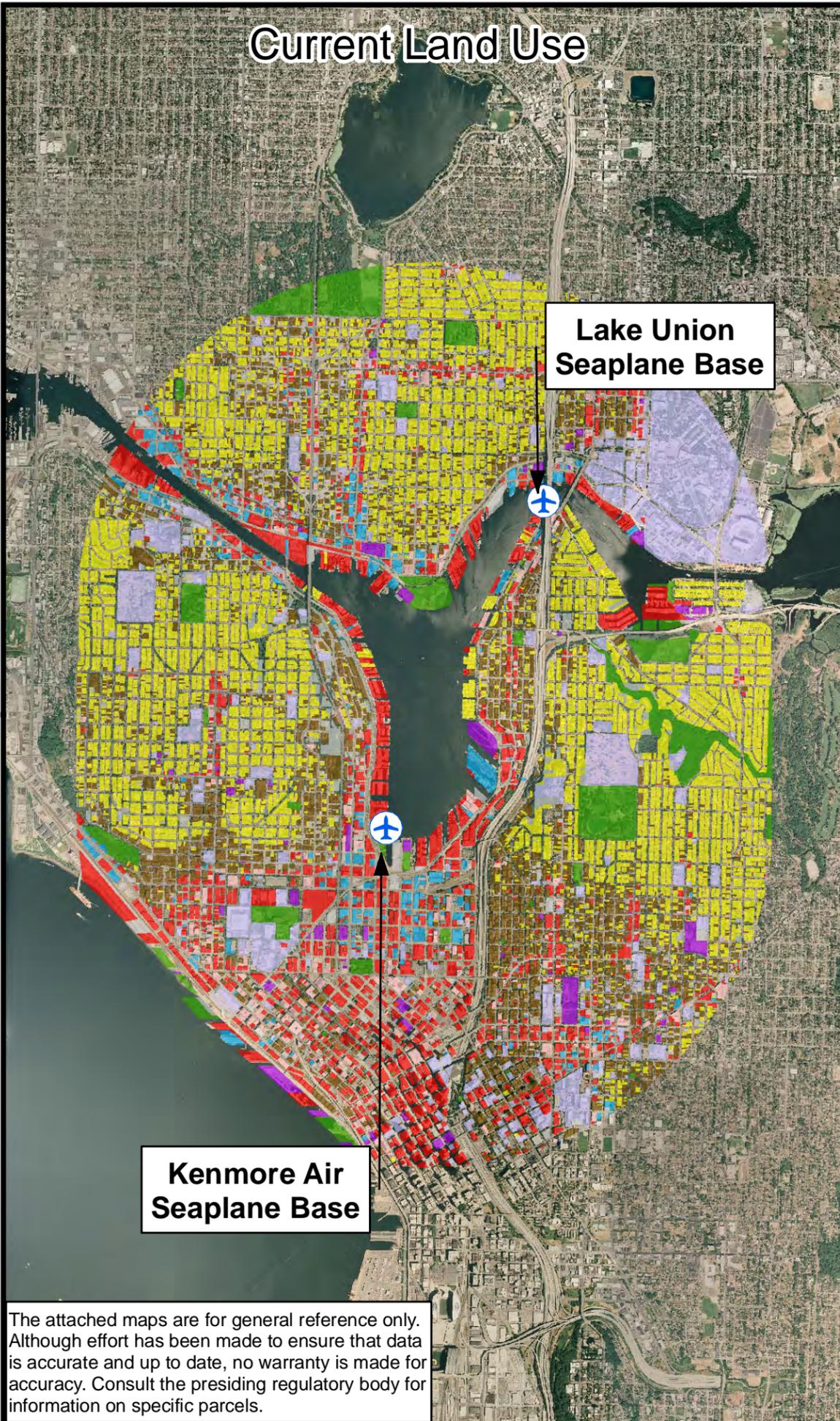
Current Land Use

Lake Union/Kenmore Air Seaplane Base is located at the southwest corner of Lake Union, west of Lake Union Park. Existing land use in the vicinity of the seaplane base is a dense mix of industrial, commercial, and residential uses which encircle the lake. Closest to the lake existing land use included residential along the east shore, including communities of house boats. The west and south shores contain extensive boating and marina uses, while Gasworks Park is located on the north shore. The Northwest Seaport and Center for Wooden Boats are located at the south end, adjacent to the seaplane base. Farther from the lakeshore, mixed commercial and residential uses are the primary land uses in surround communities.

Future Land Use

Future planned land uses will include additional mixed commercial and residential development, with higher densities planned for the areas south of the lake. Future building height is a potential compatible land use issue in the South Lake Union area. Joint planning is needed to insure future planned urban development can be accommodated consistent with continued safe operation of the seaplane base.

Current Land Use

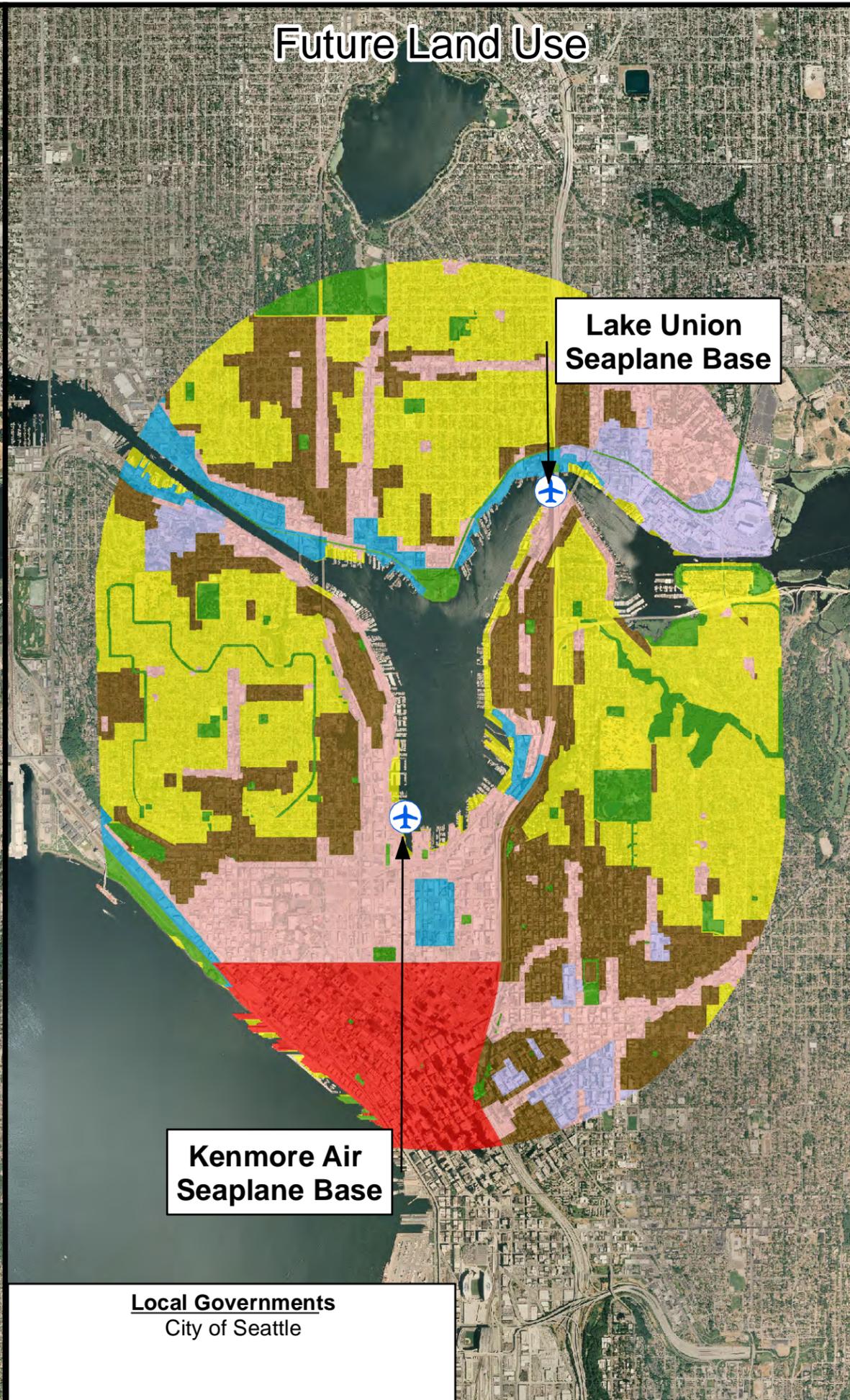


Lake Union Seaplane Base

Kenmore Air Seaplane Base

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Future Land Use



Lake Union Seaplane Base

Kenmore Air Seaplane Base

Local Governments
City of Seattle

Lake Union

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped

14 CFR Part 77 applies to Seaplane Bases only if sea lanes are outline by visual markers. The Airport location latitude and longitude coordinates are reported as estimates on the FAA 5010 form.



Scale in Miles

Sources:
Land use data: Puget Sound Regional Council (2009)
Aerial Photo: USDA National Agriculture Imagery Program (2006)

Renton Municipal Airport – King County

Current Land Use

The Boeing 737 factory is immediately east of airport and lots of SFR near airport.

Primary Surface: On airport property.

Approach Surface: Approach to runway 15 is overwater, and does not need mitigation. Approach to runway 33 has some SFR within $\frac{3}{4}$ of a mile of the threshold. Recommend avigation easement and disclosure notice. If housing is adversely impacted by noise, recommend fee simple acquisition or some sort of sound proofing. Additional SFR located within $\frac{1}{4}$ mile of runway end is recommended for fee simple acquisition or non-suit covenant. Recommend avigation easement to preserve compatibility with other land uses.

Transitional Surface: Recommend avigation easement or fee simple acquisition for SFR where appropriate, otherwise a non-suit covenant. Recommend avigation easement to maintain current compatibility of other land uses like commercial/industrial.

Horizontal Surface: Area very developed. Recommend avigation easement where zoning would allow height expansion. Disclosure notices should be sent to residential properties near airport.

Conical Surface: Same as horizontal recommendation.

Future Land Use

City of Mercer Island: Mercer Island is primarily residential and almost entirely developed. Comprehensive plan and zoning code show no deviation from this type of development.

Source: City of Mercer Island Interactive GIS, Mercer Island Comprehensive Plan Land Use Map, 2008.

City of Newcastle: Northeastern portion of the study area. Comprehensive plan and zoning code show mostly single family residential. Area is highly developed in that aspect. Comprehensive plan and zoning code show preservation of open space.

Source: City of New Castle Comprehensive Plan Map, Amended July 5th, 2005, City of Newcastle Zoning Map, Amended July 5th, 2005.

City of Renton: Comprehensive plan includes county parcels outside city limits. There is a potential for further commercial development off runway end 33. Current commercial uses exist, but there is potential for increased density. Zoning and comprehensive plan are consistent with one another, as are comprehensive plan and King County zoning where they overlap to the west.

Source: King County Parcel Viewer, City of Renton Comprehensive Plan Map, December 8th, 2008, City of Renton Zoning Map, December 18th, 2008.

City of Seattle: Comprehensive plan shows area in northwestern conical surface remaining single family residential with intermittent open space. Density increases at outermost reach of conical surface (Rainer & 56th Avenues). Current zoning/land use are consistent with general plan.

Source: Seattle Department of Planning and Development Online GIS, City of Seattle Comprehensive Plan Future Land Use Map, Nov. 9th, 2007 Satellite Imagery (Google Earth).

City of Tukwila: Comprehensive plan indicates northeastern Tukwila is mostly residential while southeastern Tukwila is mainly commercial. The northeastern corner of the Tukwila urban center is located in the outer southwestern portion of the horizontal surface. Zoning map and general plan map are largely consistent with one another beneath airport surfaces.

Source: City of Tukwila Comprehensive Plan Map, 12/03/07, City of Tukwila Zoning Map, 12/03/07.

King County: City of Renton includes King County land on their Comprehensive Plan map (See: City of Renton in this section). King County Zoning and King County comprehensive plan show area to the west of the airport, in the horizontal and conical surfaces, remaining residential with some commercial and open space. This is consistent with current land use.

Source: King County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use

Future Land Use

Renton Municipal Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006)

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Local Governments

King County, City of Mercer Island,
 City of Newcastle, City of Renton,
 City of Seattle, City of Tukwila

Will Rogers/Wiley Post Seaplane Base - King County

Will Rogers/Wiley Post Seaplane Base is located at the northwest corner of Renton Municipal airport on the shore of Lake Washington, just west of runway 16. The seaplane base shares property with Renton airport. Existing and future land use information relative to the seaplane base can be found on adjoining pages for Renton Municipal Airport.

Current Land Use

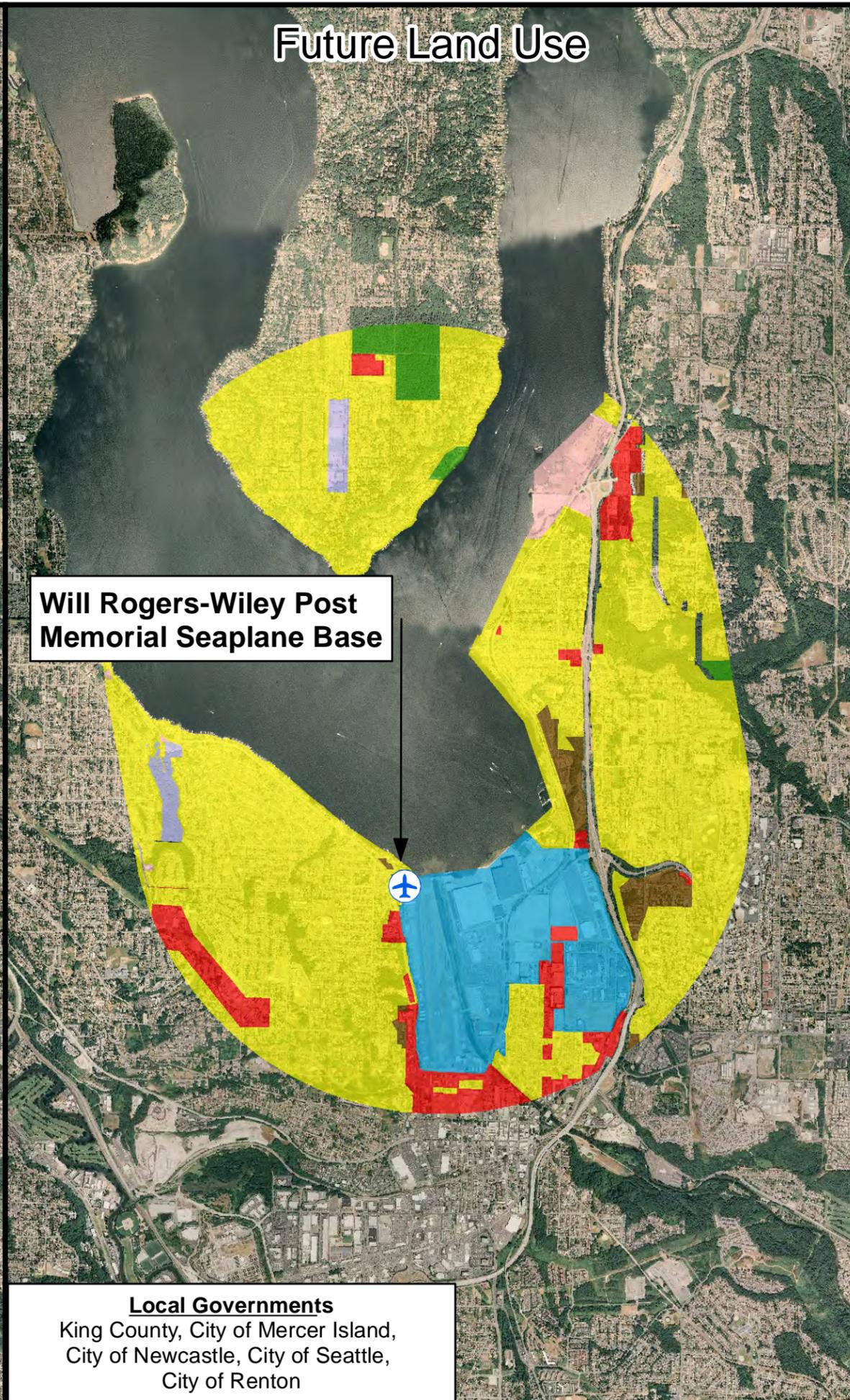
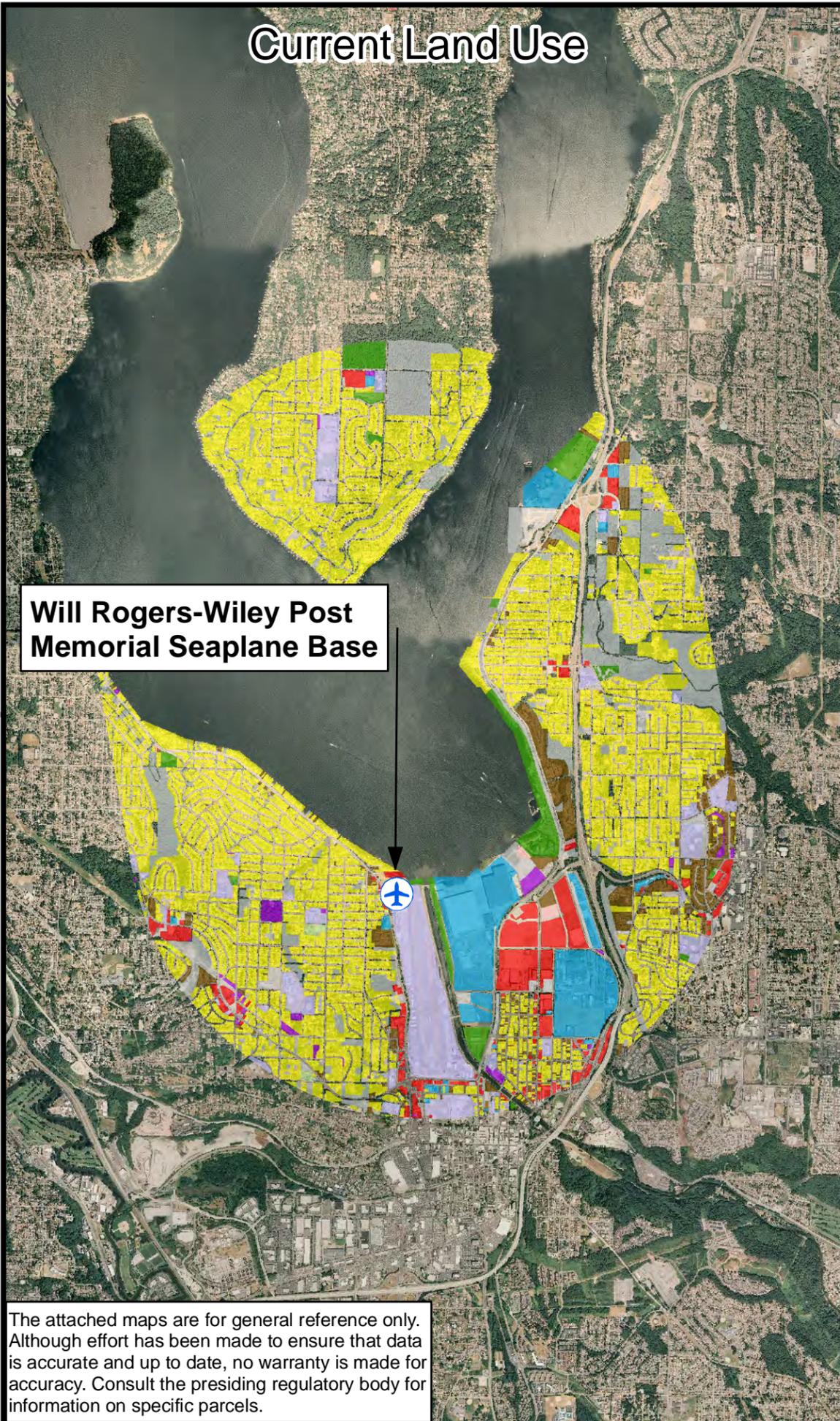
See Renton Municipal Airport page.

Future Land Use

See Renton Municipal Airport page.

Current Land Use

Future Land Use



Will Rogers-Wiley Post Memorial Seaplane Base

Will Rogers-Wiley Post Memorial Seaplane Base

Will Rogers-Wiley Post Memorial Seaplane Base

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped

14 CFR Part 77 applies to Seaplane Bases only if sea lanes are outline by visual markers. The Airport location latitude and longitude coordinates are reported as estimates on the FAA 5010 form.



Scale in Miles

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

Local Governments
 King County, City of Mercer Island,
 City of Newcastle, City of Seattle,
 City of Renton

Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006)

Seattle-Tacoma International Airport – King County

Current Land Use

Area surrounding airport is highly developed. Airport is of National importance for commercial aviation and trade and takes a high priority for protection.

Primary Surface: On airport property.

Approach Surface: Runway 16L & R: Approach area nearest airport has compatible land development. As approach extends outward, development of all types increase. Recommend avigation easement to protect precision approaches from north. Recommend conservation easement to protect undeveloped land nearest to the runway ends. Runway 34L & R: Approach near runway end of 34R is shielded from incompatible development through parks and open space. Some SFR below approach to 34L however topography may shield these homes from much of the noise. Additional study recommended with the possible need for non-suit covenant or disclosure notice. Avigation easement might be necessary to stop development that may compromise precision approach.

Transitional Surface: Same issues as approach surfaces.

Horizontal Surface: Area is highly developed. Avigation easements are necessary where zoning would allow excessive height. Zoning overlays should be coordinated with local municipalities if not already in effect.

Conical Surface: Same as horizontal.

Future Land Use

City of Burien: Potential from low density residential development north of S. 176th, under the western portion of the horizontal surface. Comprehensive plan indicates that several areas zoned as residential are planned to be preserved as public open space.

Source: City of Burien Comprehensive Plan Map, December 29th, 2008, City of Burien Zoning Map, December 29th, 2008.

City of Des Moines: City of Des Moines comprehensive plan and zoning maps indicate potential business park development beneath the southern approach areas. There is potential for further residential development beneath southern outer conical area and approach areas, along South Kent Des Moines road.

Source: City of Des Moines Zoning Map, December 31st, 2007, City of Des Moines Comprehensive Plan Map, February 19, 2008, Aerial imagery, Washington NAIP 2006.

City of Federal Way: Federal Way is located in the outer southern edge of the approach zones. Provided no developments of significant height are added, there should not be any conflict with the airport approach.

Source: City of Federal Way Comprehensive Plan Map, July 16, 2007, City of Federal Way Land Use Map, January, 2005, City of Federal Way Zoning Map, July 16, 2007.

City of Kent: There is open land zoned for commercial and residential development in along Kent's border with SeaTac in the southeastern horizontal and conical area. The comprehensive plan map indicates that this area is planned to remain an urban separator.

Source: City of Kent Zoning Map August, 2007, City of Kent Comprehensive Plan Map August, 2007, Aerial imagery, Washington NAIP 2006, March 12, 2006 Satellite Imagery (Google Earth).

Seattle-Tacoma International Airport – King County

Future Land Use continued

City of Normandy Park: Mainly low density residential with some commercial beneath horizontal surface. General plan and zoning map are consistent. Area appears to be developed.

Source: City of Normandy Park Zoning Map, August 21, 2007, City of Normandy Park Comprehensive Plan Map, November, 2004.

City of SeaTac: High density residential zoning immediately east of passenger terminal. Area appears to be developed to its full extent.

Source: SeaTac Comprehensive Plan Map, March, 2009, SeaTac Zoning Map, February, 2009.

City of Seattle: Approached into the runway 16 R/L side of the airport extend out over downtown Seattle. Area is highly developed already. Primary concern will be any new developments taller than current buildings in downtown Seattle.

Source: City of Seattle Future Land Use Map

City of Tukwila: Most of Tukwila falls under the northeastern horizontal and conical surfaces. Tukwila is highly developed and there is no indication in the comprehensive plan about intensification of land uses.

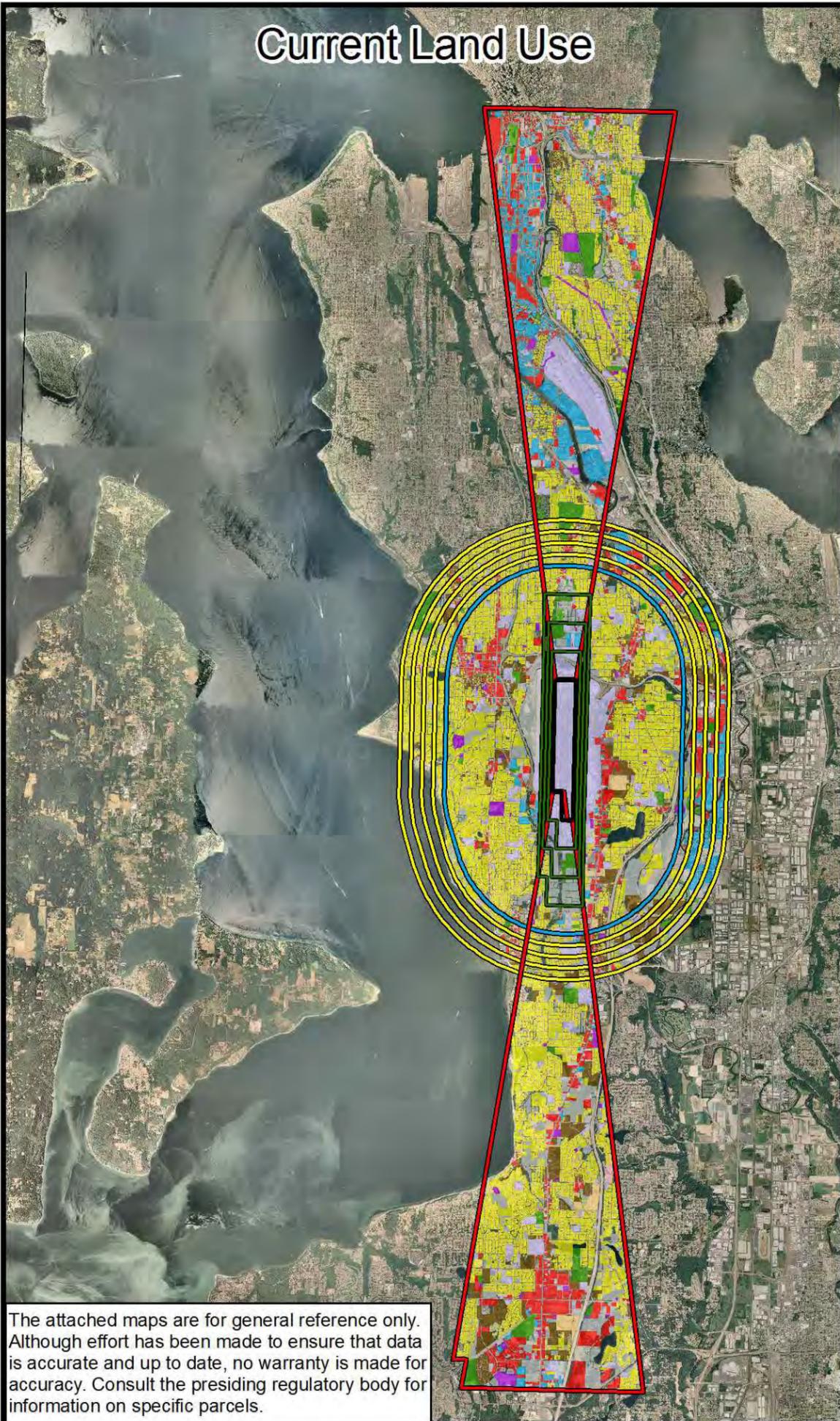
Source: City of Tukwila Comprehensive Plan Map, 12/03/07, City of Tukwila Zoning Map, 12/03/07.

King County: The outermost southeastern portion of the approach area into runways 34 R & L passes over urban, unincorporated King County. Area has some undeveloped land, and the comprehensive plan indicates that this land is designated to become residential. Further north, but still on the approach to the 34 end of the runways, there is a sliver of King County between Federal Way and Auburn. Land use, zoning and comprehensive plan are generally consistent with one another. Most land use is residential with a majority of this being single family. There is a portion along Interstate Five that is zoned for residential that is currently undeveloped.

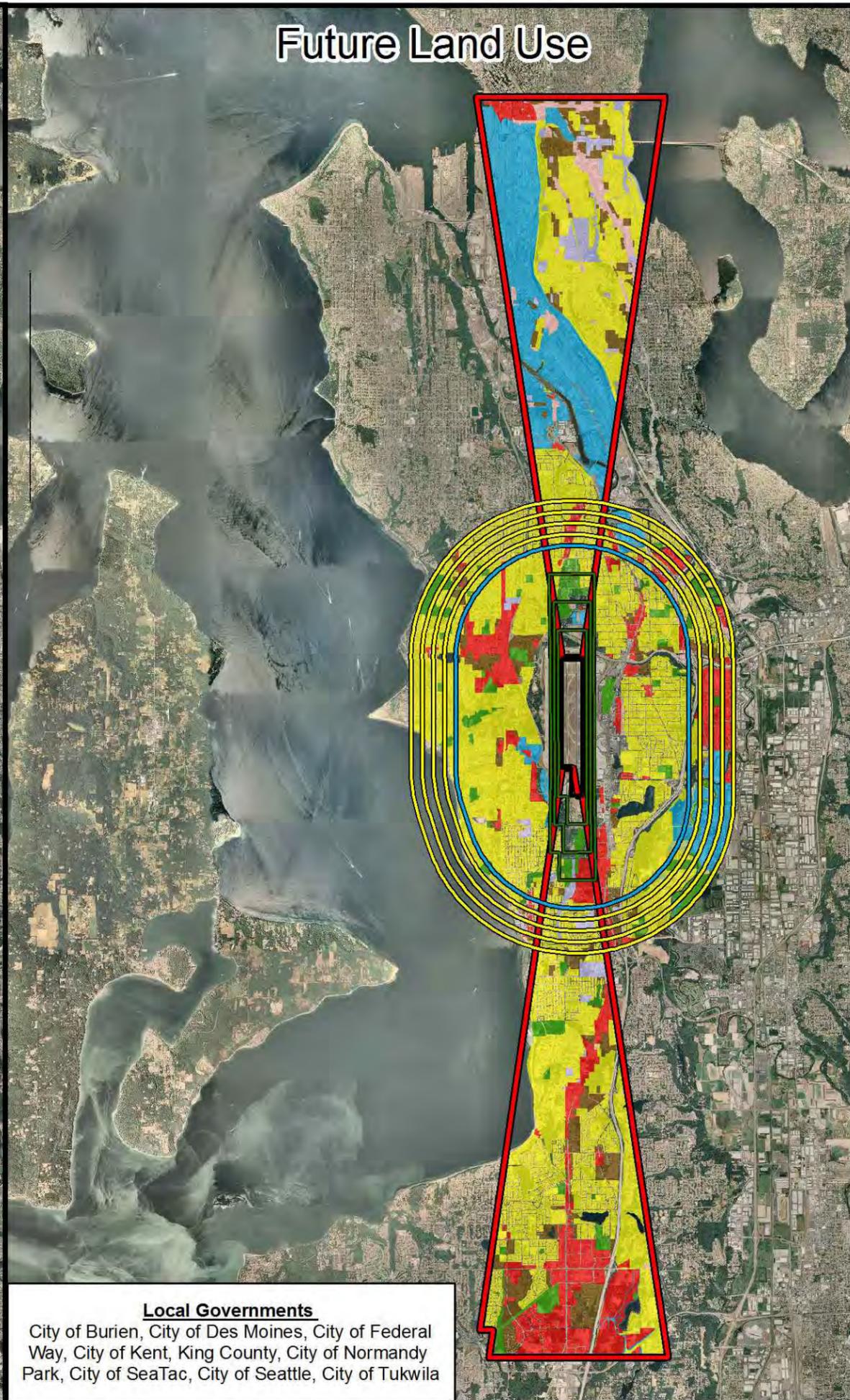
To the north, King County has jurisdiction over an area between Burien, Seattle, SeaTac, and Tukwila. This area is developed as residential with some commercial on the major streets. Comprehensive plan does not indicate further intensification of development in this area

Source: King County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use



Future Land Use



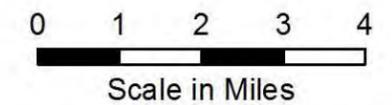
Seattle-Tacoma International Airport

Airport Surfaces

-  Primary
-  Transitional
-  Horizontal
-  Conical
-  Approach

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:

Land use data: Puget Sound Regional Council (2009)
Aerial Photo: King County Online GIS (2005)

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Local Governments

City of Burien, City of Des Moines, City of Federal Way, City of Kent, King County, City of Normandy Park, City of SeaTac, City of Seattle, City of Tukwila

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Skykomish Airport – King County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Town of Skykomish falls below approach path to runway 6. Avigation easements and disclosure notices are recommended where appropriate to preserve the approach path. Much of the land off the end of runway 24 is undeveloped. In this situation, conservation easements are recommended.

Transitional Surface: Western end of the transitional surface passes over town of Skykomish. Same mitigation processes as runway 6 approach.

Horizontal Surface: The horizontal surface encompasses most of the town of Skykomish. To the north, south, and west most of the land is undeveloped. Recommended protection through conservation easements and similar methods as the runway 6 approach for that portion that covers the town of Skykomish.

Conical Surface: Area is almost all forest land. Topography will limit development however parcels that are at risk can be protected with a conservation easement.

Future Land Use

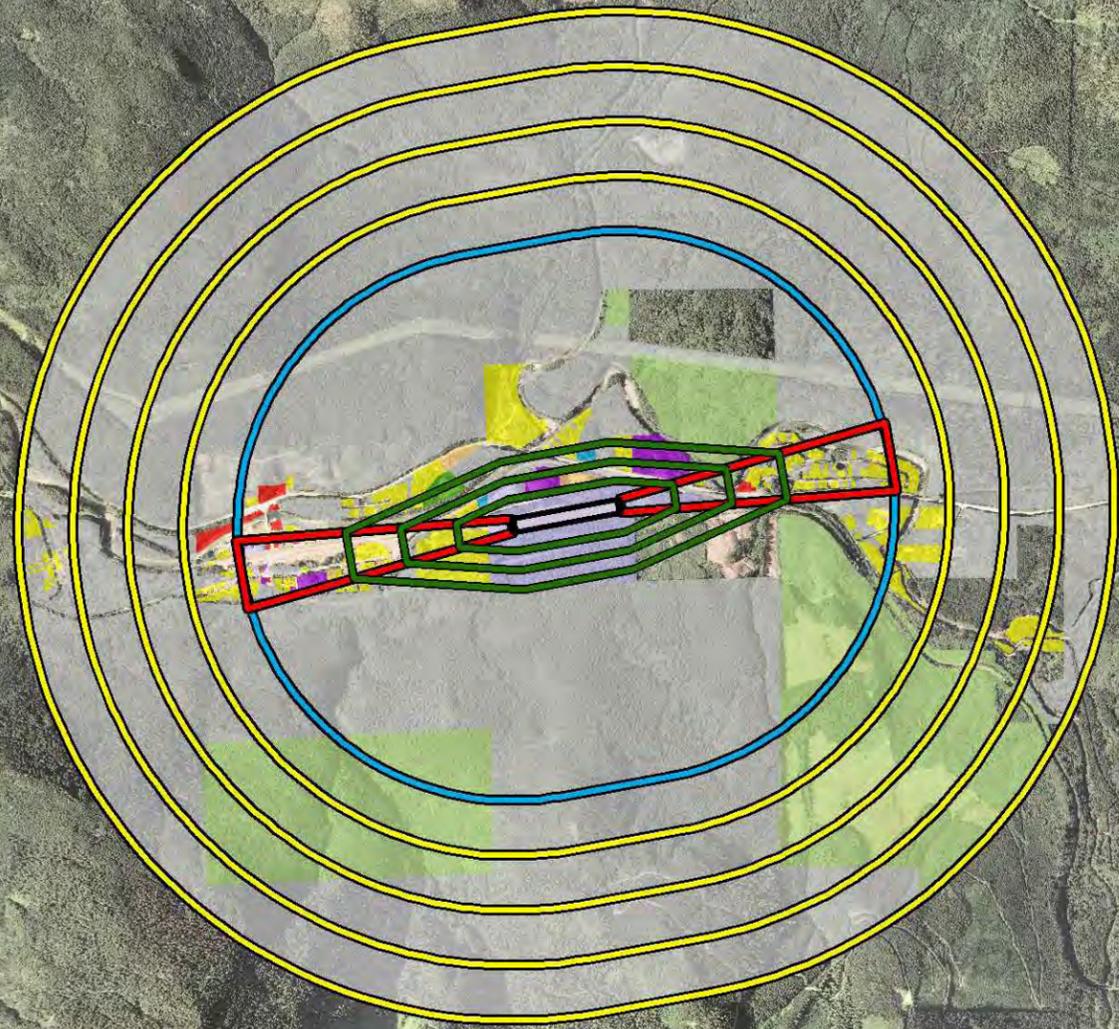
Town of Skykomish: Skykomish administers land to the west of the airport. Most of the town is zoned for residential; however the zoning map does not specify intensity.

Source: Skykomish Zoning Map, April, 2008.

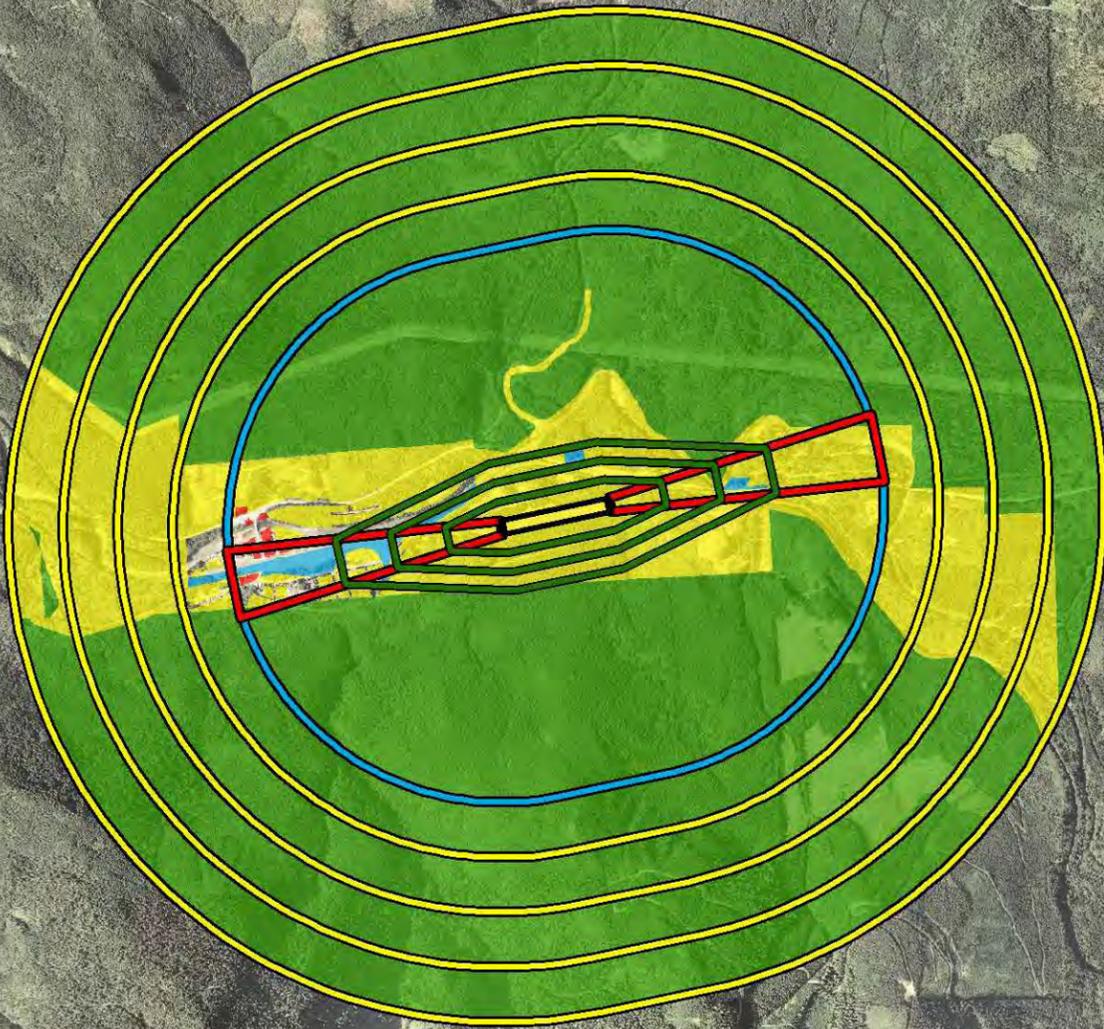
King County: Most of the land near the airport is zoned for rural residential. Should development of this area increase, there may be consequences for the airfield. The outer horizontal, conical, and outer approaches are all zoned for forest land. The comprehensive plan indicates that there may be more land slated to become rural residential.

Source: County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use



Future Land Use



Skykomish State Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments
 King County, City of Skykomish

Vashon Island Airport – King County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Some residential development below both approach ends. Recommend aviation easements on existing property, conservation easements on undeveloped property. If residents are impacted by aircraft noise, a disclosure notice or a non-suit covenant may also be appropriate.

Transitional Surface: Same as approach surfaces.

Horizontal Surface: As development progresses near the airport, aviation easements may be appropriate. If possible, the airport may want to consider encouraging the county to transfer development rights to somewhere further away from the airport.

Conical Surface: Unless there is a spike in development on the island, the conical surface will remain safe from development for the time being. Airport may want to consider acquiring an overlay zone to protect the outer surfaces if one is not already in place.

Future Land Use

King County: Comprehensive plan identifies area around the airport as agricultural and rural residential. Area has a very low level of development, yet is highly subdivided. There is a potential for more rural residential development. In the southeastern portion of the conical area, the unincorporated town of Vashon has some commercial activity. The comprehensive plan shows this area expanding towards the south, away from the airport but still partially beneath the conical surface.

Source: County Parcel Viewer, King County Comprehensive Plan Land Use Map Jan. 3, 2005.

Current Land Use

Future Land Use

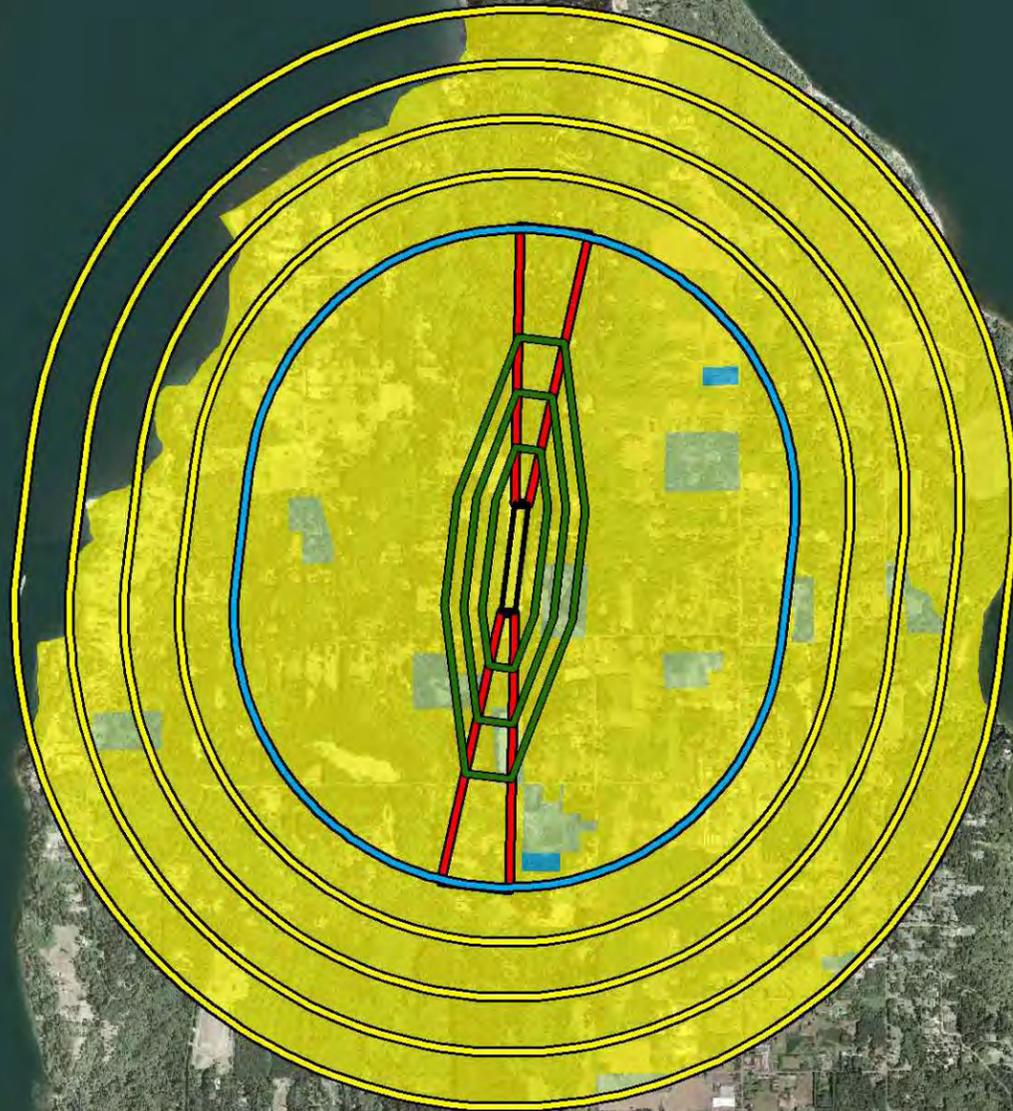
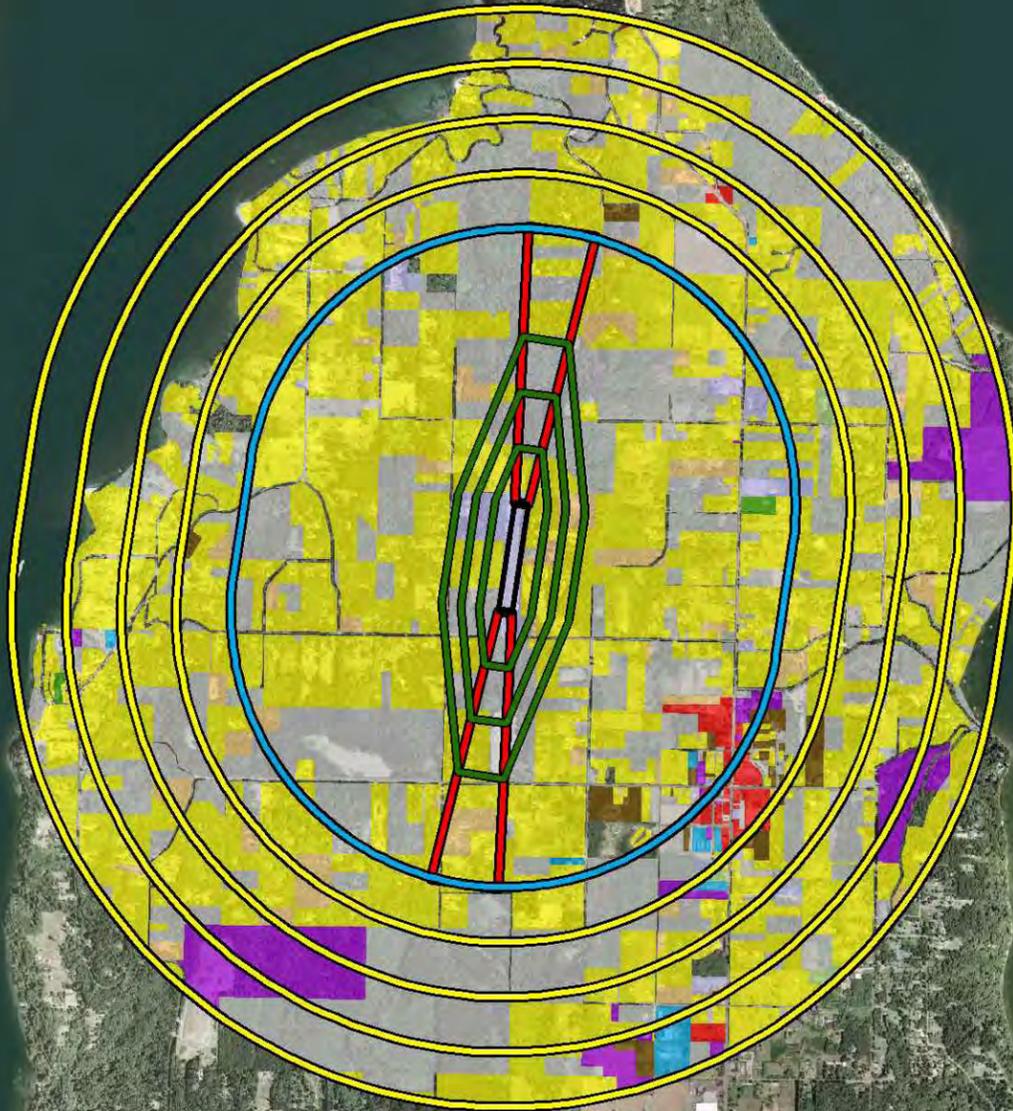
Vashon Municipal Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: King County Online GIS (2005)

Local Governments
 King County

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Apex Airpark – Kitsap County

Current Land Use

Primary Surface: Some houses on airport property. Airport may be part of an aviation-residential community but if not, it is recommended the airport acquire this property through fee simple acquisition.

Approach Surface: Some residential off both runway ends. Recommend aviation easements, disclosure notices and non-suit covenants.

Transitional Surface: Same as approach for residential areas.

Horizontal Surface: As development progresses near the airport, aviation easements may be appropriate. If possible, the airport may want to consider encouraging the county to transfer development rights to somewhere further away from the airport.

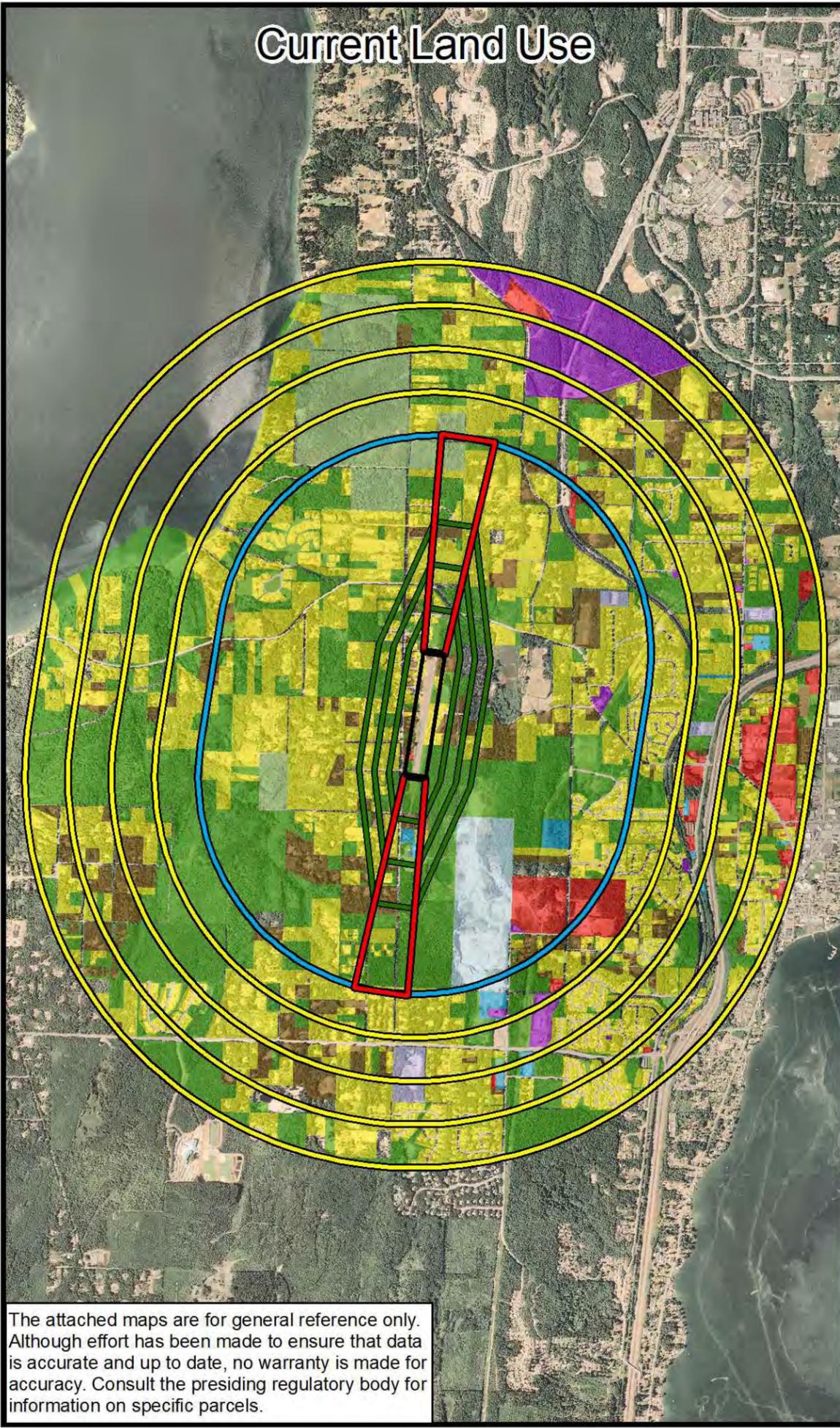
Conical Surface: Consult town of Silverdale and Kitsap County about an airport overlay zone.

Future Land Use

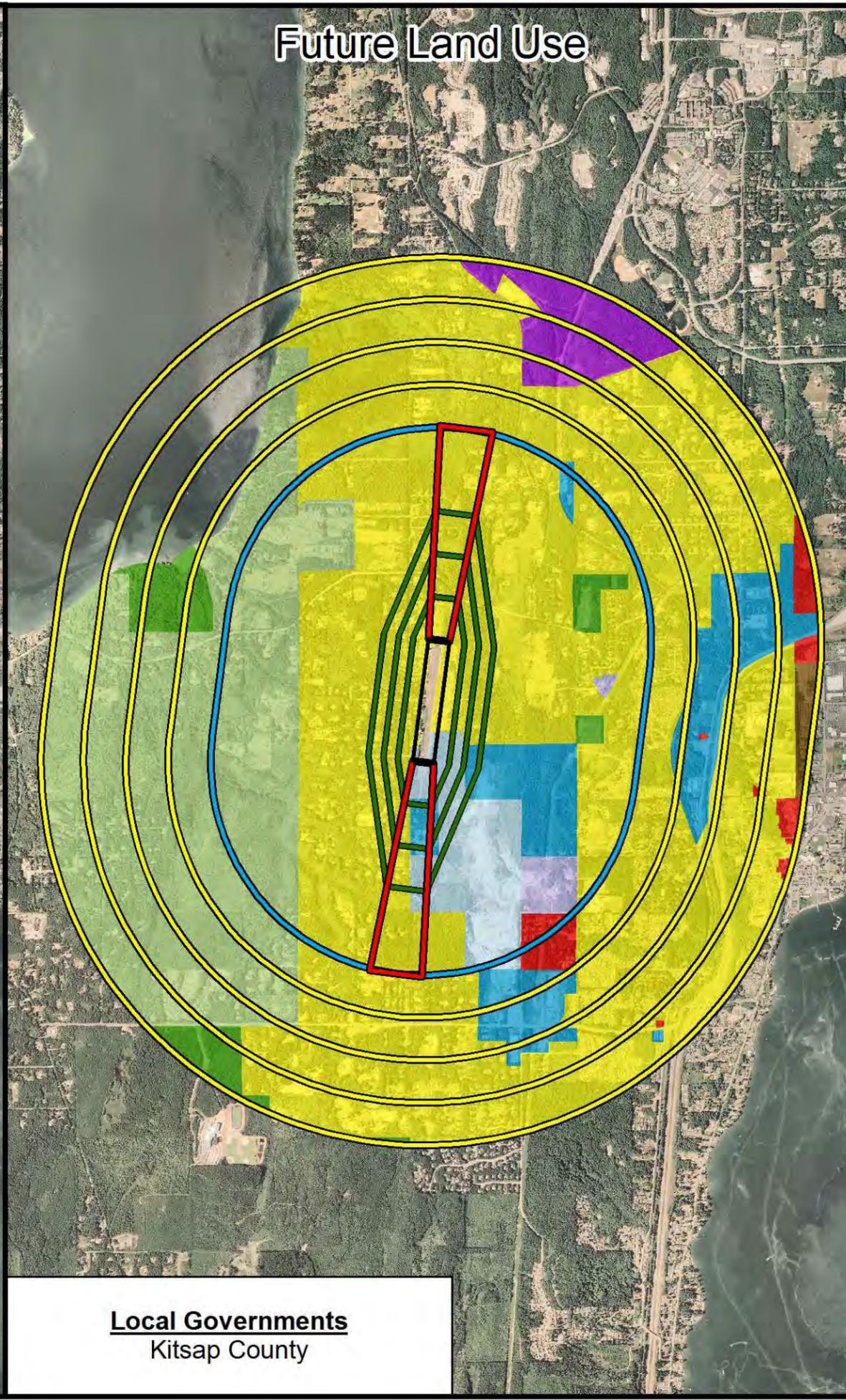
Kitsap County: Area zoning and planning are similar. Existing land is not fully developed, so there is the possibility of more low density rural housing. There is a rural protection zone to the west beneath the horizontal and conical surface.

Source: Kitsap County Department of Community Development "Compplan" shapefile, June 11th, 2007, Kitsap County Department of Community Development "zoning" shapefile, June 11th, 2007.

Current Land Use



Future Land Use



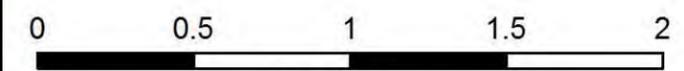
Apex Airpark

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Scale in Miles

Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments
 Kitsap County

Bremerton National Airport – Kitsap County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Avigation easements to protect the precision approach into runway 1. Residential development is occurring off the end of runway 28. Recommend conservation easements or the transfer of development rights and non-suit covenants.

Transitional Surface: Same issues as approach surfaces. Recommend avigation easements to stop height of existing land uses from increasing.

Horizontal Surface: Avigation/conservation easements to keep heights from penetrating.

Conical Surface: Probably not an issue due to low intensity of surrounding development.

Future Land Use

City of Bremerton: Most of the land surrounding the airport lies within an urban growth area for the city of Bremerton. This land is currently under county jurisdiction, however it may change. The area south of that is indicated as a future associates UGA by the City of Bremerton Comprehensive Plan Map. Much of this land is undeveloped so coordination between cities and the airport will be essential.

Source: City of Bremerton Comprehensive Plan Map, Effective December 17, 2004, Aerial imagery, Washington NAIP 2006.

City of Belfair: There is a potential for residential development beneath the instrument approach into runway 1. Belfair is not fully developed and city zoning indicates potential for development beneath approach and southwestern portions of the conical and horizontal areas.

Source: Mason County GIS

Town of Allyn: The part of the Allyn UGA that falls beneath the approach area is more or less developed. Impacted zoning is all residential.

Source: Mason County GIS

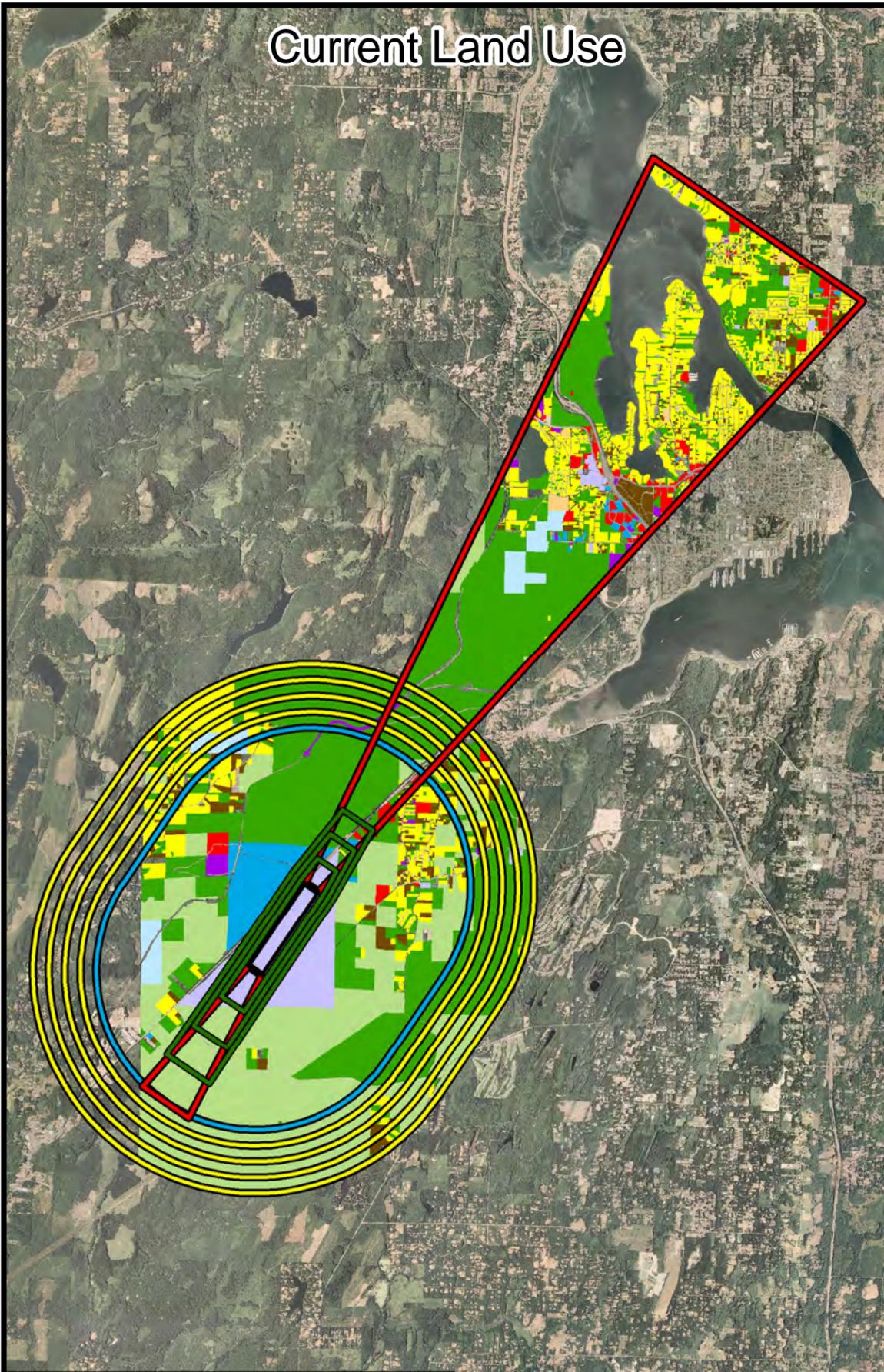
Kitsap County: Comprehensive plan indicates Bremerton eventually incorporating all of the land around, and including, the airport. This indicates that this is a hot spot for development. Northwest horizontal surface is part of a rural protection zone, however comprehensive plan indicates that some of this is planned to become other things such as mineral extraction and urban industrial.

Source: Kitsap County Department of Community Development "Compplan" shapefile, June 11th, 2007, Kitsap County Department of Community Development "zoning" shapefile, June 11th, 2007.

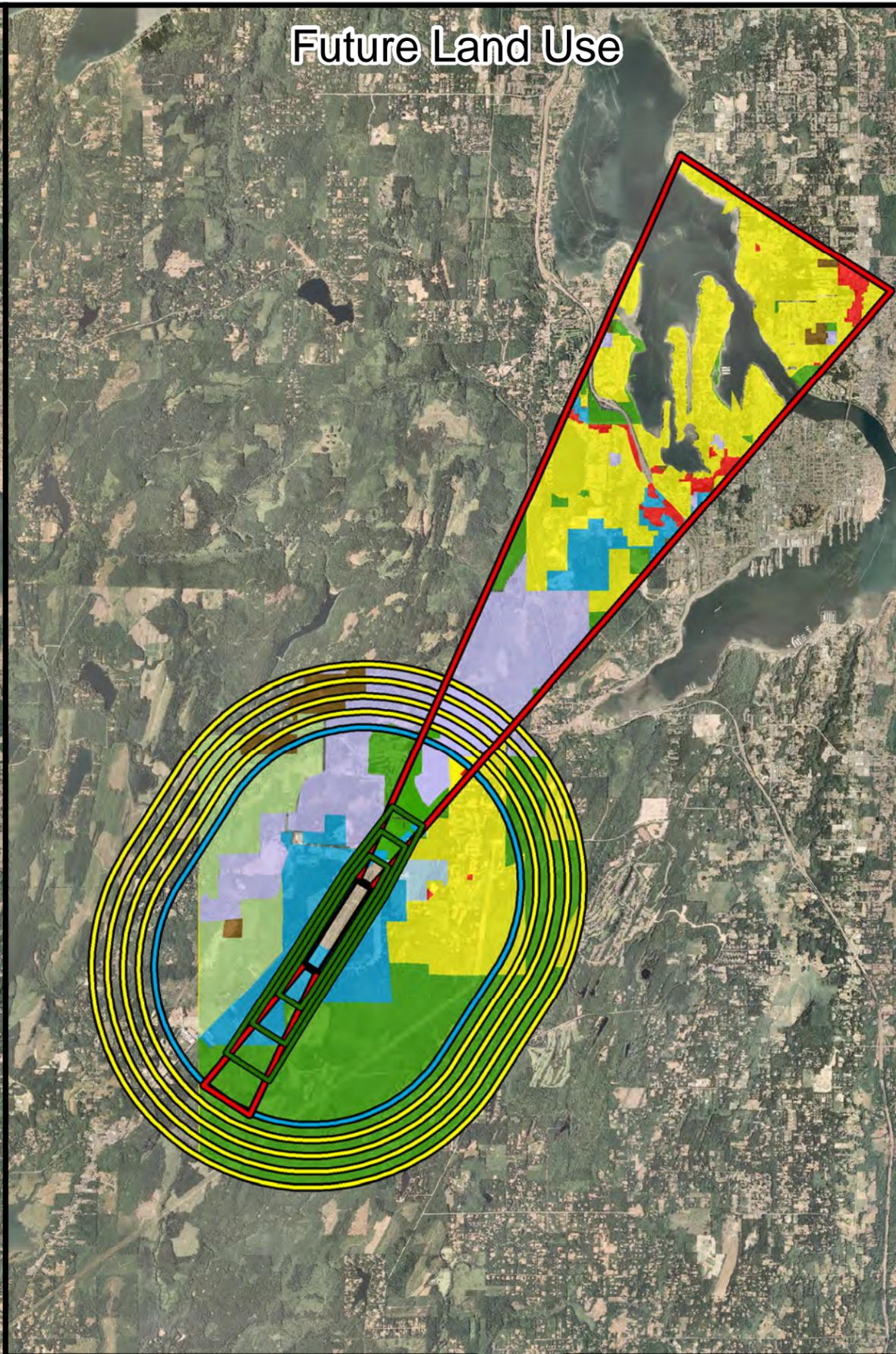
Mason County: Area beneath the approach into runway 1 is zoned for rural residential. The end of the approach area is zoned for long term commercial forest.

Source: Mason County GIS

Current Land Use



Future Land Use



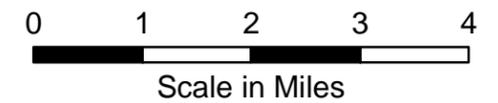
Bremerton National Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



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Local Governments
 Town of Allyn, City of Bremerton, City of Belfair, Kitsap County, Mason County

Note: Mason County is not part of the Puget Sound Regional Council. For analysis of current and future land uses within Mason County, see the report.

Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

Port Orchard Airport – Kitsap County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Subdivision off runway 18 end and lighter SFR development scattered off the end of runway 36. Recommend non-suit covenant and possible fee simple acquisition for properties close to the runway end if necessary. Recommend disclosure notice for new homes built in the area.

Transitional Surface: Same issues with the runway 18 end of the transitional surface. Recommend aviation easements to stop intensification of property development.

Horizontal Surface: Recommend aviation easements to stop major intensification near airport.

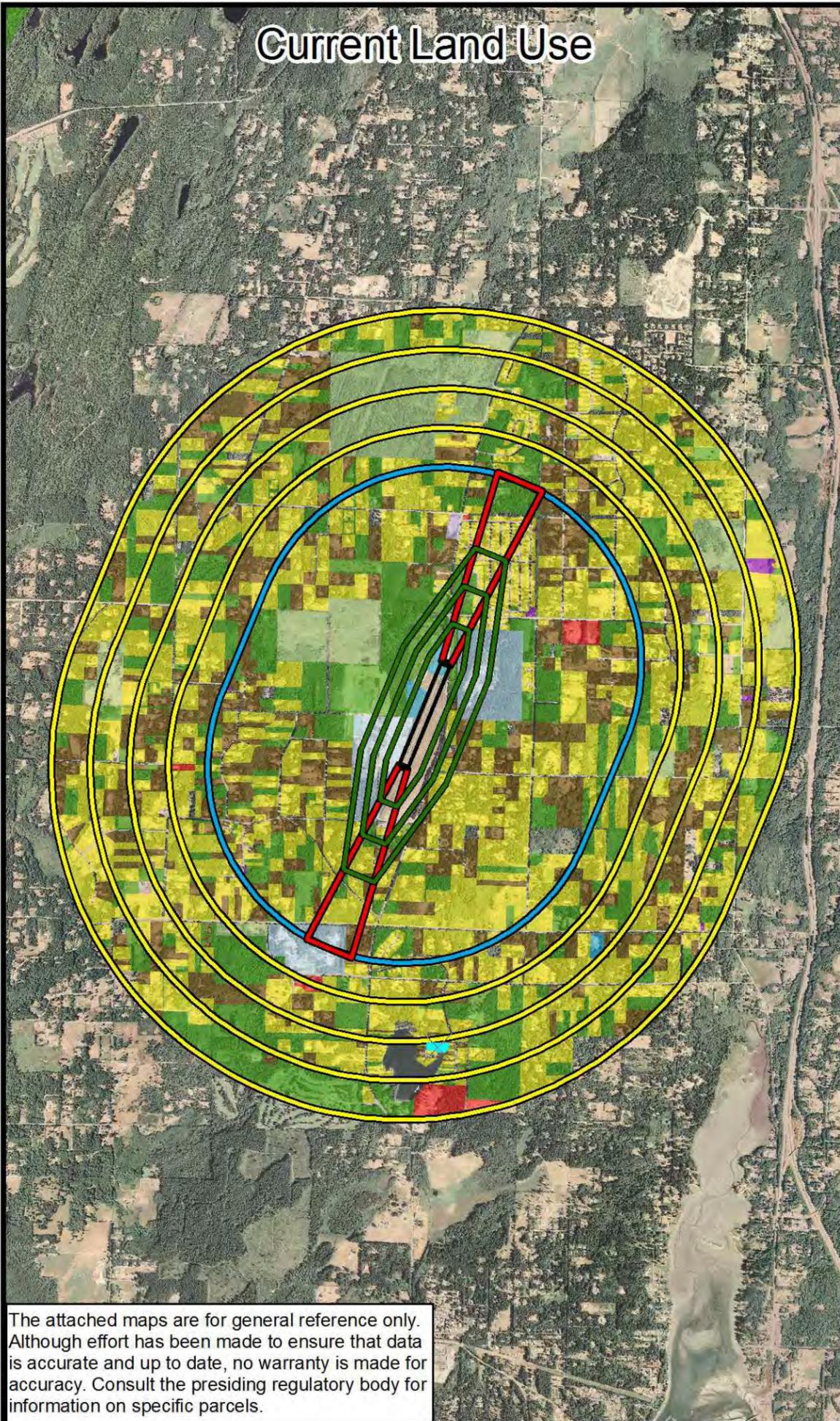
Conical Surface: Development around airport does not appear to present a threat to the conical surface.

Future Land Use

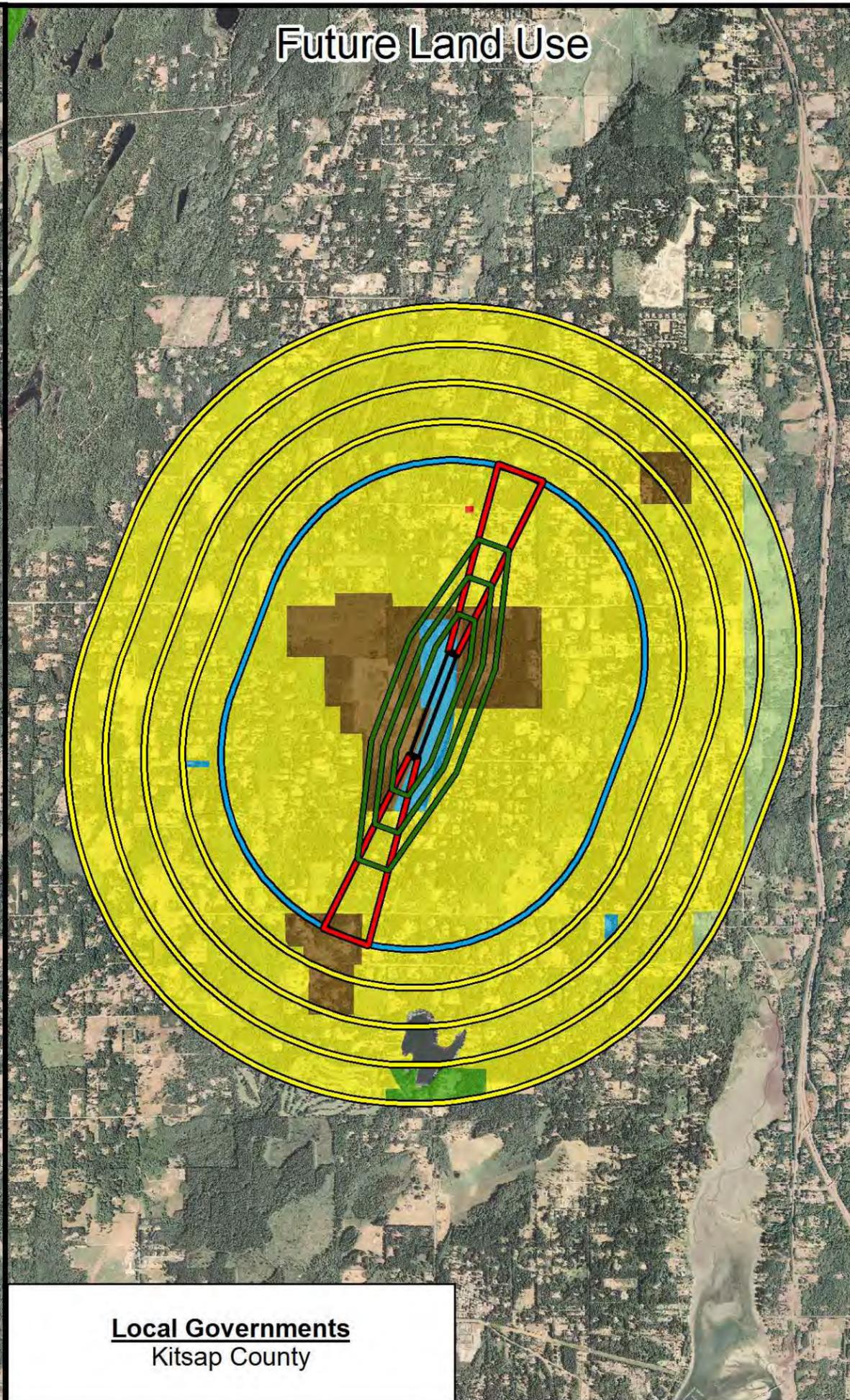
Kitsap County: Airport's surfaces are largely free of incompatible development. Area around the airport is indicated to change from rural residential to mineral resource on the comprehensive plan. No other types of development are indicated.

Source: Kitsap County Department of Community Development "Compplan" shapefile, June 11th, 2007, Kitsap County Department of Community Development "zoning" shapefile, June 11th, 2007.

Current Land Use



Future Land Use



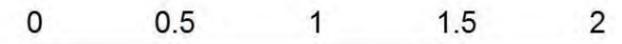
Port Orchard Airport

Airport Surfaces

- Primary
- Transitional
- Approach
- Horizontal
- Conical

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped



Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

Local Governments
 Kitsap County

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

American Lake Seaplane Landing Strip – Pierce County

Current and Future Land Use

City of Lakewood: The city's comprehensive plan map indicated that development around the lake will remain single family residential and large lot estate residential. Land to the east belongs to McChord Air Force Base (now part of Joint Base Lewis-McChord).

Source: City of Lakewood Future Land Use Map, December 3, 2007, Pierce County GIS County Map, August 2007.

History and Status of the American Lake Seaplane Landing Strip

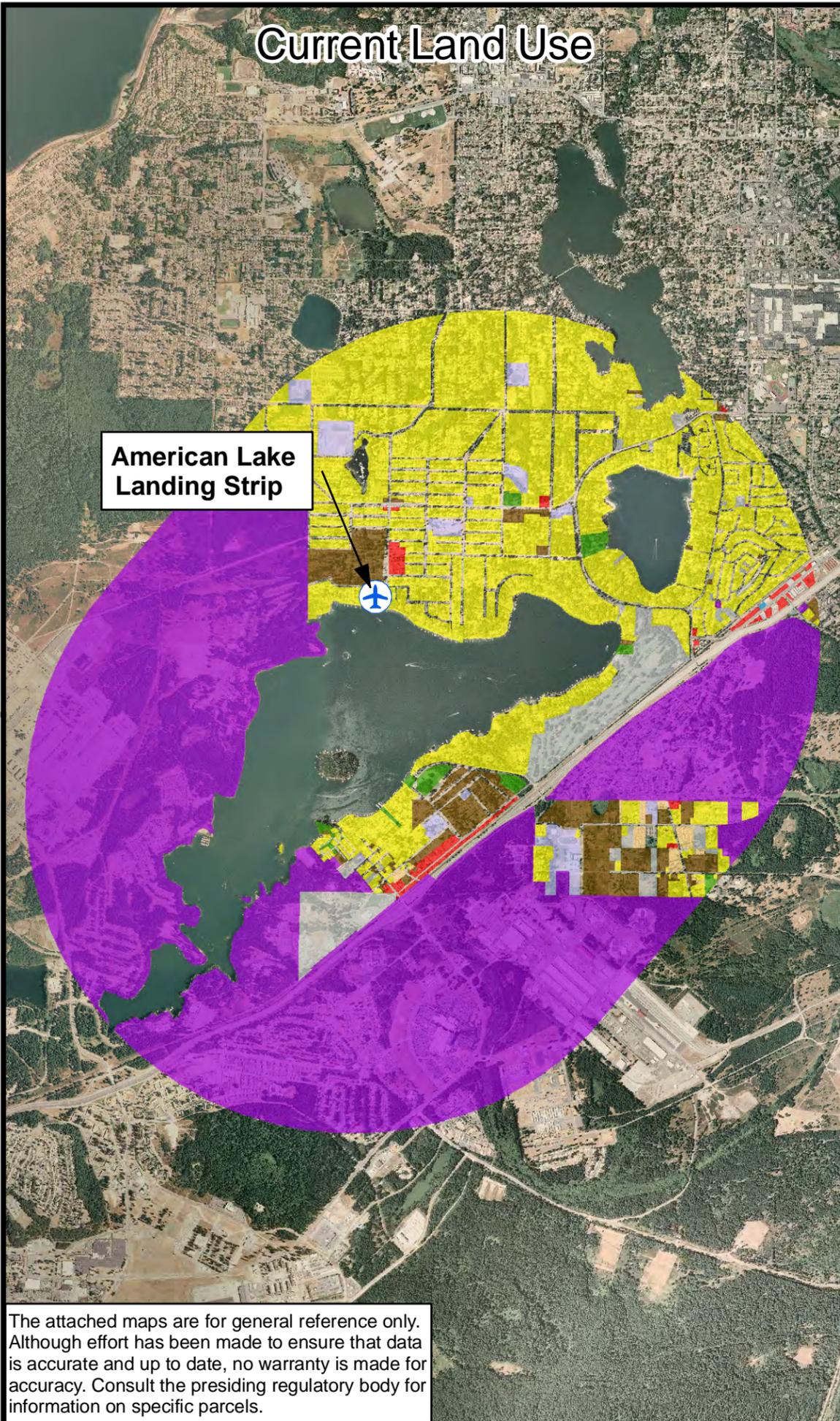
Originally owned by a private operator, the former seaplane base was conveyed to Pierce County when the county acquired the seaplane's landside property for a public park. Following incorporation of the city of Lakewood, the facility was conveyed to the city of Lakewood. The seaplane landing strip is open to the public, and continues to be shown on pilot charts. American Lake seaplane landing strip is designated by FAA and WSDOT as site number 26433.C and shown on aeronautical charts as FAA airport identifier W37. Consistent with these FAA designations, American Lake seaplane landing strip is included in the Washington State Airport System Plan and the PSRC Regional Airport System Plan as a seaplane "base." However, it is recognized that there is currently no base of operations for seaplanes. There are no services or facilities, no fuel, and no airplane storage, other than the city dock, which is available for seaplane docking. Seaplane activity at American Lake is primarily recreational in nature, and while records are scarce, the level of activity is estimated at 50 takeoffs and landings per year. The former seaplane "base" is now considered to be only a seaplane landing strip.

Appendix B displays the Part 77 surfaces for American Lake, with the water landing strip oriented in a northeast-southwest direction. There is no air traffic control tower at American Lake, and there are no published instrument procedures. All traffic is visual, and occurs during daylight hours. According to pilot reports and city of Lakewood staff, pilots tend to land in a more east-west pattern to the north of Silcox Island, in response to typical wind patterns.

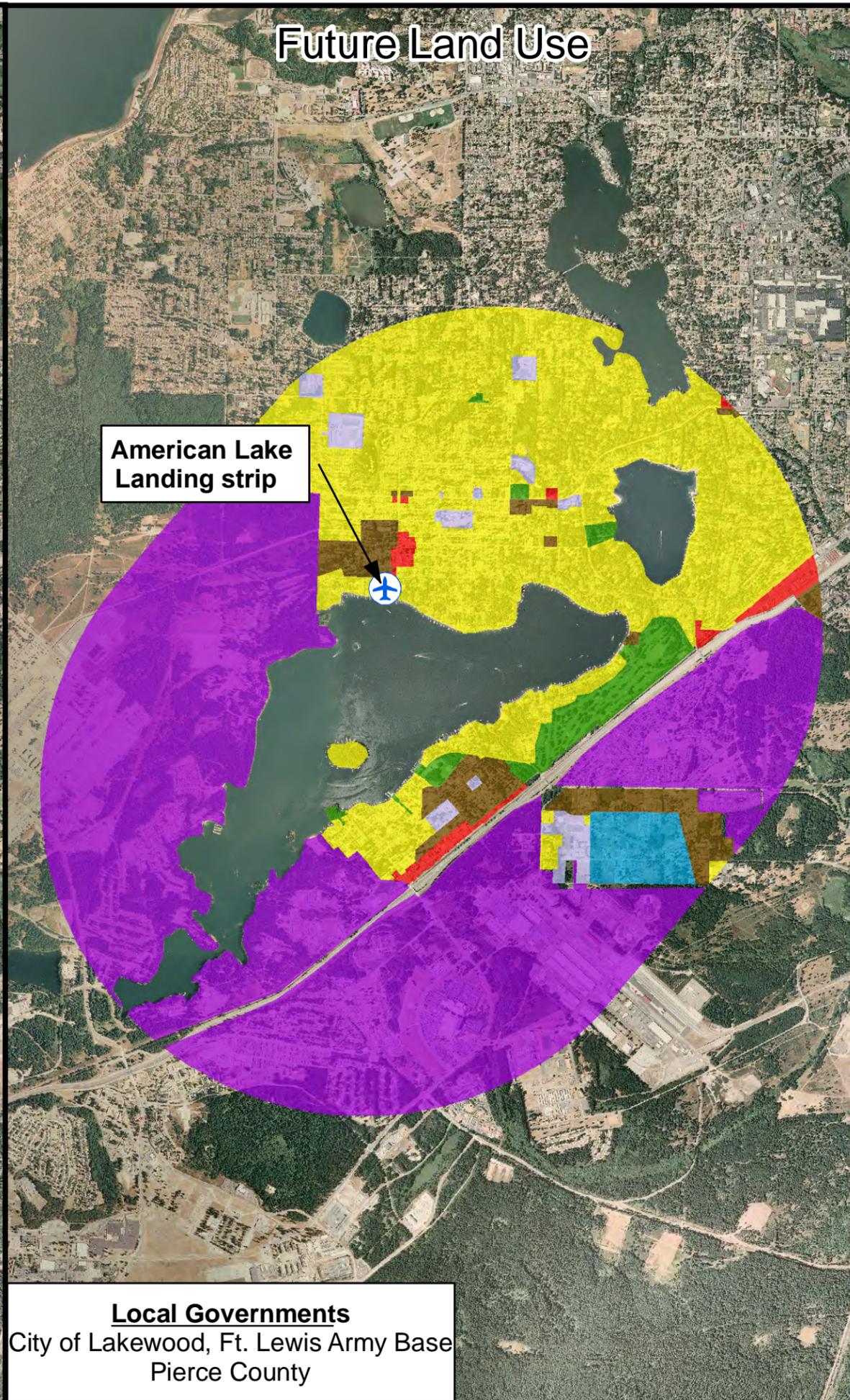
Because of the variable traffic patterns, very low use level, and the lack of seaplane facilities, this seaplane landing strip warrants only a modest level of land use or development regulations by surrounding jurisdictions. For instance, local land use authorities should consider the prevailing take-off and landing patterns when considering future land use or development proposals, such as tall towers. The information provided in the PSRC program (as well as the WSDOT Aviation Division's guidebook) provides flexible guidance to local planning efforts in areas surrounding seaplane facilities.

Source: City of Lakewood, August 2011.

Current Land Use



Future Land Use



American Lake

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped

14 CFR Part 77 applies to Seaplane Bases only if sea lanes are outline by visual markers. The Airport location latitude and longitude coordinates are reported as estimates on the FAA 5010 form.



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Local Governments
City of Lakewood, Ft. Lewis Army Base
Pierce County

Sources:
Land use data: Puget Sound Regional Council (2009)
Aerial Photo: USDA National Agriculture Imagery Program (2006)

Joint Base Lewis McChord – Pierce County

McChord Air Force Base (AFB) and Gray Army Airfield (AAF) are now part of the combined Joint Base Lewis-McChord (JBLM). However, the two military airfields affect slightly different geographic areas, and are therefore treated individually here. The military and surrounding jurisdictions (Pierce County, Thurston County, Lakewood, Tacoma, and others) have a long-standing history of collaborative planning to address common growth and land use compatibility concerns.

Gray Army Air Field

Current Land Use

Almost all of the property impacted by the airport belongs to Fort Lewis (now JBLM); therefore base development should be conducted with the airfield in mind.

Primary Surface: Located entirely on Fort Lewis property.

Approach Surface: Located entirely on Fort Lewis property. Part of precision approach passes over some residential areas before heading out over water. Disclosure notice to owners/buyers of these properties may be appropriate.

Transitional Surface: Located on Fort Lewis property.

Horizontal Surface: Located on Fort Lewis property.

Conical Surface: Located mostly on Fort Lewis property. Private development is not intense enough to justify land acquisition or use mitigation.

Future Land Use

City of DuPont: DuPont lies in the outer northwestern conical area. Their comprehensive plan indicates some low density residential development along the DuPont-Steilacoom highway.

Fort Lewis Army Base: The entire airfield is surrounded by the base. All operations and development are military oriented.

*Sources: City of DuPont Comprehensive Land Use Map, 2008.
Pierce County GIS County Map, August 2007, Satellite Imagery November 8, 2007 (Google Earth).*

Current Land Use

Future Land Use

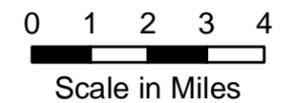
Gray Army Airfield

Airport Surfaces

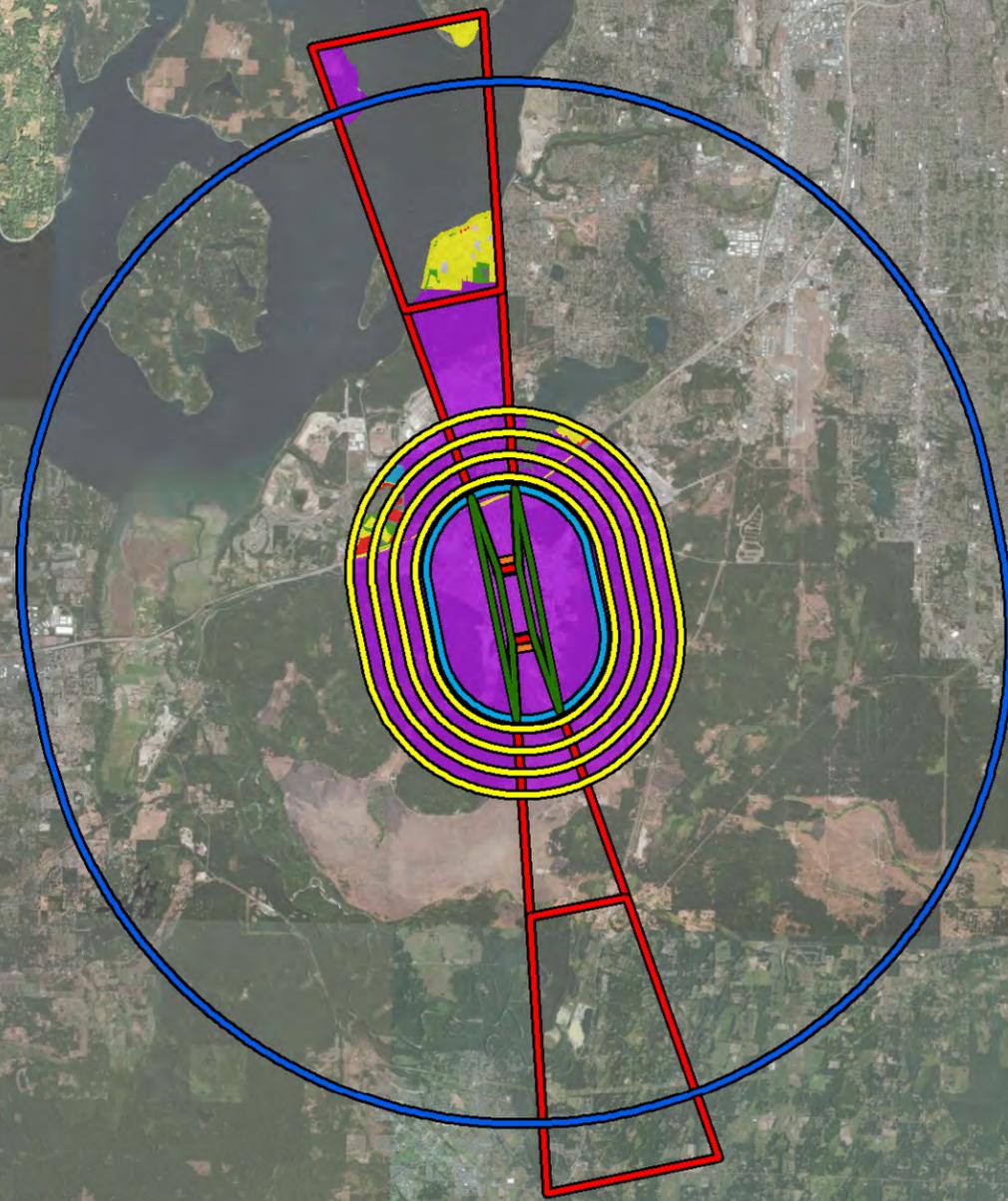
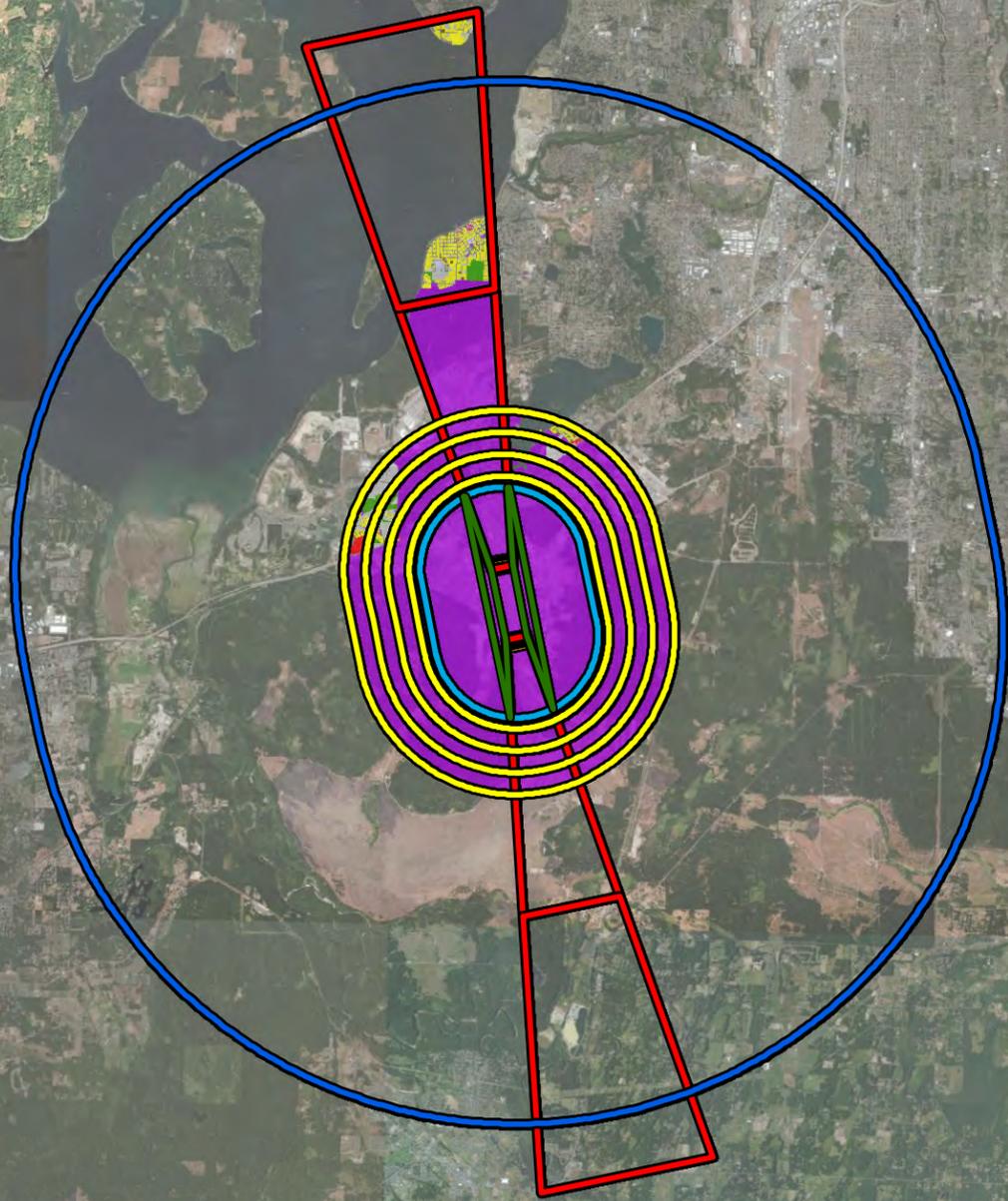
-  Approach Clearance Surface
-  Clear Zone Surface
-  Conical Surface
-  Inner Horizontal Surface
-  Outer Horizontal Surface
-  Primary Surface
-  Transitional Surface

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: (c) 2010 Microsoft Corporation and its data suppliers



FAR Part § 77.28: Military airport imaginary surfaces were applied to the Military Base.

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

Local Governments

City of DuPont, Ft. Lewis Army Base, City of Lacey, City of Lakewood, Pierce County, Town of Steliacoom, City of Tacoma, City of University Place, City of Yelm

McChord Air Force Base

Current Land Use

The areas which are most intensely affected by JBLM activity (the primary surface, inner approach surface, and portions of the transitional surface) are largely located inside JBLM boundaries. However, there are also large areas outside JBLM property which are affected by aircraft noise and low-flying military aircraft. These areas are discussed below.

Accident Potential Zones (APZ 1 and 2): These zones adjoin the ends of runways at military airfields, and are established to enhance safety for aircraft in flight and persons on the ground. Accident potential zones at military airfields are slightly different than their civilian counterparts (runway protection zones, or RPZs), but serve the same purpose. Military planning guidelines limit land use types and height of buildings in the APZ 1 and APZ 2 zones. The city of Lakewood has worked closely with JBLM to establish planning and zoning to protect the accident potential zones at the north end of the main runway at McChord AFB. These zones are known as the McChord AFB "Air Corridor," and have established land use guidance and height limitations consistent with the military's development standards for these areas.

Primary Surface: Located entirely on base property.

Approach Surface: The innermost portion of the approach surface is located on JBLM property. Between the north runway end (runway 16) and I-5 current land use includes a mix of industrial development. This area extends along the southeast margins of I-5 both north and south of SR 512. Across I-5, to the north and west, lies an area of mixed residential, commercial, and industrial use. Lakewood's town center is located about 1.5 miles west of the north end of runway 16.

Transitional Surface: Mostly located on JBLM property. However, there are portions of the transitional surfaces extending north of JBLM property along and to the north of I-5.

Horizontal Surface: The southwestern portion of the horizontal surface (the area between the runway and I-5) lies over JBLM property, but the remainder of the horizontal surface falls over a mix of residential property to the east of the main runway, commercial and industrial uses to the north, and a mix of residential, commercial, and industrial use to the west of I-5.

Conical Surface: Similar to the horizontal surface, the conical surface extends outward and upward some distance from the main runway, and falls above a broad range of existing military, residential, commercial, industrial, and other land uses.

Future Land Use

City of Lakewood: Lakewood lies to the immediate north of the airfield. The Lakewood comprehensive plan calls for infill of commercial use to the north of I-5 immediately north of the main runway, primarily north and west of I-5. The plan also calls for more intense urban infill of commercial, industrial and residential development to the west of I-5.

McChord Air Force Base (AFB): The airfield is surrounded by the base. All operations and development on the base are military oriented.

Sources: City of Lakewood Comprehensive Land Use Map, 2007.

Pierce County GIS County Map, August 2007, Satellite Imagery November 8, 2007 (Google Earth).

Current Land Use

Future Land Use

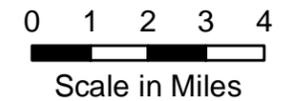
McChord Air Force Base

Airport Surfaces

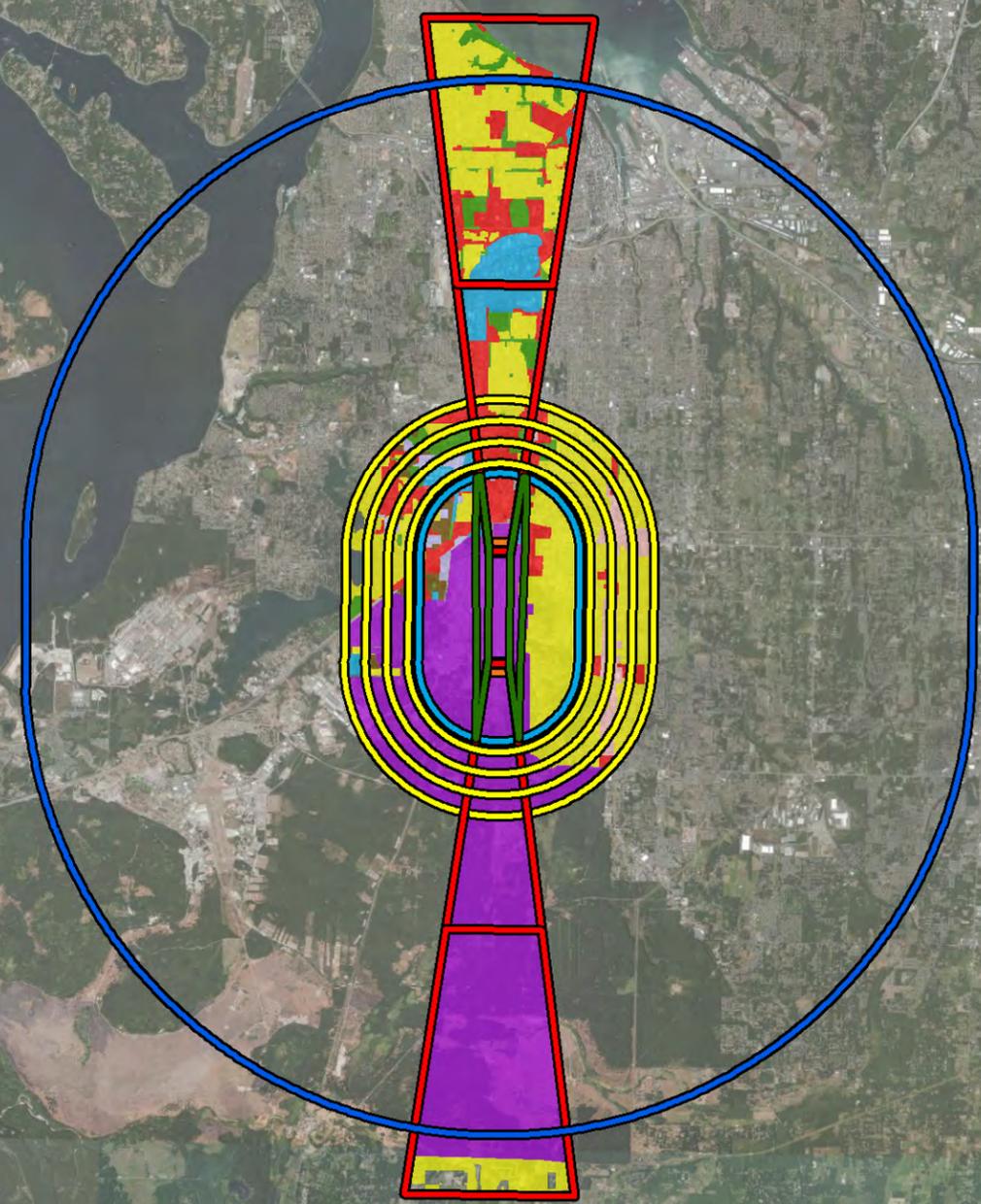
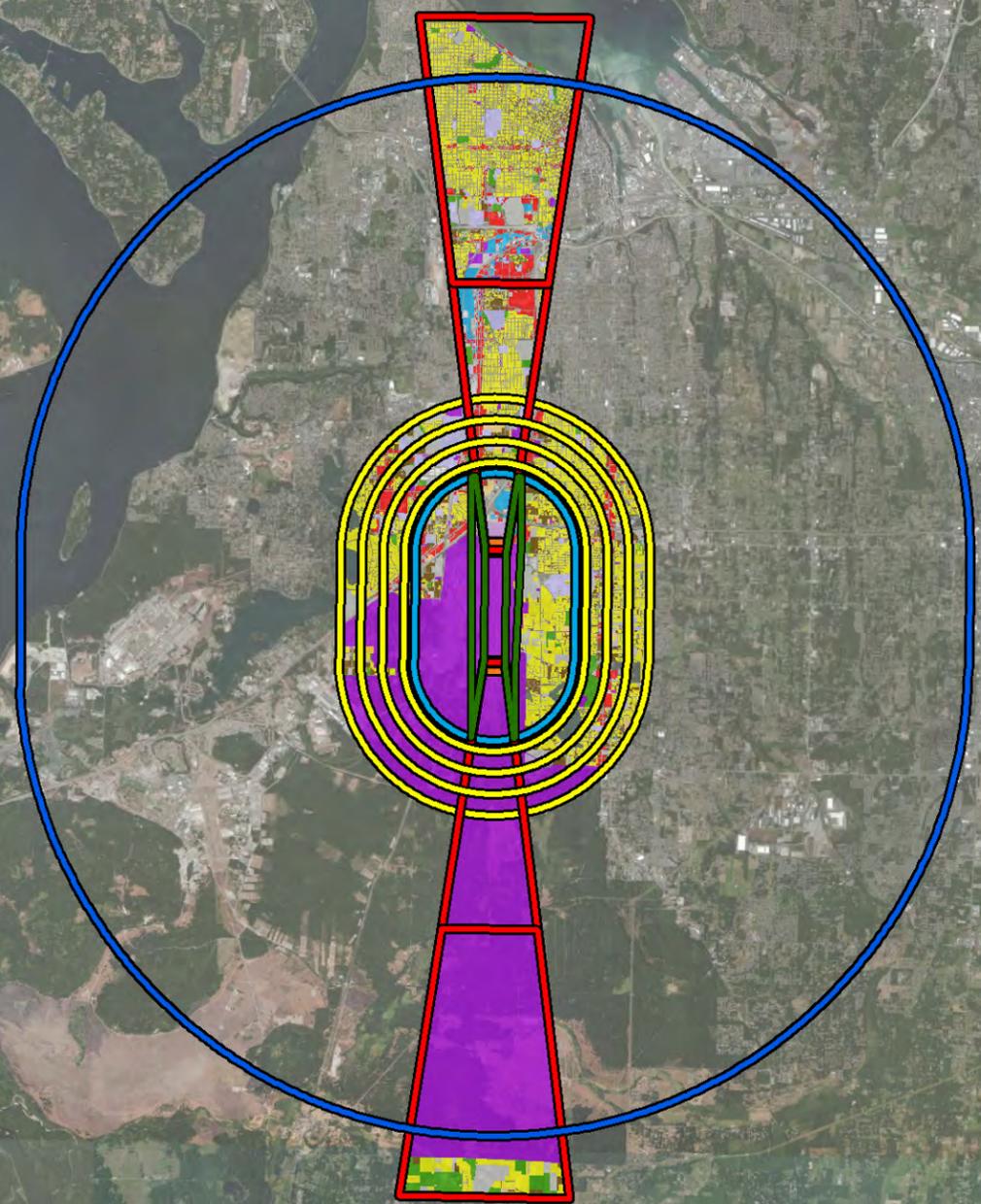
-  Approach Clearance Surface
-  Clear Zone Surface
-  Conical Surface
-  Inner Horizontal Surface
-  Outer Horizontal Surface
-  Primary Surface
-  Transitional Surface

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: (c) 2010 Microsoft Corporation and its data suppliers



FAR Part §§ 77.28: Military airport imaginary surfaces were applied to the Military Base.

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Local Governments
 City of Dupont, City of Fife, City of Fircrest, City of Lakewood, Ft. Lewis Army Base Pierce County, City of Puyallup, Town of Steliacoom, City of Tacoma, City of University Place

Ranger Creek State Airport – Pierce County

Current Land Use

Airport is surrounded by forest. Only land use is camp ground. Conservation easements across the board if deemed appropriate.

Primary Surface: On airport property.

Approach Surface: Camp ground exists under approach from the north, but it does not appear to be a hazard to navigation. Recommend conservation easement.

Transitional Surface: Recommend conservation easement.

Horizontal Surface: Topography is too steep to support most development and area is part of a national park which will further protect from development.

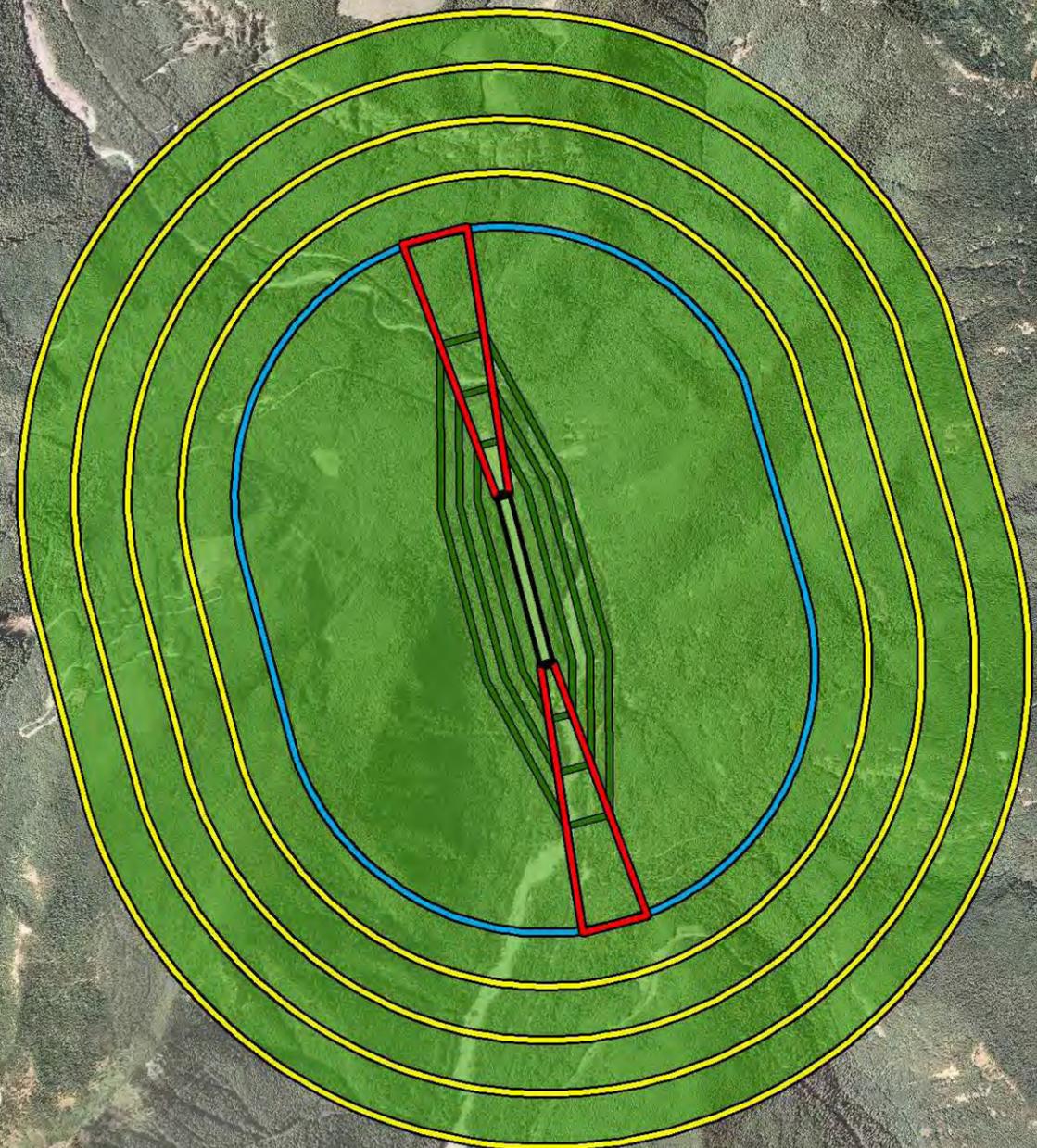
Conical Surface: Same as horizontal.

Future Land Use

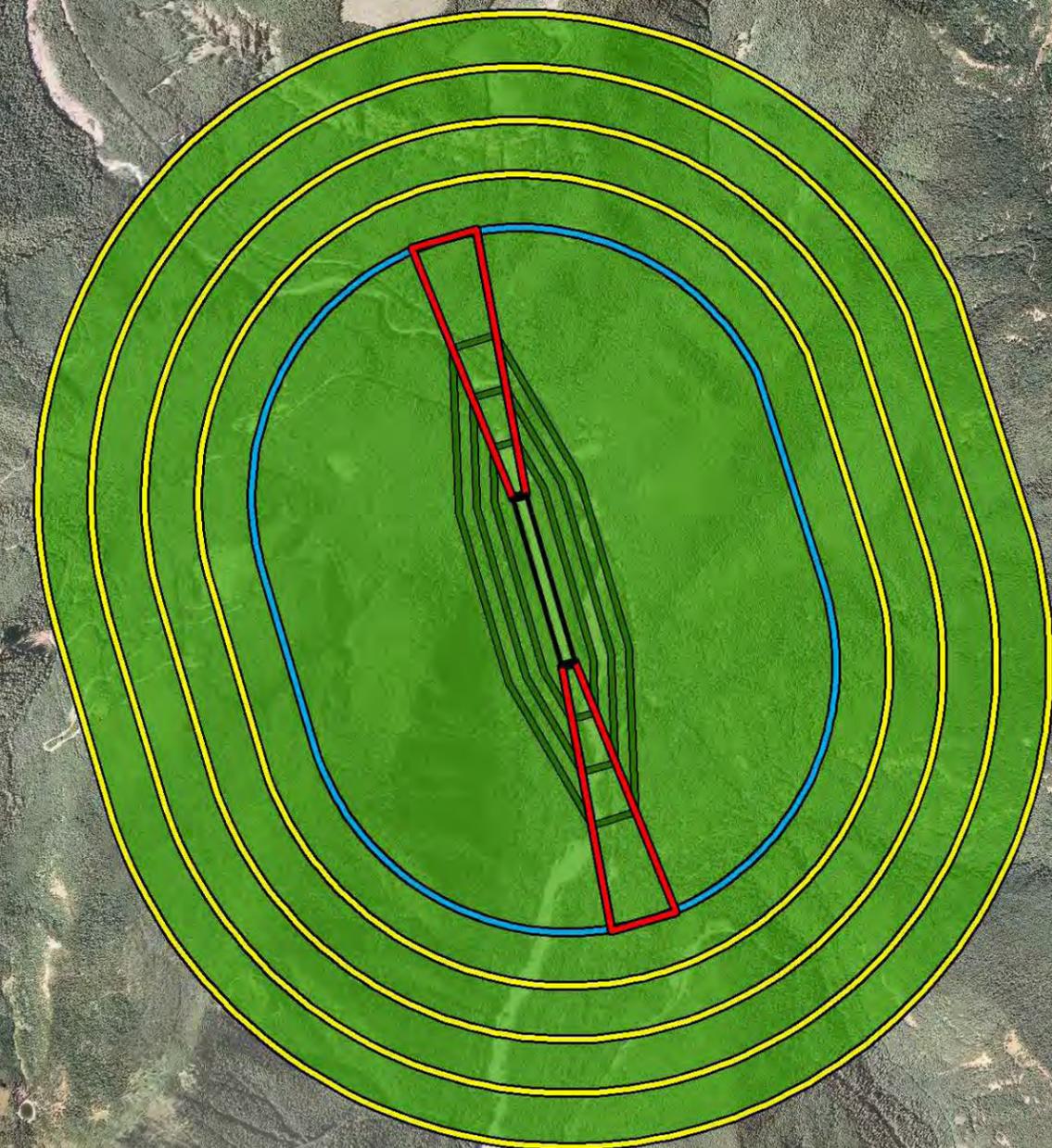
Pierce County: The area surrounding the airport is part of the Mt. Baker- Snoqualmie National Forest. It does not appear that there will be any development that will threaten the airport.

Source: Pierce County GIS County Map, August 2007.

Current Land Use



Future Land Use



Ranger Creek Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

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Local Governments
Pierce County

Sources:
Land use data: Puget Sound Regional Council (2009)
Aerial Photo: USDA National Agriculture Imagery Program (2006).

Spanaway Airport – Pierce County

Current Land Use

Large portion of land west of the airport belongs to Ft. Lewis.

Primary Surface: On airport property.

Approach Surface: Lots of SFR development beneath runway 16 approach. Some SFR beneath runway 34 approach. Recommend fee simple acquisition if noise exposure exceeds 65 DL (or more stringent state regulation if applicable). Otherwise recommend non-suit covenant and disclosure notice in addition to avigation easement to protect the approach.

Transitional Surface: SFR on both sides of runway that may be adversely impacted by aircraft noise. Recommend fee simple acquisition or a non-suit covenant. Disclosure notice recommended for all properties listed for sale.

Horizontal Surface: Recommend avigation easement to keep existing land use below surface. Southwestern edge of the surface falls on Ft. Lewis property. Recommend coordinating development of this property with the airport.

Conical Surface: Same as horizontal.

Future Land Use

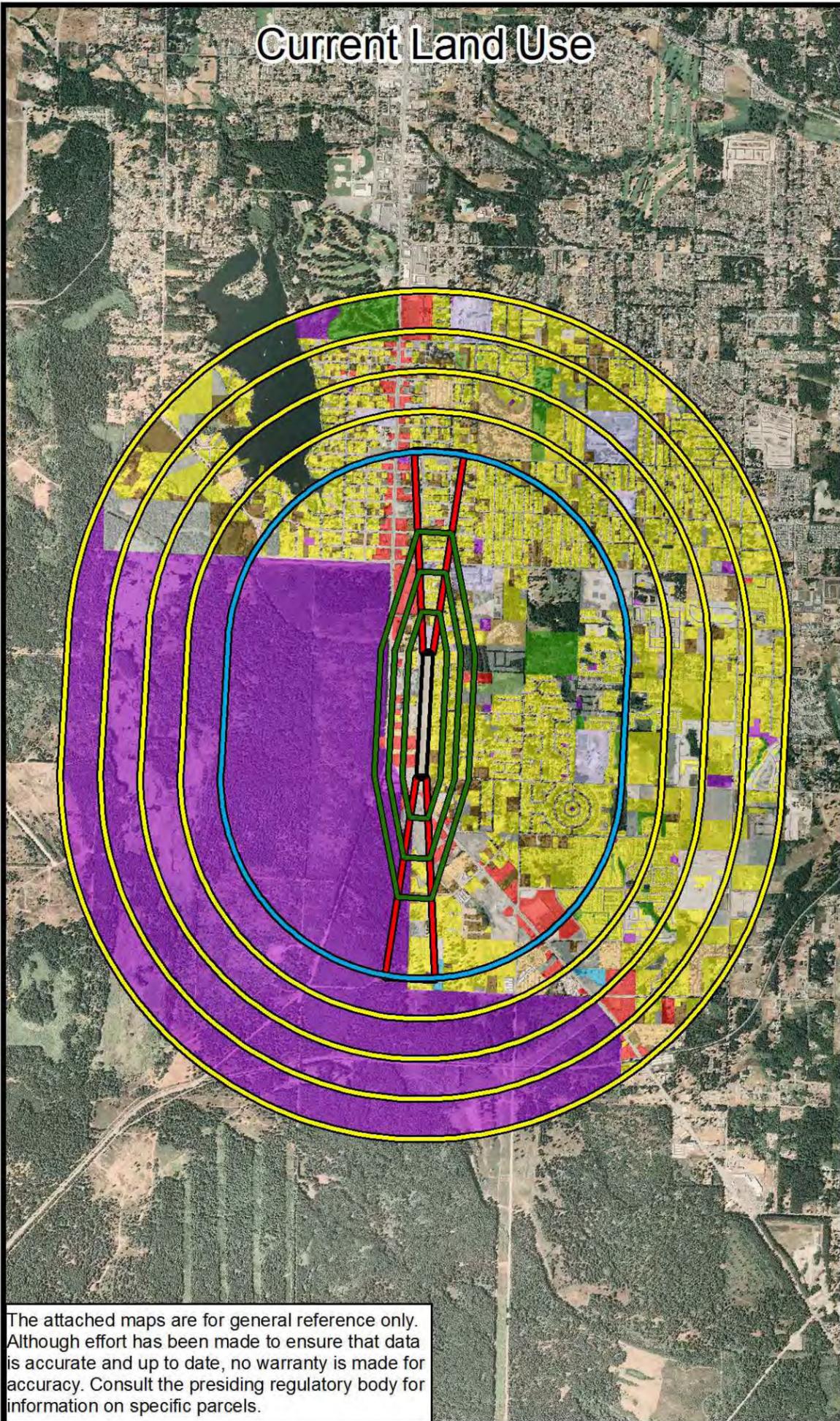
Ft. Lewis Army Base: The land to the west and southwest of the airport belongs to the military. It appears to be used for tactical training.

Source: Pierce County GIS County Map, August 2007, Satellite Imagery November 9, 2007 (Google Earth).

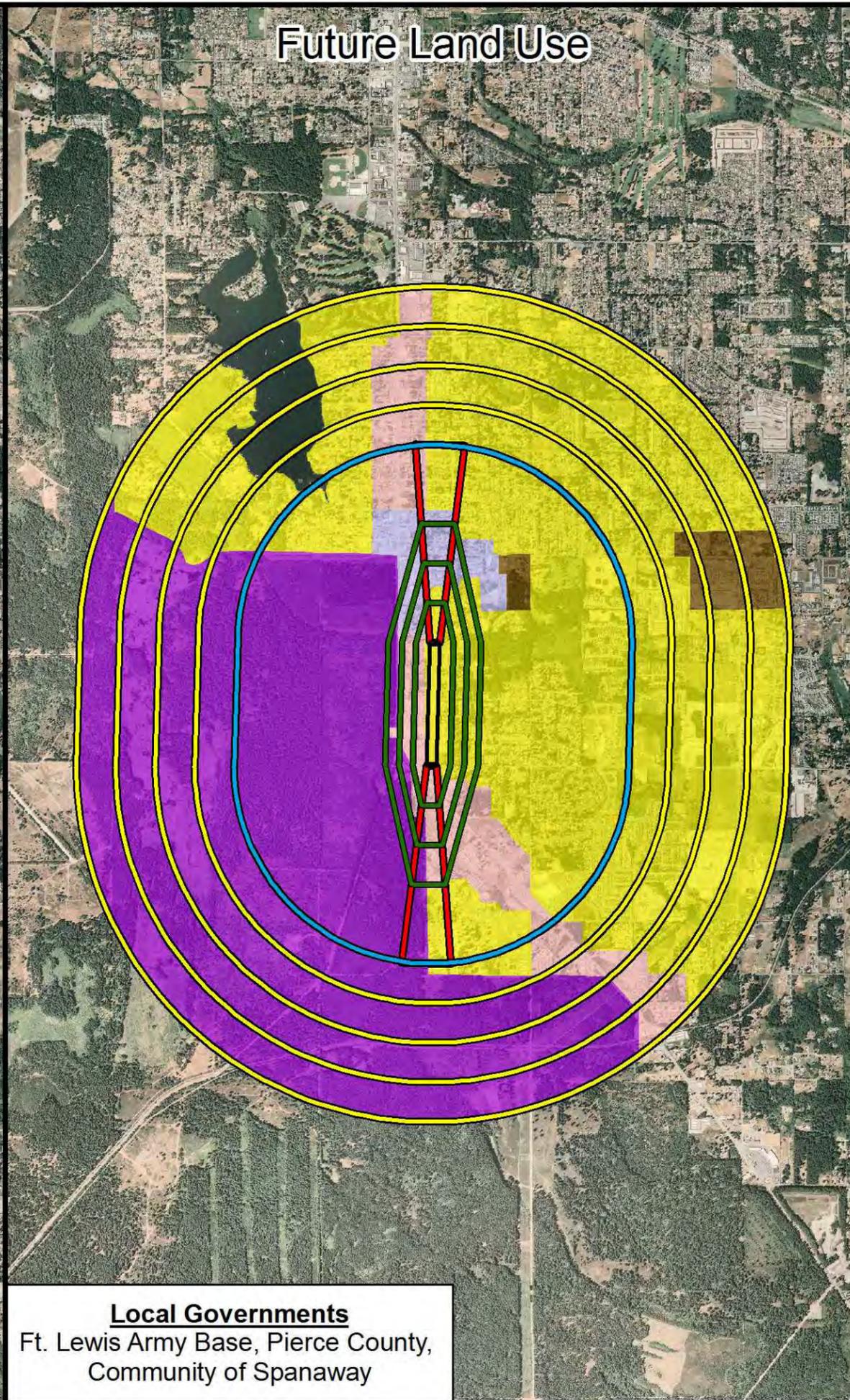
Pierce County/ Community of Spanaway: Land is available for development south of the airport along Mountain Highway East. This land is designated as industrial and “employment center.” East of the airport is designated as “high density single family.” There is area for development beneath the horizontal surface in this area.

Source: Pierce County GIS Urban Land Use Designation Map, 10/01/2008, Satellite Imagery November 9, 2007 (Google Earth).

Current Land Use



Future Land Use



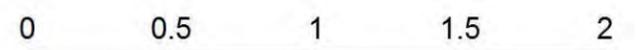
Spanaway Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Scale in Miles

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Local Governments
 Ft. Lewis Army Base, Pierce County,
 Community of Spanaway

Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery
 Program (2006).

Swanson Field – Pierce County

Current Land Use

Town of Eatonville is southwest of the airfield. Other surrounding area is agrarian or undeveloped for the most part.

Primary Surface: Existing residential near runway. Possible aviation-residential community. If not, recommend fee simple acquisition or a non-suit covenant.

Approach Surface: A few rural residential parcels. Most of area is undeveloped. Recommend aviation easements in conjunction with conservation easements

Transitional Surface: Multiple residential parcels within transitional surface at southern end of the airport. Recommend non-suit covenant in addition to aviation easement. Conservation easement would be more appropriate for northern area of the zone.

Horizontal Surface: Area development is not intense enough to threaten the horizontal surface.

Conical Surface: Same as the horizontal surface.

Future Land Use

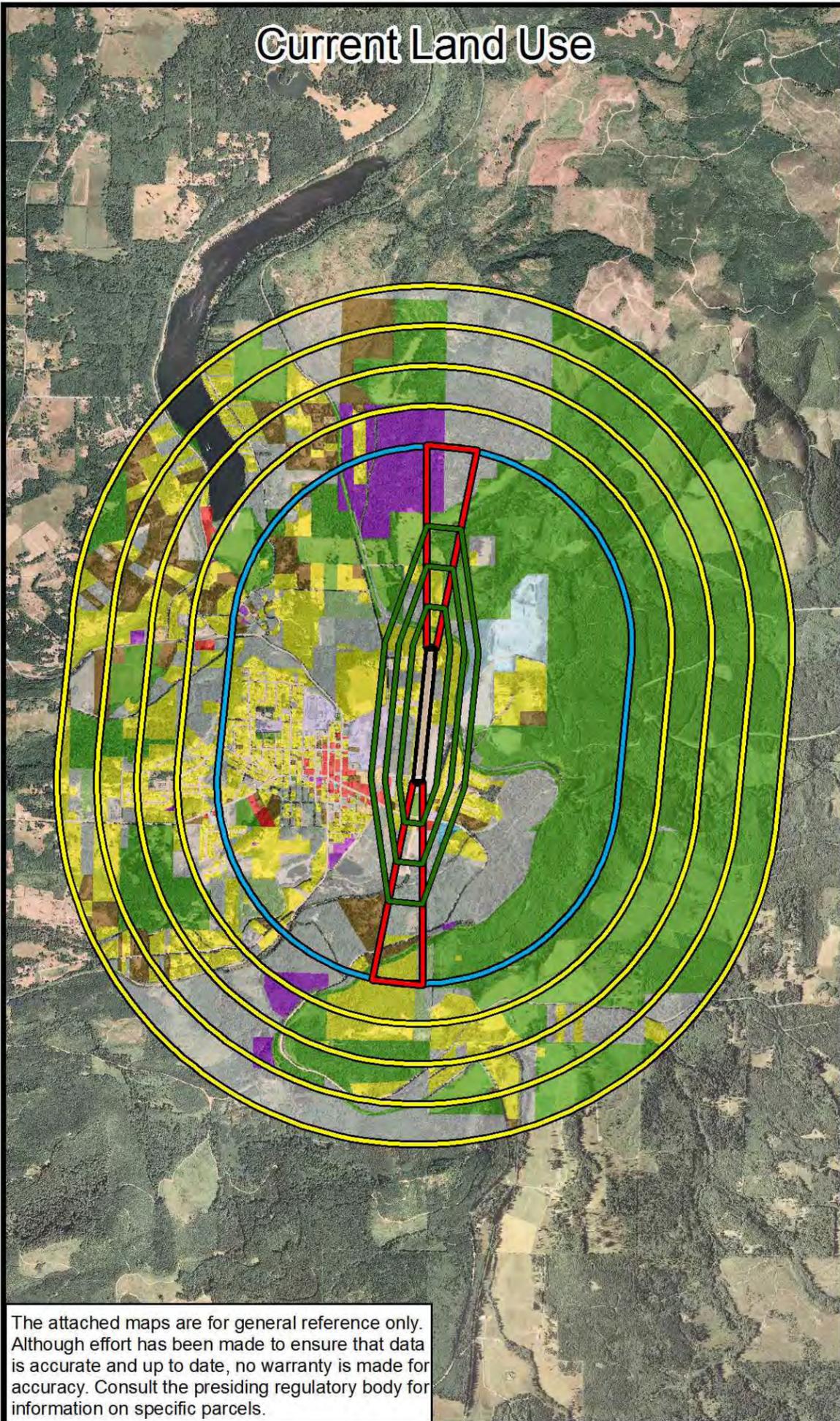
Town of Eatonville: does not have a zoning map or a land use map available. From satellite imagery, it appears that there is potential for intensified residential development in the western horizontal area. The imagery is dated, so this development may have already occurred.

Source: Satellite Imagery June 2005 (Google Earth).

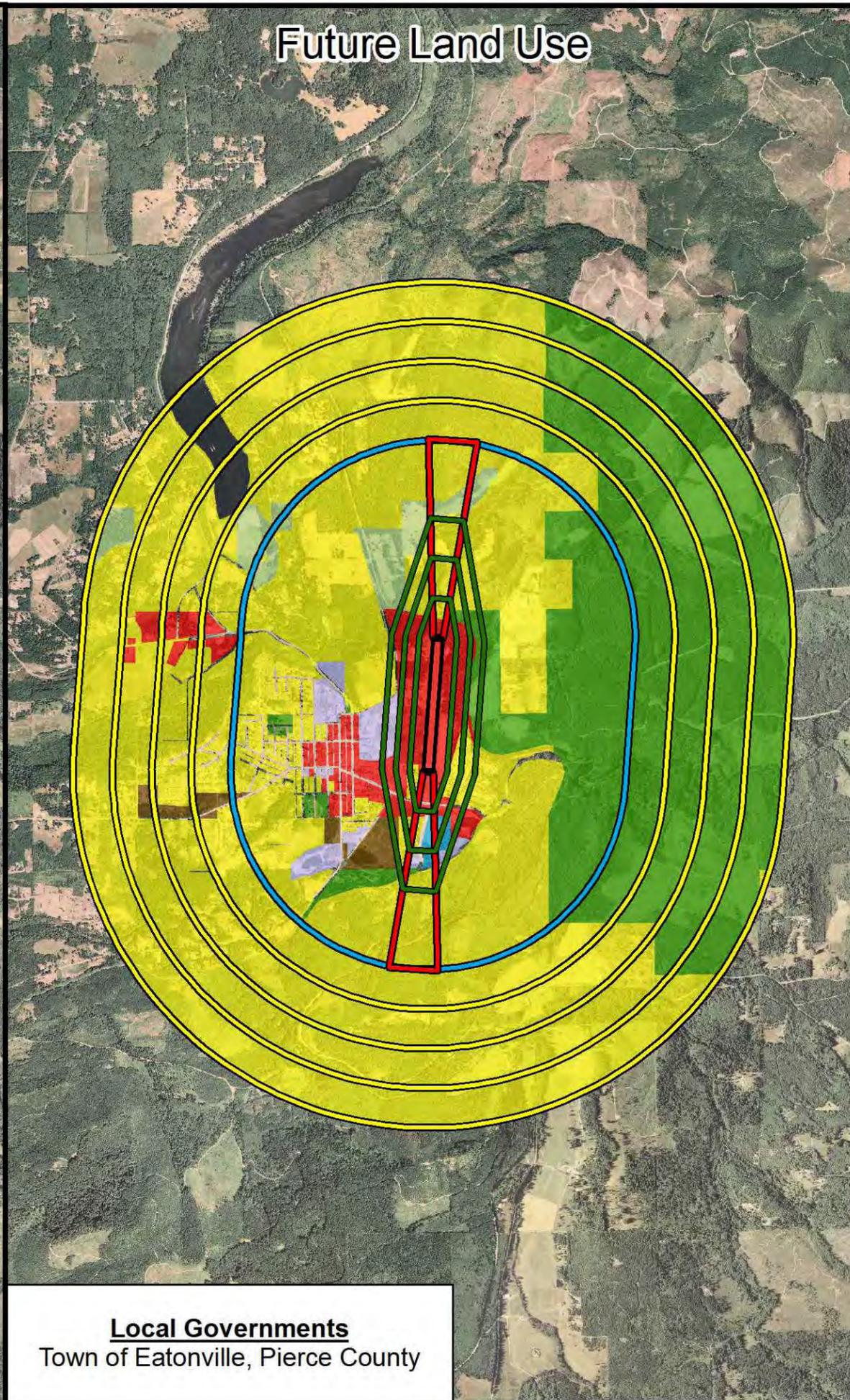
Pierce County: Area to the southeast of the airport is coded for moderate density residential development. Area to the east and northeast, beneath the horizontal and conical surfaces, is coded for rural or designated forest land.

Source: Pierce County GIS Urban Land Use Designation Map, 10/01/2008, Satellite Imagery June 2005 (Google Earth).

Current Land Use



Future Land Use



Swanson Airport

Airport Surfaces

- Primary
- Transitional
- Approach
- Horizontal
- Conical

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

The attached maps are for general reference only. Although effort has been made to ensure that data is accurate and up to date, no warranty is made for accuracy. Consult the presiding regulatory body for information on specific parcels.

Local Governments
 Town of Eatonville, Pierce County

Tacoma Narrows Airport – Pierce County

Current Land Use

Primary Surface: On airport.

Approach Surface: Approach to runway 35 is mostly over water with some residential beneath the outer portion. Inner approach area for runway 17 is generally free of obstructions. Many types of land use occur beneath the outer portion. Recommend conservation easement.

Transitional Surface: Some residential on both side of runway. Recommend avigation easement and possible non-suit covenant if noise levels are excessive.

Horizontal Surface: Development does not appear to be intense enough to penetrate horizontal surface. Recommend avigation easements where zoning would permit such height.

Conical Surface: Same as horizontal.

Future Land Use

City of Gig Harbor: The Gig Harbor land use map shows the city expanding its urban growth area to the south. This area is already developed as single family residential. City land use codes do not include high density development. There are areas in the southern portion of the town identified as “no zoning.”

Source: City of Gig Harbor Comprehensive Plan Land Use Map, March 23, 2009, City of Gig Harbor Zoning Map, March 23, 2009, Satellite Imagery November 9, 2007 (Google Earth).

City of Tacoma: Area beneath the southeast horizontal and conical surfaces is highly developed. City of Tacoma maps do not indicate any increase in intensity of current land use.

Source: City of Tacoma Generalized Land Use Plan Map: West End Neighborhood Council District, 12/29/2008.

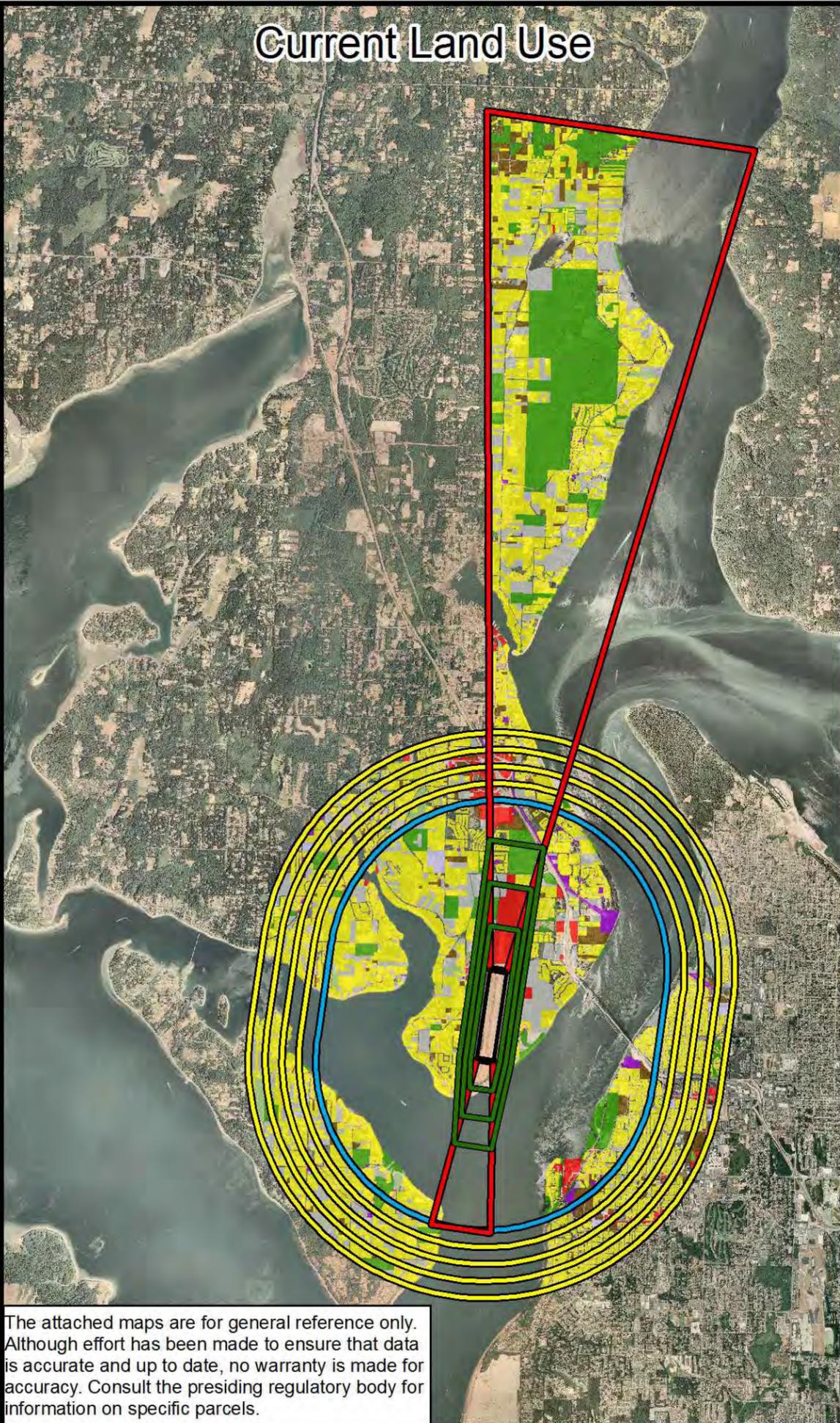
City of University Place: Area beneath the outer southern conical and horizontal areas is already developed and coded as residential.

Source: City of University Place Zoning Map, 4/18/2005.

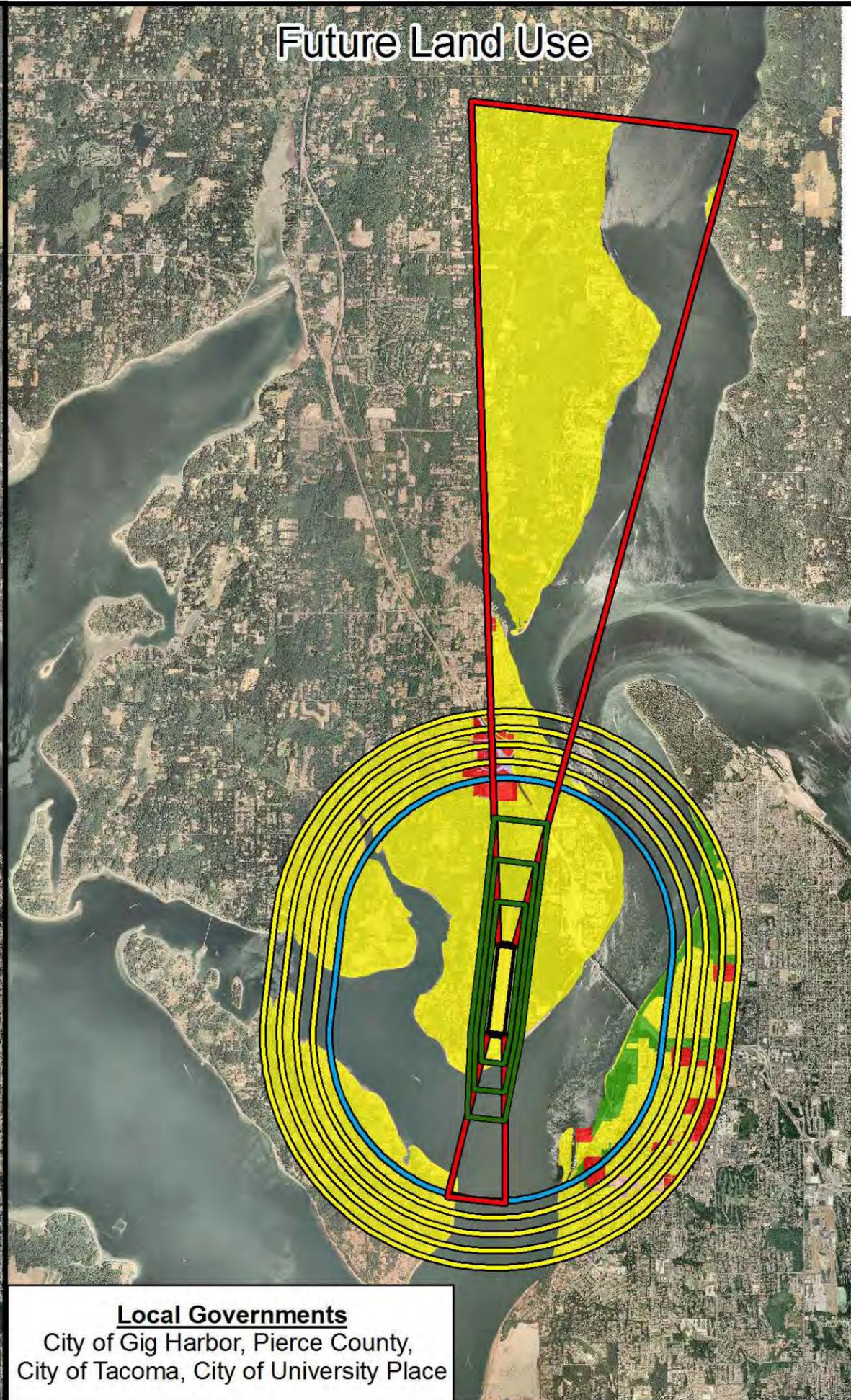
Pierce County: Land is identified as “reserve” to the northwest. Land to the immediate west of the airport has a potential for increased development. This area is labeled as “rural” on the land use map. Primary use appears to be single family residential, with many vacant/undeveloped lots. There is also considerable space for development on Fox Island to the southwest of the airport, beneath the horizontal and conical surfaces.

Source: Pierce County GIS Urban Land Use Designation Map, 10/01/2008, Satellite Imagery November 9, 2007 (Google Earth).

Current Land Use



Future Land Use



Tacoma Narrows Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 1 2 3 4

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments

City of Gig Harbor, Pierce County,
 City of Tacoma, City of University Place

Thun Field – Pierce County

Current Land Use

Primary Surface: On airport property.

Approach Surface: There is significant residential development under both approach paths. Development is not close enough to runway ends to justify fee simple acquisition, but airport may want to consider avigation easements to stop intensification of land use and a non-suit covenant to maintain operational utility of the airfield.

Transitional Surface: Residential development to the north falls under the transitional zone. Recommend avigation easement for SFR, other land uses are compatible.

Horizontal Surface: There are some areas around the airport that are undeveloped. Recommend a conservation easement. Other types of land uses do not appear to penetrate the conical surface. Avigation easement may be appropriate in places where zoning allows height to exceed that of horizontal surface.

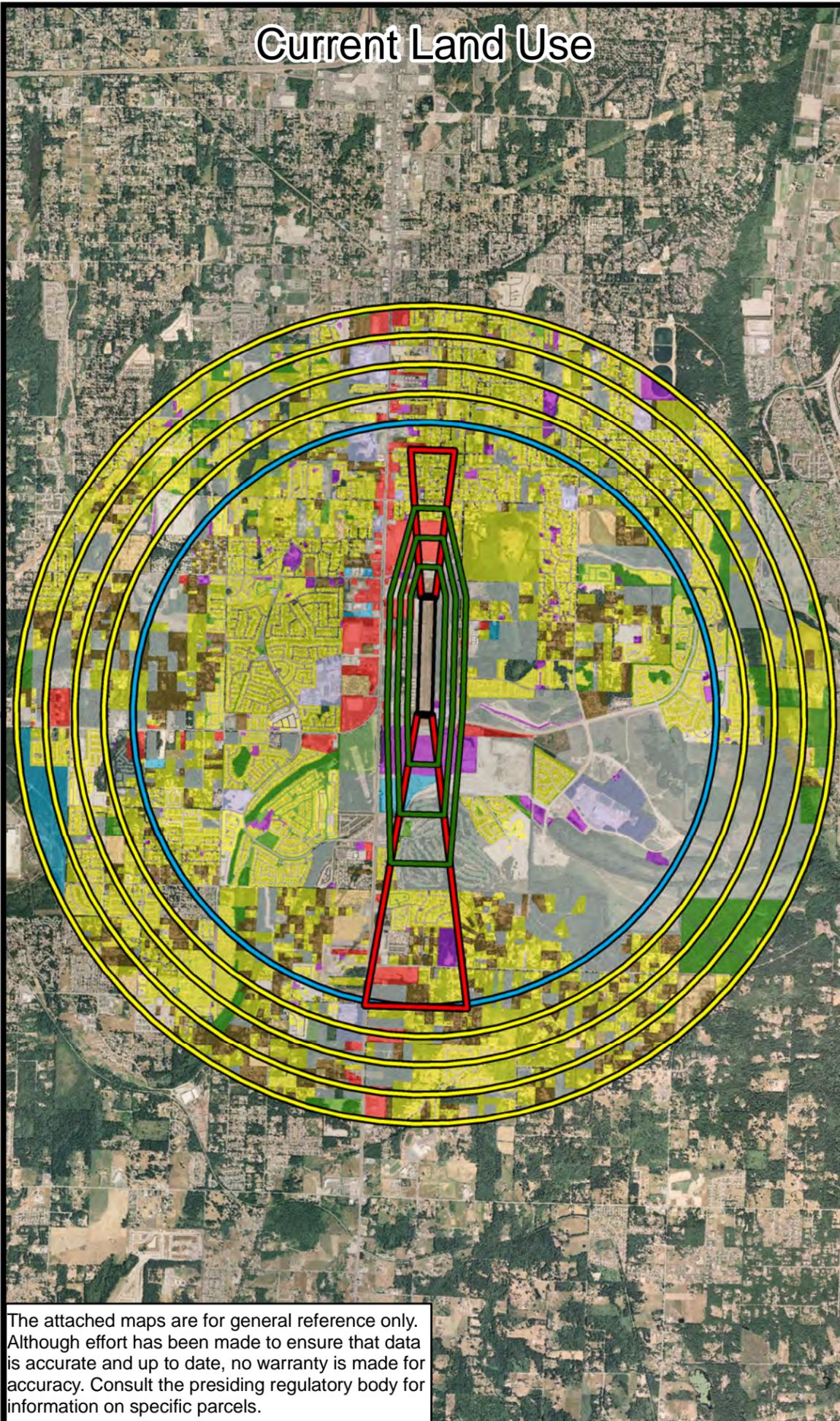
Conical Surface: Same as horizontal surface.

Future Land Use

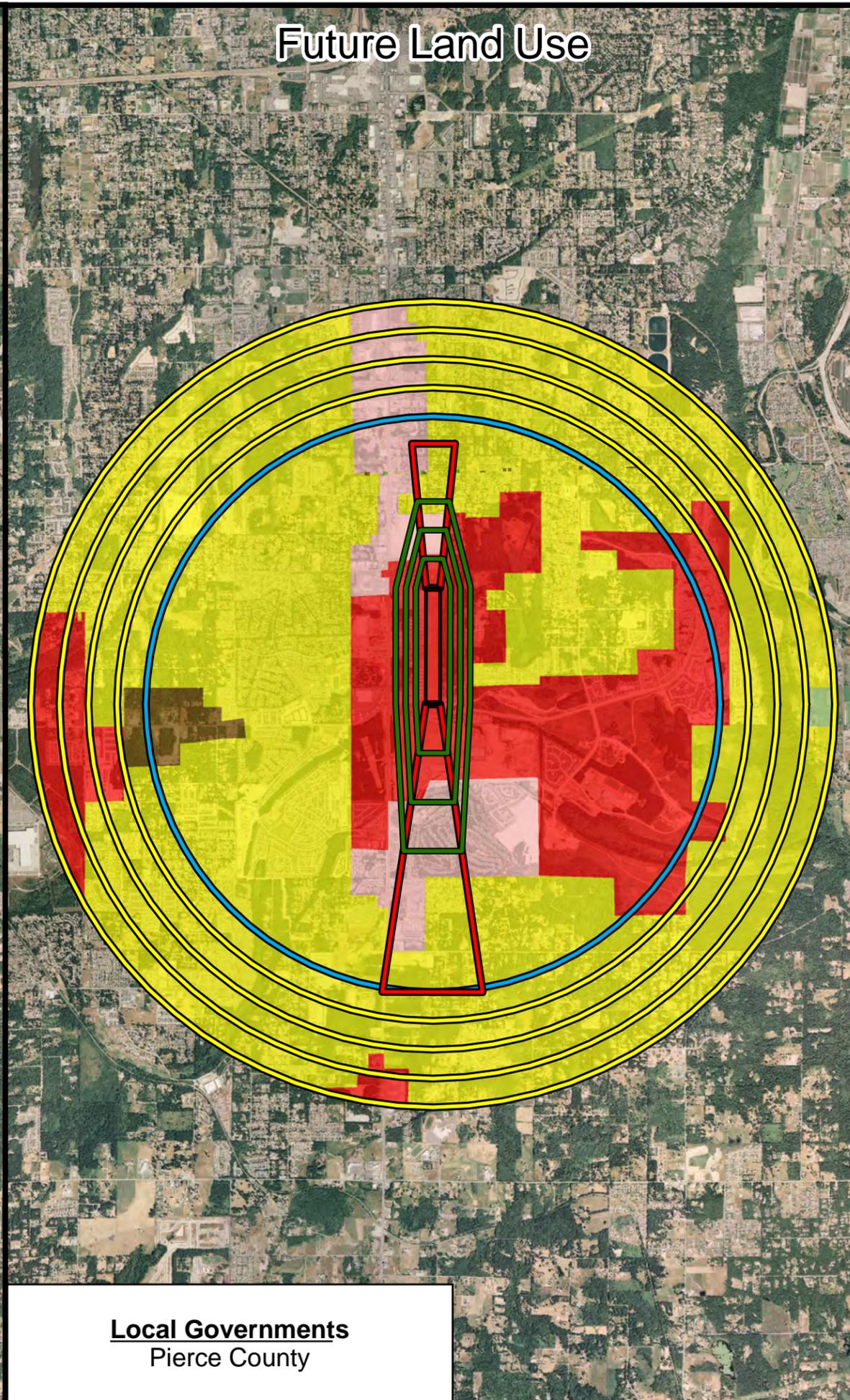
Pierce County: Area to the east of the airport is available for development. Pierce County has coded this land as “employment center.” In the eastern portion of the horizontal surface, there is land coded as “high density single family” residential that is also open for development.

Source: Pierce County GIS Urban Land Use Designation Map, 10/01/2008, Satellite Imagery November 9, 2007 (Google Earth).

Current Land Use



Future Land Use



Pierce County Airport Thun Field

Airport Surfaces

- Primary
- Transitional
- Approach
- Horizontal
- Conical

Land Use

- Agriculture/Silviculture
- Forest, Park, Open Space
- Civic and Quasi-Public; Schools
- Tribal, Government, Military
- Mixed Use
- Commercial
- Mining
- Industrial
- Mobile-Home Park
- Single Family Residential
- Multi-Family Residential
- Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments
 Pierce County

Arlington Municipal Airport – Snohomish County

Current Land Use

Primary Surface: On airport.

Approach Surface: Four different approaches. Recommend avigation easements for the developed properties and conservation easements for undeveloped properties. Some SFR beneath the approaches to runway 11 and runway 16 which may require disclosure notices.

Transitional Surface: Most land uses are compatible; recommend avigation easement to keep it that way. Some SFR which may require disclosure notices.

Horizontal Surface: Development does not appear to be intense enough to penetrate horizontal surface. Recommend avigation easements where zoning would permit such height.

Conical Surface: Same as horizontal.

Future Land Use

City of Arlington: Area off of approach ends of runway poised for development. Comprehensive plan slates most land as general or light industrial. Residential development located beneath approach into runway 16.

Source: City of Arlington Comprehensive Plan Land Use Map, 12/05/05.

City of Marysville: Area beneath runway 34 is indicated to be light industrial on comprehensive plan. There are many parcels of open land beneath airport environs, which indicates a high potential for development.

Source: City of Marysville Comprehensive Plan Map, December 8, 2008.

Snohomish County: Most of the area immediately surrounding the airport is incorporated by Marysville (to the south) or Arlington (all other directions). Zoning and comprehensive plan are similar in this area of the county. Most of the land beneath airport surfaces is slated as rural residential. Development potential still exists, as does the possibility of annexation by Marysville or Arlington.

Source: Snohomish County Planning and Development Services Online GIS "flu_polygon" and "snohmoishzoning", Accessed April, 2009.

Current Land Use

Future Land Use

Arlington Municipal Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments
 City of Arlington, City of Marysville,
 Snohomish County

Darrington Municipal Airport – Snohomish County

Current Land Use

Primary Surface: On airport.

Approach Surface: Approach to runway 10 is mostly clear of development, recommend conservation easement. Some residential beneath approach to runway 28 which might require an avigation easement and/or a disclosure notice if noise impact is great enough.

Transitional Surface: Height of existing development is not great enough to threaten transitional surface. Recommend avigation easement to protect this surface.

Horizontal Surface: Development does not appear to be intense enough to penetrate horizontal surface. Recommend avigation easements where zoning would permit such height.

Conical Surface: Same as horizontal.

Future Land Use

Snohomish County: To the north, most of the land is zoned and planned as rural residential. There is a portion of land off the northwestern end of the runway that is identified as urban industrial. Area to the southwest is listed as forest land. Large area of land is available for development of residential land uses to the west of the airport.

Source: Snohomish County Planning and Development Services Online GIS "flu_polygon" and "snohomishzoning", Accessed April, 2009.

Current Land Use

Future Land Use

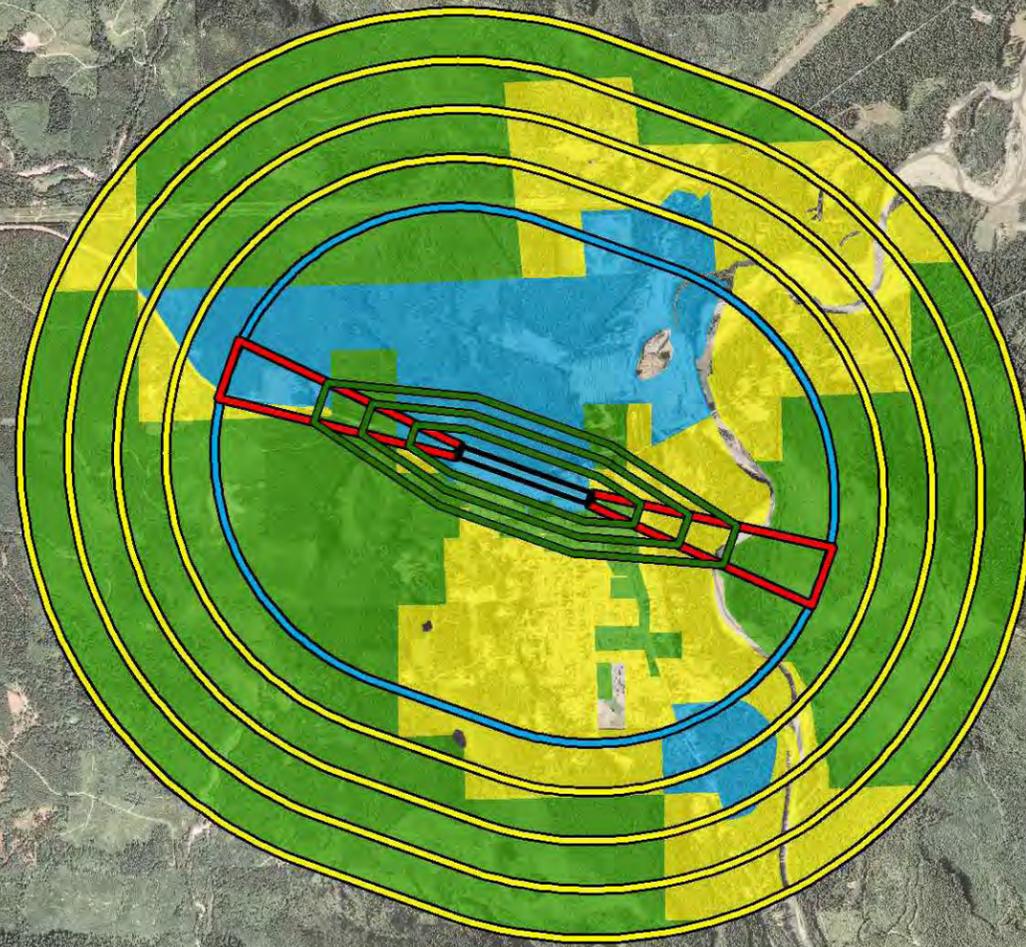
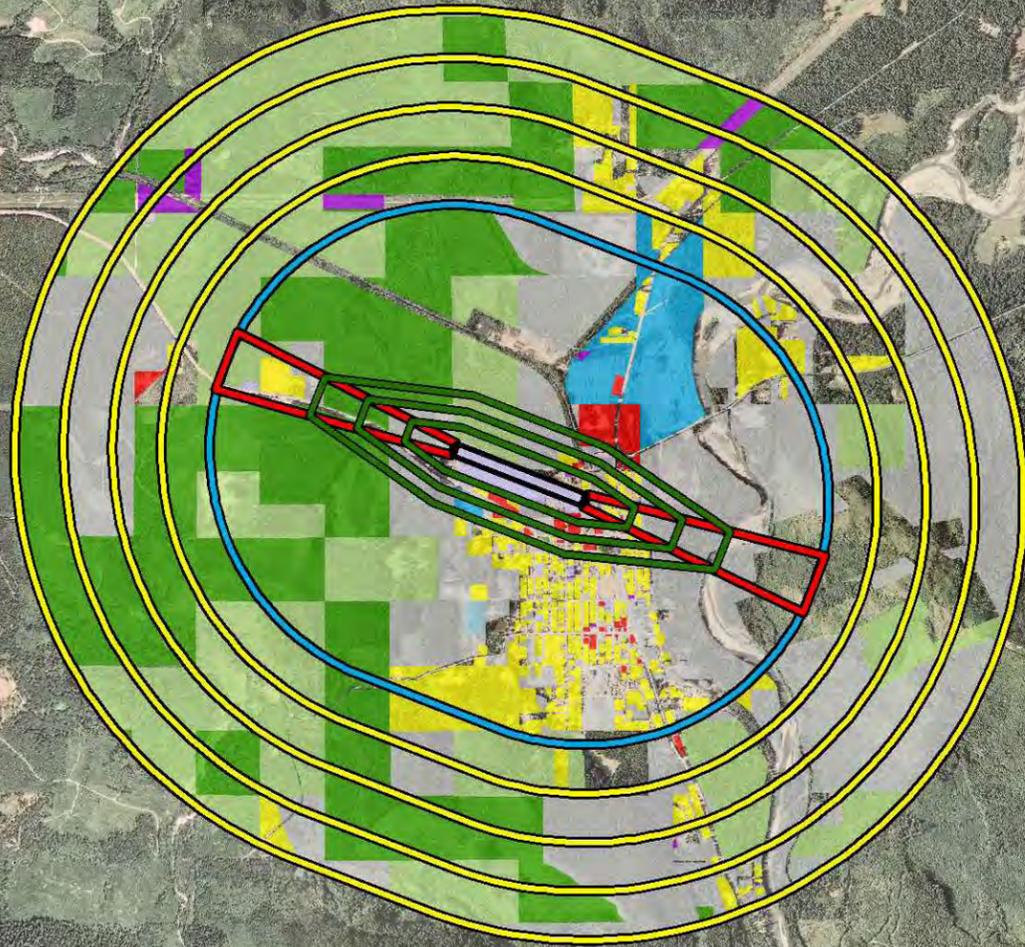
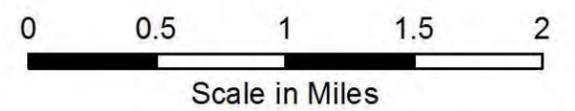
Darrington Municipal Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



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Local Governments
City of Darrington, Snohomish County

Sources:
Land use data: Puget Sound Regional Council (2009)
Aerial Photo: USDA National Agriculture Imagery Program (2006).

Firstair Field Airport – Snohomish County

Current Land Use

Primary Surface: On airport.

Approach Surface: Land use compatible under runway 7 approach, recommend avigation easements and conservation easements to protect it. Some residential beneath the outer portion of runway 25 approach. More than likely not close enough to be adversely impacted. Depending on noise levels, disclosure notices may be in order.

Transitional Surface: Avigation easements may be appropriate should properties have the potential to grow in height.

Horizontal Surface: Low risk of development that would impact this surface.

Conical Surface: Same as horizontal.

Future Land Use

City of Monroe: City has an airport overlay zone roughly the size of the horizontal surface. Most of the land around the airport is designated as “special regional use” for the fairground or as open space. There are several residential developments within the outer horizontal and conical surface to the east of the airport. Town is already developed to the south.

Source: City of Monroe Comprehensive Plan Map, 11/20/2008, City of Monroe Zoning Map 3/26/2008, Aerial Photography, Washington NAIP, 2006.

Snohomish County: Most of the land to the west of the airport is identified as RCF, or rural conservation forestry. Some rural residential is in the horizontal area.

Source: Snohomish County Planning and Development Services Online GIS “flu_polygon” and “snohomishzoning”, Accessed April, 2009, Snohomish County Zoning Map. April 20, 2009.

Current Land Use

Future Land Use

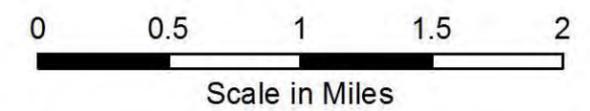
Firstair Field Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:
 Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006)

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Local Governments
 City of Monroe, Snohomish County

Harvey Field Airport – Snohomish County

Current Land Use

Primary Surface: On airport.

Approach Surface: Runway 32 approach is mostly agricultural land, conservation easement is recommended. Approach into runway 14 passes over some residential land uses on the outer boundary. Recommend aviation easement to keep nearby land uses compatible and disclosure notices to properties further out. If noise is an issue. Recommend a non-suit covenant.

Transitional Surface: Recommend conservation easements to keep land uses surrounding the airport agricultural.

Horizontal Surface: Recommend aviation easements or a transfer of development rights to keep development in downtown Snohomish from penetrating the surface.

Conical Surface: Same as horizontal.

Future Land Use

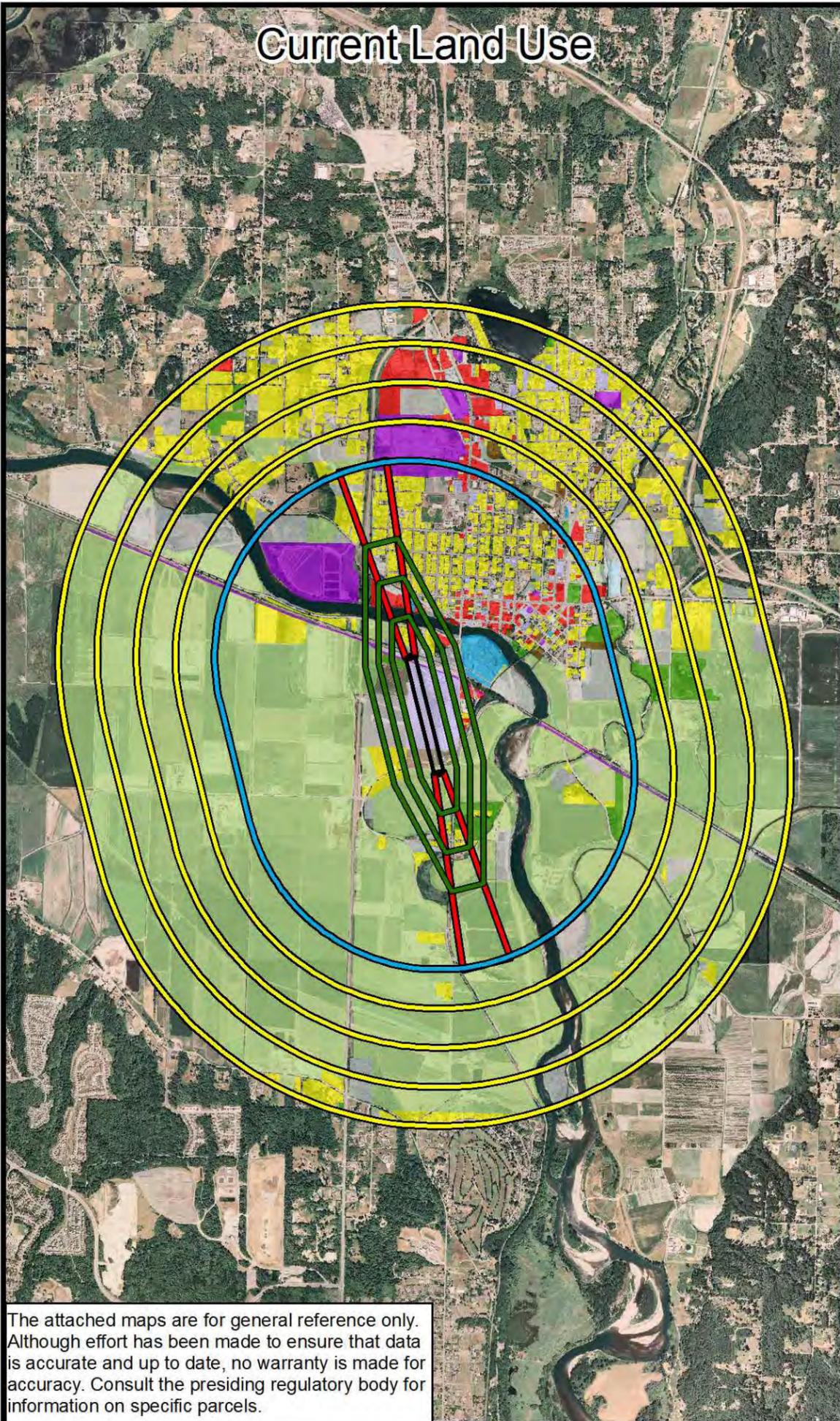
City of Snohomish: Area beneath airport surfaces mostly developed. Some undeveloped land slated for residential development in the northwestern portion of runway 14's approach surface.

Source: City of Snohomish Map LU-1: Land Use Designations, June 2004.

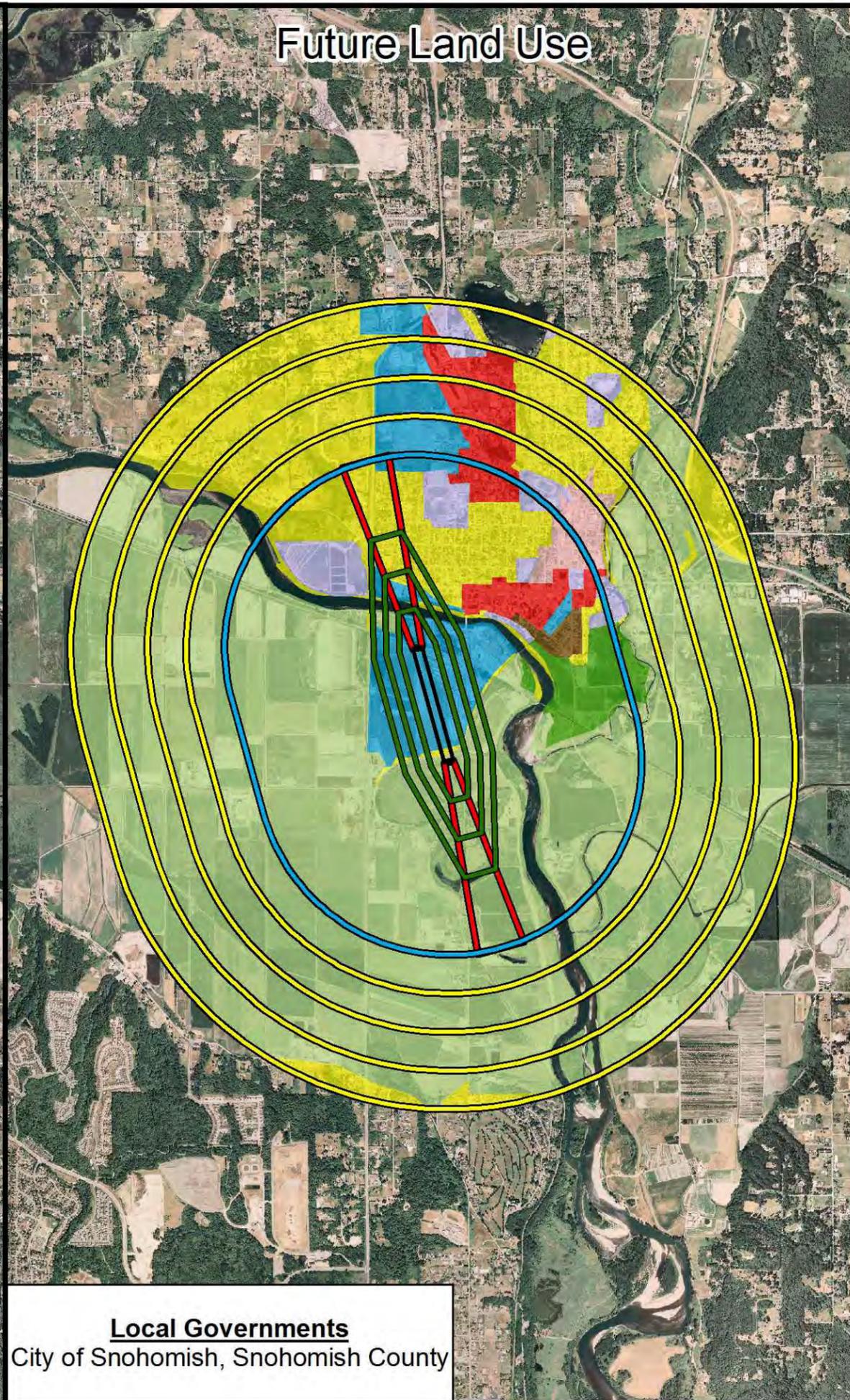
Snohomish County: Land immediately adjacent to the airport is zoned and planned for urban industrial. There is a large belt of land to the south that covers most of the airport surfaces that is reserved for agriculture.

Source: Snohomish County Planning and Development Services Online GIS "flu_polygon" and "snohomishzoning", Accessed April, 2009.

Current Land Use



Future Land Use



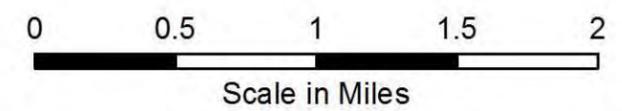
Harvey Field Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



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Local Governments
City of Snohomish, Snohomish County

Sources:
Land use data: Puget Sound Regional Council (2009)
Aerial Photo: USDA National Agriculture Imagery Program (2006)

Sky Harbor Airport – Snohomish County

Current Land Use

Primary Surface: On airport property.

Approach Surface: Approach to runway 7 has some residential beneath it. Recommend avigation easement and a disclosure notice if necessary. Recommend conservation easement for undeveloped and agricultural land beneath approach to runway 25.

Transitional Surface: Some residential development beneath transitional surface. Recommend disclosure notice to people buying these homes.

Horizontal Surface: Town of Sultan falls beneath the far western portion of the horizontal surface. Recommend an avigation easement to protect this surface from development. Possibility for an overlay zone if such a zone does not already exist.

Conical Surface: Development is not intense enough to threaten this surface.

Future Land Use

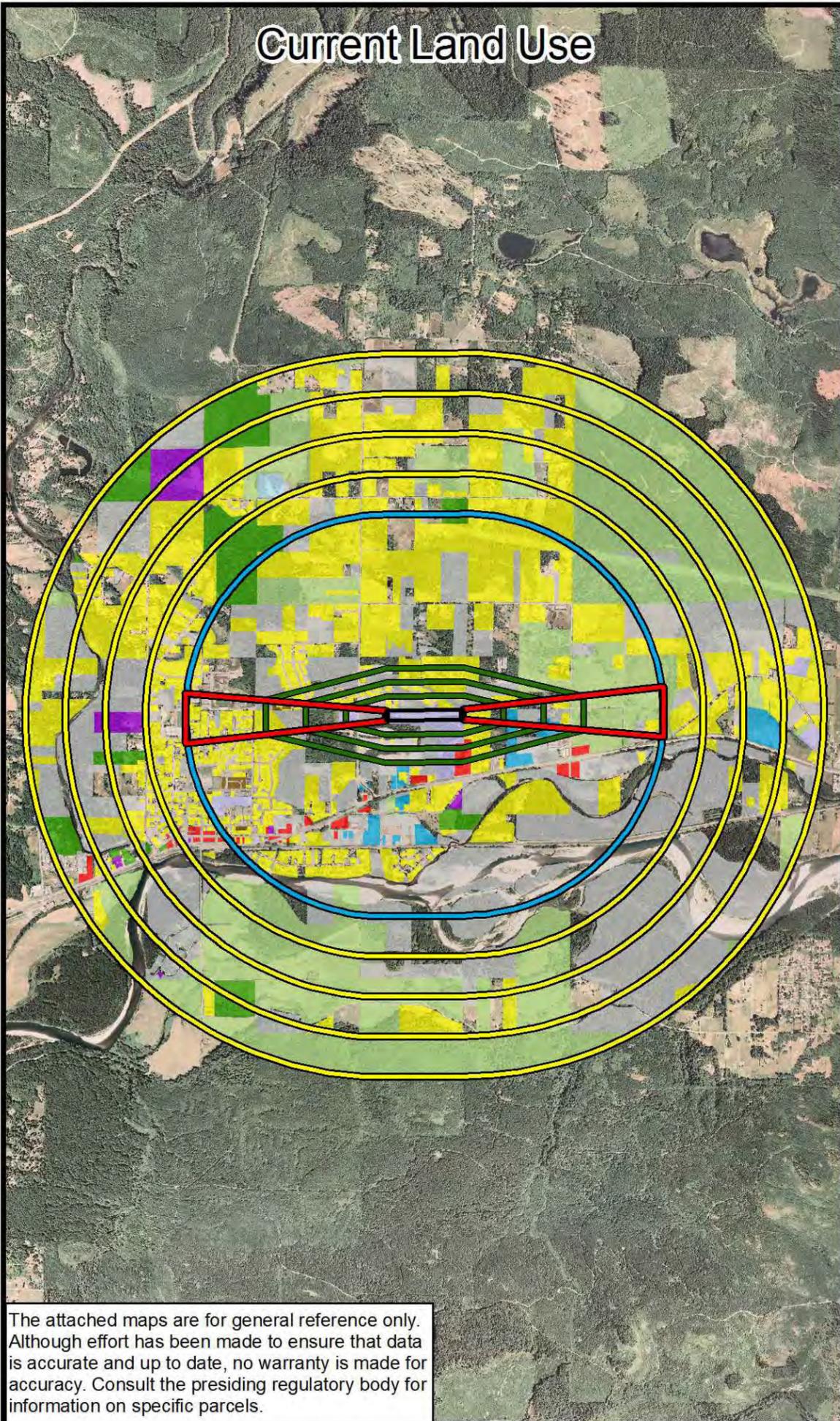
City of Sultan: Area south of airport planned for moderated density. Existing residential very close to the runway and there is the possibility that airport may become overrun with residential development. No mention in comprehensive plan about airport.

Source: Sultan Comprehensive Plan Land Use Map, August, 2007.

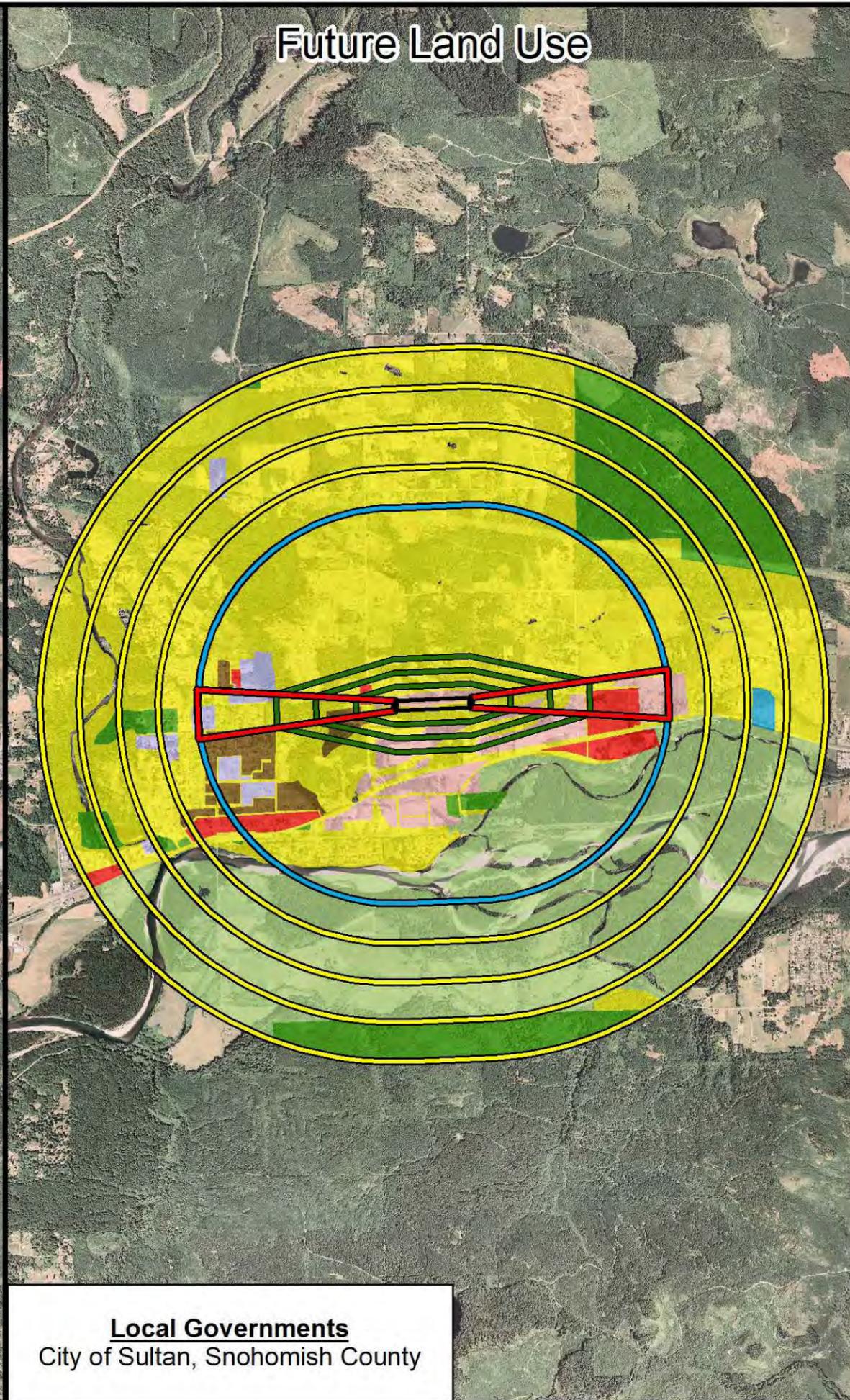
Snohomish County: Southern portion of horizontal and conical surface are protected by rural conservation zones. Outer portions of conical surface to the immediate west and north of the airport are zoned as rural residential and have some development on the.

Source: Snohomish County Planning and Development Services Online GIS "flu_polygon" and "snohomishzoning", Accessed April, 2009, Snohomish County Zoning Map.

Current Land Use



Future Land Use



Sky Harbor Airport

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



0 0.5 1 1.5 2

Scale in Miles

Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery Program (2006).

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Local Governments
 City of Sultan, Snohomish County

Snohomish County-Paine Field – Snohomish County

Current Land Use

Precision approaches into this airport are of statewide importance due to the jobs created by the Boeing factory.

Primary Surface: On airport.

Approach Surface: Precision approach into runway 16R does not have much incompatible development. Recommend a conservation easement to keep land use compatible. Inner portion of approach to runway 34L has development beneath it, recommend avigation easements to keep this development compatible. Approach to runway 16L is on airport and Boeing property while runway 34R has some residential development beneath it. Avigation easement is recommended for runway 34R in addition to a disclosure notice. Runway 29 may adversely impact some residential developments as is the case for runway 11. Recommend disclosure notices and avigation easements for these two.

Transitional Surface: Most of transitional surface is compatible development. Recommend avigation easement to keep it this way.

Horizontal Surface: Occupies a very large area. Recommend coordination with local governments to establish an airport overlay zone if one is not already in place.

Conical Surface: Same as horizontal.

Future Land Use

City of Everett: Area around airport is mostly developed. Comprehensive plan for airport environs is similar to current land use.

Source: City of Everett Growth Management Comprehensive Land Use Map, December, 2008, Aerial Imagery Washington NAIP 2006.

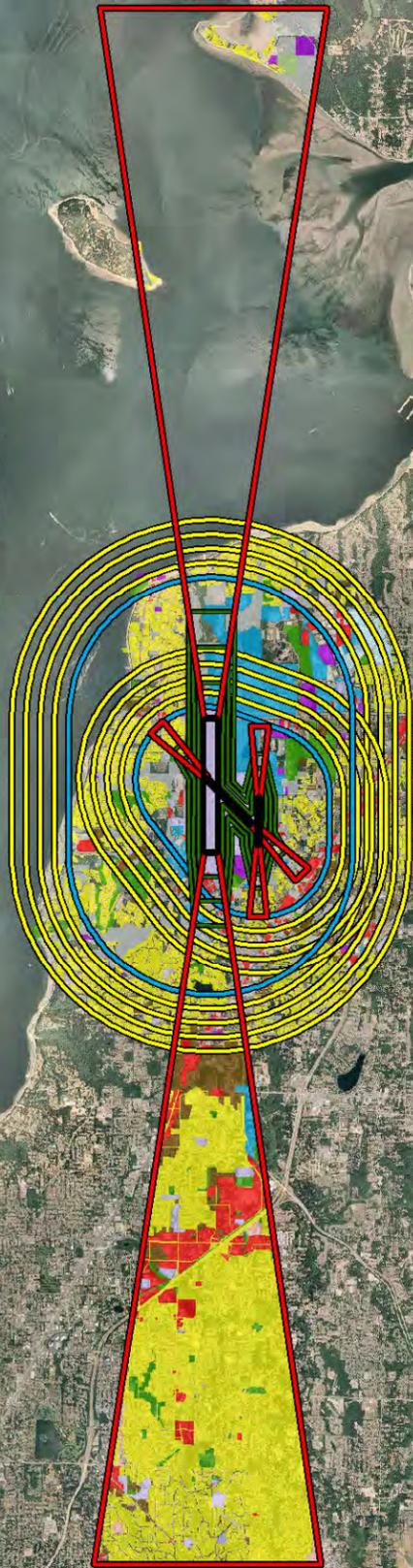
City of Mukilteo: Area around airport is largely built upon. Medium density residential is on the comprehensive plan beneath approach into runway 34L, which could result in some intensification in development. The airport master plan includes a future instrument approach to runway 34L, to be implemented between 2011 and 2021. Land use under the approach to runway 34L should recognize these future plans by the airport.

*Source: City of Mukilteo Comprehensive Plan Map, November 26, 2008, Aerial Imagery Washington NAIP 2006.
Paine Field Master Plan.*

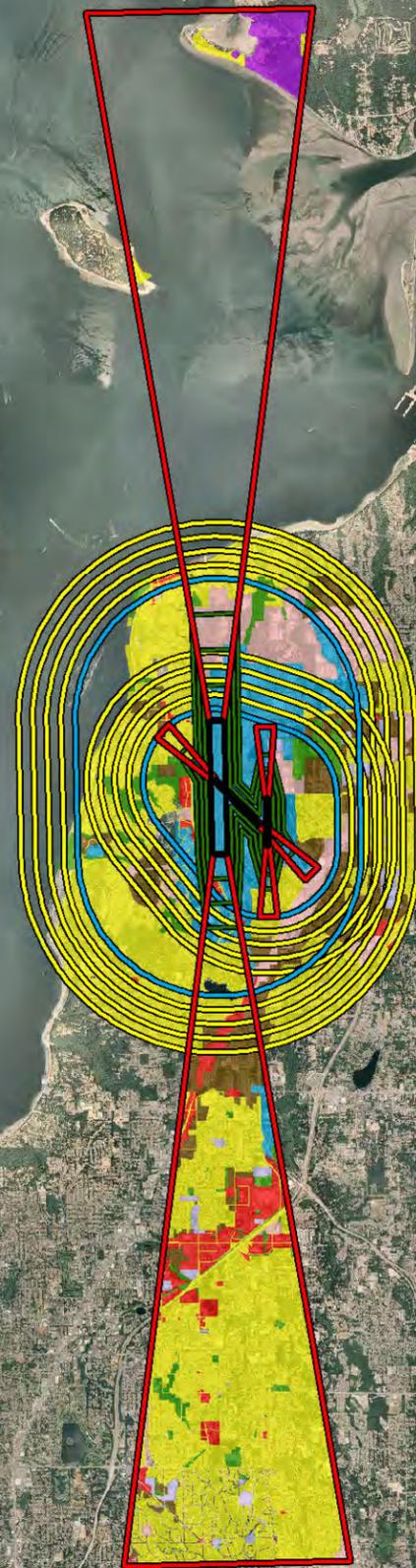
Snohomish County: Medium and high density residential planned and developed. Planned density decreases to the north and increases to the south (see City of Mukilteo text above).

Source: Snohomish County Planning and Development Services Online GIS "flu_polygon" and "snohmoishzoning", Accessed April, 2009, Snohomish County Zoning Map.

Current Land Use



Future Land Use



Snohomish County Airport (Paine Field)

Airport Surfaces

-  Primary
-  Transitional
-  Approach
-  Horizontal
-  Conical

Land Use

-  Agriculture/Silviculture
-  Forest, Park, Open Space
-  Civic and Quasi-Public; Schools
-  Tribal, Government, Military
-  Mixed Use
-  Commercial
-  Mining
-  Industrial
-  Mobile-Home Park
-  Single Family Residential
-  Multi-Family Residential
-  Vacant, Undeveloped



Sources:

Land use data: Puget Sound Regional Council (2009)
 Aerial Photo: USDA National Agriculture Imagery
 Program (2006), (c) 2010 Microsoft Corporation and
 its data suppliers

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Local Governments

City of Brier, City of Everett, City of Kenmore, City of Lake Forest Park,
 City of Lynnwood, City of Mountlake Terrace, City of Mukilteo,
 City of Shoreline, Snohomish County

APPENDIX E

Methodology for Drawing FAR Part 77 Surfaces

Helpful Resources for Generating Part 77 Surfaces

1. Guidance from the Federal Aviation Administration (FAA) can be found at:

http://www.faa.gov/regulations_policies/faa_regulations/

Federal Aviation Regulation Title 14 Aeronautics and Space, Part 77 – Objects Affecting Navigable Airspace guidance, Subpart 77.25 - Civil airport imaginary surfaces. This subpart describes the dimensions, characteristics, and criteria of the five Part 77 surfaces, which include: horizontal, conical, primary, approach, and transitional.

2. National Geodetic Survey (NGS) provides aeronautical data for the operation of the National Airspace System, in accordance with a series of interagency agreements with the FAA.

A table showing the type and dimension of FAR Part 77 surfaces based on the runway classification can be found at and is included on the following pages as Table 1:

<http://www.ngs.noaa.gov/AERO/oisspec.html>

A plan view diagram of the FAR Part 77 surfaces can be found at:

<http://www.ngs.noaa.gov/AERO/yplanfar77.gif>

A 3-dimensional diagram of the FAR Part 77 surfaces can be found at:

<http://www.ngs.noaa.gov/AERO/3dfar77.html>

3. Airport data (5010) and runway information is provided by the FAA at:

http://www.faa.gov/airports_airtraffic/airports/airport_safety/airportdata_5010/

Enter the airport data in to the Location Selection Form and submit. A web page containing links to various reports and/or data downloads will open.

Airport Runways Data, under Data Downloads, contains information that is helpful to create the FAR Part 77 surfaces, which includes:

- Runway ID, Length, Width, Surface Type Condition
- Base End and Reciprocal End ID and Physical Elevation
- Base End and Reciprocal End Physical Latitude and Physical Longitude
- Base End and Reciprocal End Part 77 Category

4. Aerial/orthophotos can be acquired from the United States Department of Agriculture (USDA) Farm Services Agency (FSA) Aerial Photography Field Office at:

<http://www.fsa.usda.gov/FSA/apfoapp?area=apfohome&subject=landing&topic=landing>

Aerial/orthophotos may also be found at various city, county, state, or federal agencies.

Example – Auburn Municipal Airport in King County.

Airport Data (5010) and Runway Information from the FAA

• Runway ID	16/34
• Runway Length	3,400 feet
• Runway Width	75 feet
• Runway Surface Type Condition	ASPH-G (Asphalt – Good Condition)
• Base End ID	16
• Base End Physical Latitude	47-19-56.4300N
• Base End Physical Longitude	122-13-36.1300W
• Base End Physical Elevation	57 feet MSL
• Base End Part 77 Category	A(V)
• Reciprocal End ID	34
• Reciprocal End Physical Latitude	47-19-22.8976N
• Reciprocal End Physical Longitude	122-13-35.7832W
• Reciprocal End Physical Elevation	63 feet MSL
• Reciprocal End Part 77 Category	A(V)

Constructing plan view Part 77 surfaces in CAD

1. Plot the latitude/longitude of the Base End (16) and Reciprocal End (34).
(Exhibit 1, Point_A1 and Point_B1)
2. Plot the runway centerline by connecting the points for Runway 16 and Runway 34 (Centerline_A).
(Exhibit 1, Centerline_A)
3. **PRIMARY SURFACE** (Exhibit 1)

- FAR Part 77 Guidance, under Subpart 77.25 (c), states:

When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway; but when the runway has no specially prepared hard surface, or planned hard surface, the primary surface ends at each end of that runway.

Runway 16/34 has a prepared hard surface of asphalt (ASPH); therefore the primary surface extends 200 feet beyond each end of Runway 16/34. To achieve the 200-foot offset, create a circle with a radius of 200 feet from Point_A1 and Point_B1. Extend Centerline_A to intersect each of the created circles; the intersection points are labeled Point_A2 and Point_B2. A net increase of 400 feet will result to the extended runway centerline (Centerline_B). Delete circles.

- Both ends of Runway 16/34 are classified as A(V), which is a utility/visual runway. According to FAR Part 77 Guidance, under Subpart 77.25 (c)(1), and a table provided by the National Geodetic Survey (Table 1), the width of the primary surface is 250 feet. To achieve a width of 250 feet, offset Centerline_B by 125 feet (one-half the total width) on both sides.
- Connect the endpoints of the offset centerline to create a polygon, which is the Primary Surface.

4. HORIZONTAL SURFACE (Exhibit 2)

- FAR Part 77 Guidance, under Subpart 77.25 (a), states:

A horizontal plane 150 feet above the established airport elevation, the perimeter of which is constructed by swinging arcs of specified radii from the center of each end of the primary surface of each runway of each airport and connecting the adjacent arcs by lines tangent to those arcs.

- According to FAR Part 77 Guidance, under Subpart 77.25 (a)(1), and a table provided by the National Geodetic Survey (Table 1), the radius of a horizontal surface for an A(V) classification is 5,000 feet. Create a circle with a 5,000-foot radius from the center of each end of the primary surface (Point_A2 and Point_B2). Connect the circles by lines tangent to the circle. Break the circles at the intersection of the tangent line and delete overlapping segments. Join the two remaining arcs with the two tangent lines. The resulting closed polygon is the horizontal surface.
- Extend Centerline_B to intersect with the edge of the horizontal surface to create Centerline_C. The intersection points are labeled Point_A3 and Point_B3. A net increase of 10,000 feet will result to the extended Centerline_C.

5. APPROACH SURFACE (Exhibit 3)

- FAR Part 77 Guidance, under Subpart 77.25 (d), states:

A surface longitudinally centered on the extended runway centerline and extending outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based upon the type of approach available or planned for that runway end.

- The geometry of the approach surface is dependent upon the type of runway and approach.

The table provided by the National Geodetic Survey (Table 1) provides the geometry standards of an approach surface, which is dependent upon the runway and approach type. FAR Part 77 Guidance, under Subpart 77.25 (d) provides text narrative of approach surface geometry.

- Runway 16/34 is classified as A(V) on both runway ends. The approach surface geometry for an A(V) classification will have an inner edge width of 250 feet (same as the width of the primary surface), an outer edge width of 1,250 feet, a length of 5,000 feet (same as the horizontal surface radius), and a horizontal to vertical slope of 20:1.
- At Point_A3 and Point_B3, draw a circle with a diameter of 1,250 feet (or a radius of 625 feet). For each runway end, connect the quadrant points on each of the drafted circles with a line (labeled Line_A1 and Line_B1). Each line should be 1,250 feet long and perpendicular to the runway centerline. The midpoint of Line_A1 must pass through Point_A3 and the midpoint of Line_B1 must pass through Point_B3. Delete the circle from each end of the runway centerline.
- Connect the endpoints of Line_A1 with the corresponding endpoints of the primary surface to create a polygon, which is the approach surface for Runway 16.
- Connect the endpoints of Line_B1 with the corresponding endpoints of the primary surface to create a polygon, which is the approach surface for Runway 34.

6. CONICAL SURFACE (Exhibit 4)

- FAR Part 77 Guidance, under Subpart 77.25 (b), states:

A surface extending outward and upward from the periphery of the horizontal surface at a slope of 20 to 1 for a horizontal distance of 4,000 feet.

- Offset the horizontal surface polygon by 4,000 feet. The horizontal surface represents the inner extent of the conical surface and the offset polygon (Conical_4) represents the outer extent of the conical surface.
- Extend Centerline_C to intersect with the edge of the conical surface to create the final extended runway centerline.
- Optional – offset the horizontal surface polygon by 1,000 feet, to create polygon Conical_1, then offset polygon Conical_1 by 1,000 feet, to create polygon Conical_2, and offset polygon Conical_2 by 1,000 feet, to create polygon Conical_3. Each conical polygon represents a vertical increase in elevation of 50 feet, for a total vertical increase of 200 feet from the horizontal surface to the outer extent of the conical surface.

7. TRANSITIONAL SURFACE (Exhibit 5 and 6)

- FAR Part 77 Guidance, under Subpart 77.25 (e), states:

These surfaces extend outward and upward at right angles to the runway centerline and the runway centerline extended at a slope of 7 to 1 from the sides of the primary surface and from the sides of the approach surfaces.

- Transitional surfaces are extended from the sides of the primary surface at a horizontal to vertical slope of 7:1 until they intersect with the horizontal surface, which lies 150 feet above the established airport elevation.
- Offset each side of the primary surface, those parallel to the runway centerline, by 1,050 feet. The horizontal to vertical slope of the transitional surface is 7:1. In order to intersect the horizontal surface, the transition surface needs to reach 150 feet in the vertical direction, which results in 1,050 feet in the horizontal direction.
- As explained in FAR Part 77 Guidance, Subpart 77.25 (d), the approach slope for Runway 16/34 is 20:1, per the A(V) classification. In order to achieve 150 feet in the vertical direction to intersect the horizontal surface at a slope of 20:1 along the approach surface, the offset from the primary surface that is perpendicular to the runway centerline needs to be 3,000 feet in the horizontal direction.
- Connect the endpoints of each offset line to create a transitional surface polygon (Transitional_3).

- As with the conical surface, the transitional surface may be drawn at various intervals. Typically, the transitional surface is created at a vertical increase in elevation of 50 feet. This will require an offset parallel to the runway along the primary surface of 350 feet and 700 feet, with the 1,050 feet representing the outer edge of the transitional surface. The offset perpendicular to the runway along the primary surface will be at 1,000 feet and 2,000 feet, with the 3,000 feet representing the outer edge of the transitional surface along the approach surface. Connect the corresponding endpoints to create the inner (Transitional_1) and middle (Transitional_2) transitional surface polygons. Each transitional polygon represents a vertical increase in elevation of 50 feet, for a total vertical increase of 150 feet from the primary surface to the outer extent of the transitional surface.
8. The example to construct plan view Part 77 surfaces in CAD for Auburn Municipal described above is relatively uncomplicated because of the single A(V) runway configuration (Exhibit 6). If more than one runway exists at an airport, Part 77 surfaces can overlap and often results in a confusing CAD drawing. Consider joining polygons of the same surface, such as the horizontal surface, and deleting any excessive line work.
 9. When drafting Part 77 surfaces for runways with a PIR approach, refer to FAR Part 77 Guidance, Subpart 77.25 (d) and (e), as well as the table provided by the National Geodetic Survey (Table 1) for specifics. FAR Part 77 Guidance, Subpart 77.25 (e) states:

Transitional surfaces for those portions of the precision approach surface which project through and beyond the limits of the conical surface, extend a distance of 5,000 feet measured horizontally from the edge of the approach surface and at right angles to the runway centerline.

Table 1 OBSTRUCTION IDENTIFICATION SURFACES

FEDERAL AVIATION REGULATIONS PART 77							
DIM	ITEM	DIMENSIONAL STANDARDS (FEET)					
		VISUAL RUNWAY		NON - PRECISION INSTRUMENT RUNWAY		PRECISION INSTRUMENT RUNWAY <u>PIR</u>	
		<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>		
		<u>C</u>	<u>D</u>				
A	WIDTH OF <u>PRIMARY SURFACE</u> AND APPROACH SURFACE WIDTH AT INNER END	250	500	500	500	1,000	1,000
B	RADIUS OF <u>HORIZONTAL SURFACE</u>	5,000	5,000	5,000	10,000	10,000	10,000
		VISUAL APPROACH		NON - PRECISION INSTRUMENT APPROACH		PRECISION INSTRUMENT APPROACH	
		<u>A</u>	<u>B</u>	<u>A</u>	<u>B</u>		
				<u>C</u>	<u>D</u>		
C	APPROACH SURFACE WIDTH AT END	1,250	1,500	2,000	3,500	4,000	16,000
D	APPROACH SURFACE LENGTH	5,000	5,000	5,000	10,000	10,000	*
E	APPROACH SLOPE	20:1	20:1	20:1	34:1	34:1	*

Source: National Geodetic Survey at <http://www.ngs.noaa.gov/AERO/oisspec.html>

- A - Utility runways
- B - Runways larger than utility
- C - Visibility minimums greater than ¾ mile
- D - Visibility minimums as low as ¾ mile
- * - PIR slope is 50:1 for inner 10,000 feet and 40:1 for an additional 40,000 feet

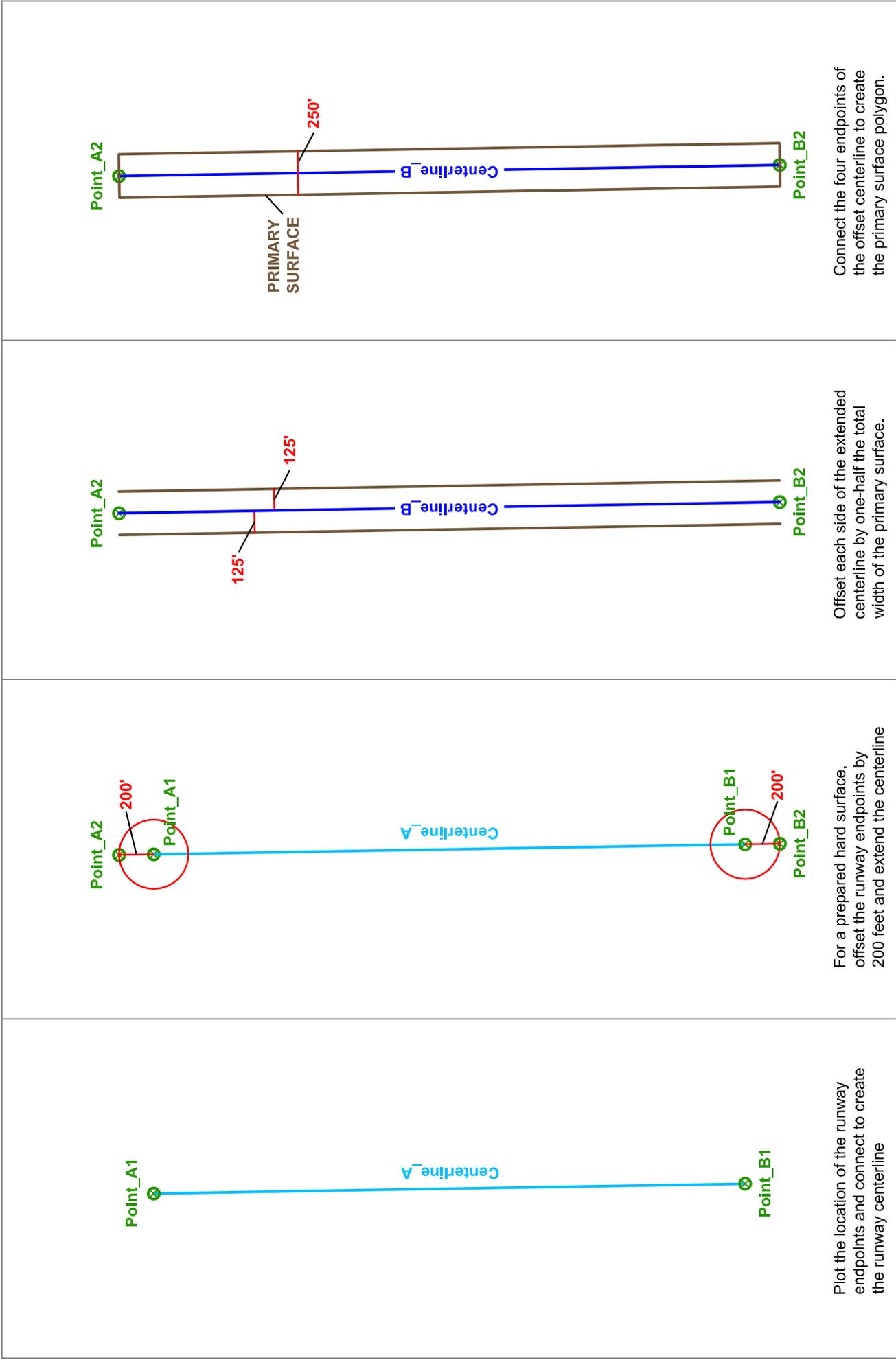
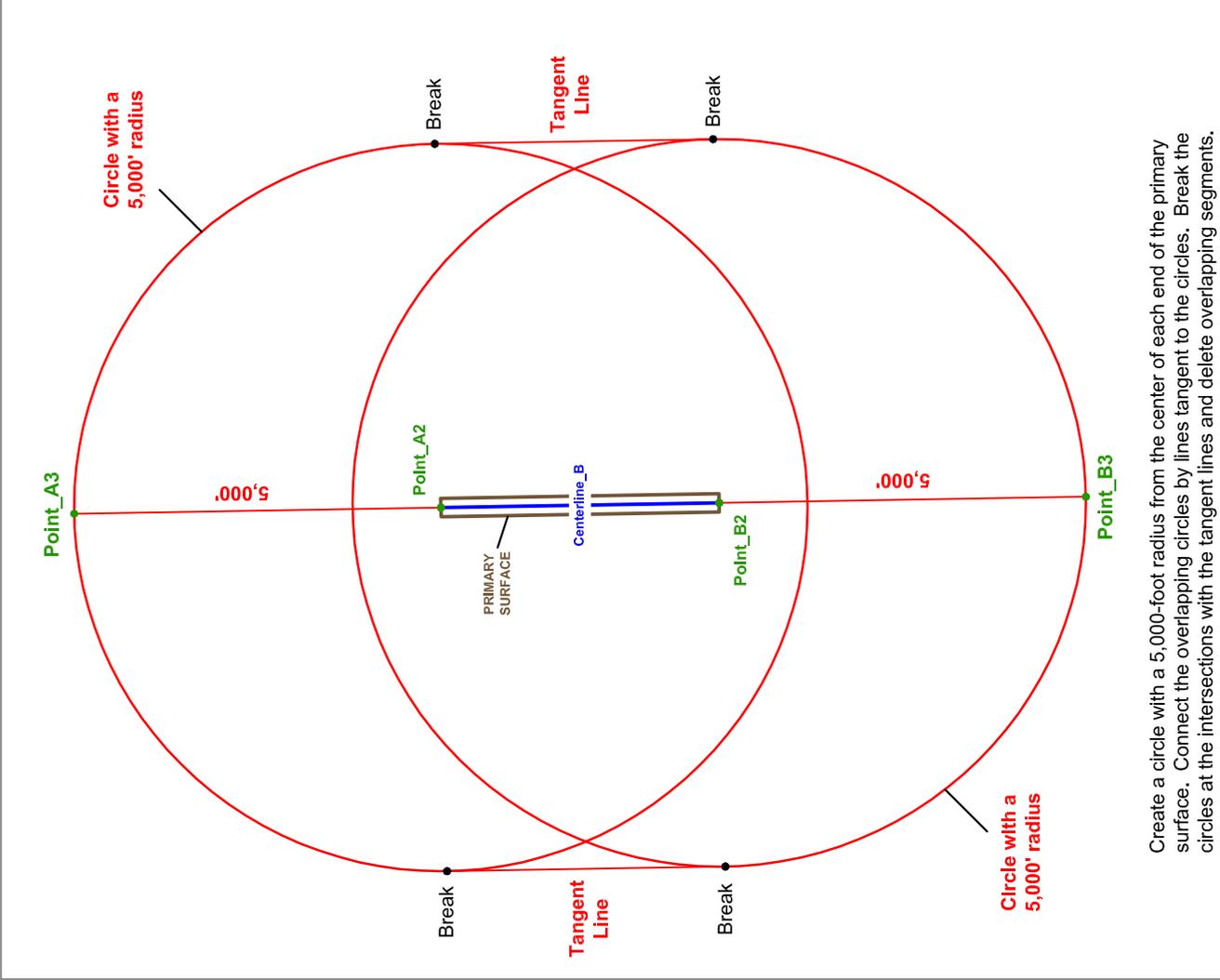
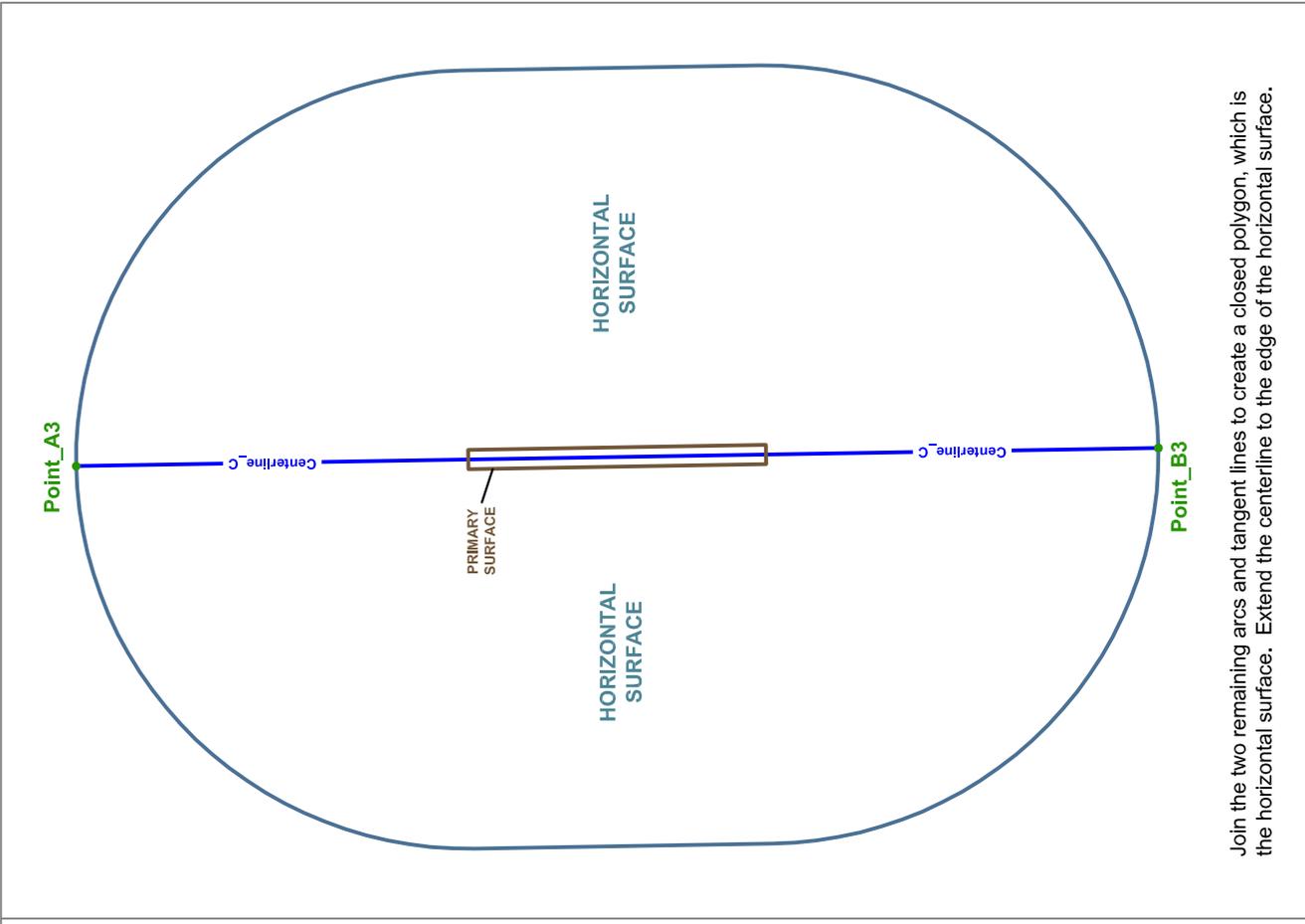


Exhibit 1 Constructing the Primary Surface for Auburn Municipal Airport in King County, Washington.

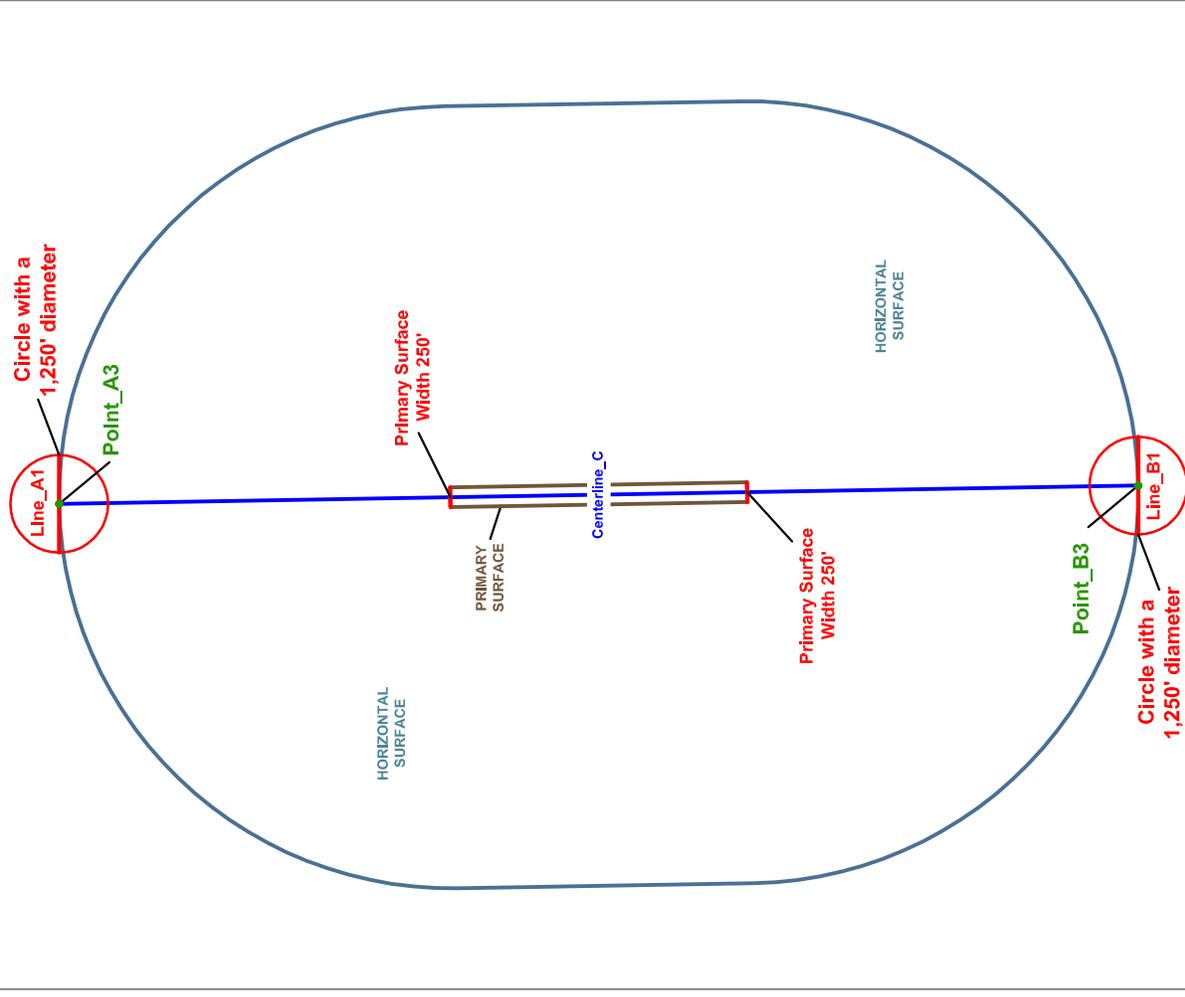


Create a circle with a 5,000-foot radius from the center of each end of the primary surface. Connect the overlapping circles by lines tangent to the circles. Break the circles at the intersections with the tangent lines and delete overlapping segments.

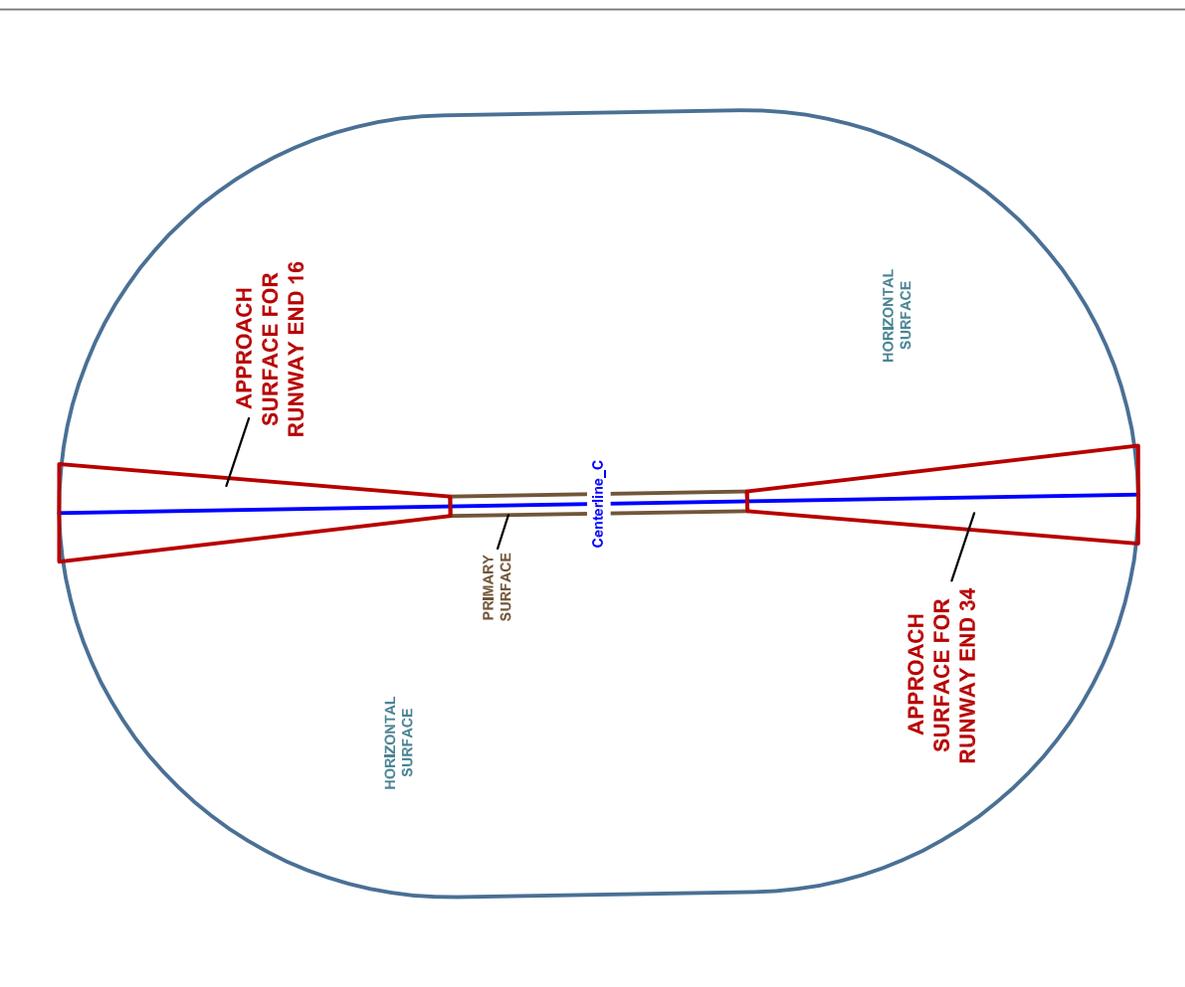


Join the two remaining arcs and tangent lines to create a closed polygon, which is the horizontal surface. Extend the centerline to the edge of the horizontal surface.

Exhibit 2 Constructing the Horizontal Surface for Auburn Municipal Airport in King County, Washington.

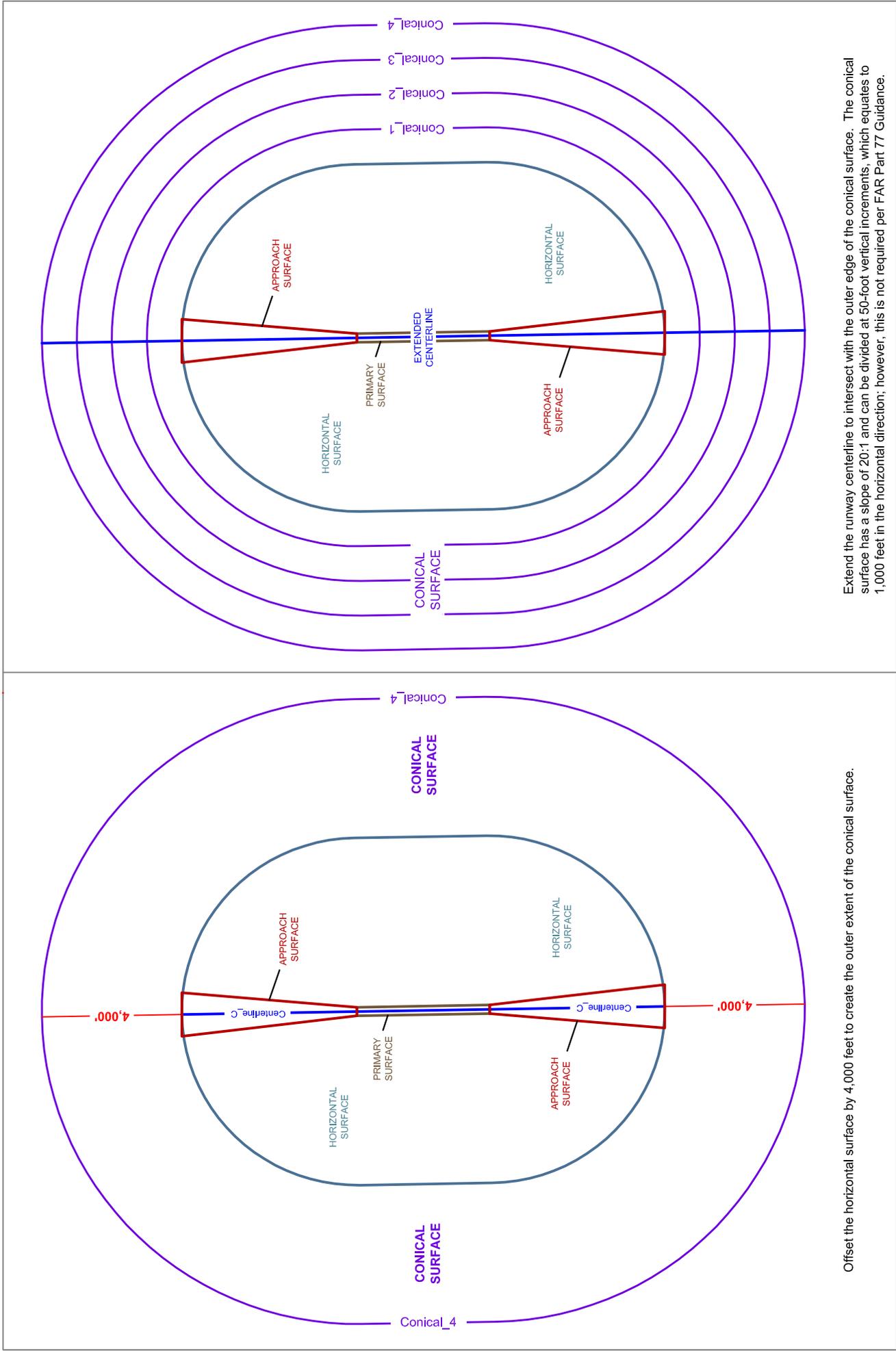


Create a circle with a 1,250-foot diameter at the intersection of the runway centerline and horizontal surface. Connect the quadrants of each circle with a line that is perpendicular to the runway and passes through the intersection of the runway and horizontal surface. Delete the two circles.



Connect the endpoints of each drafted line with the corresponding endpoints of the 250-foot wide primary surface to create a closed polygon, which is the approach surface. The approach surface will overlap the end of the primary surface that is perpendicular to the runway centerline.

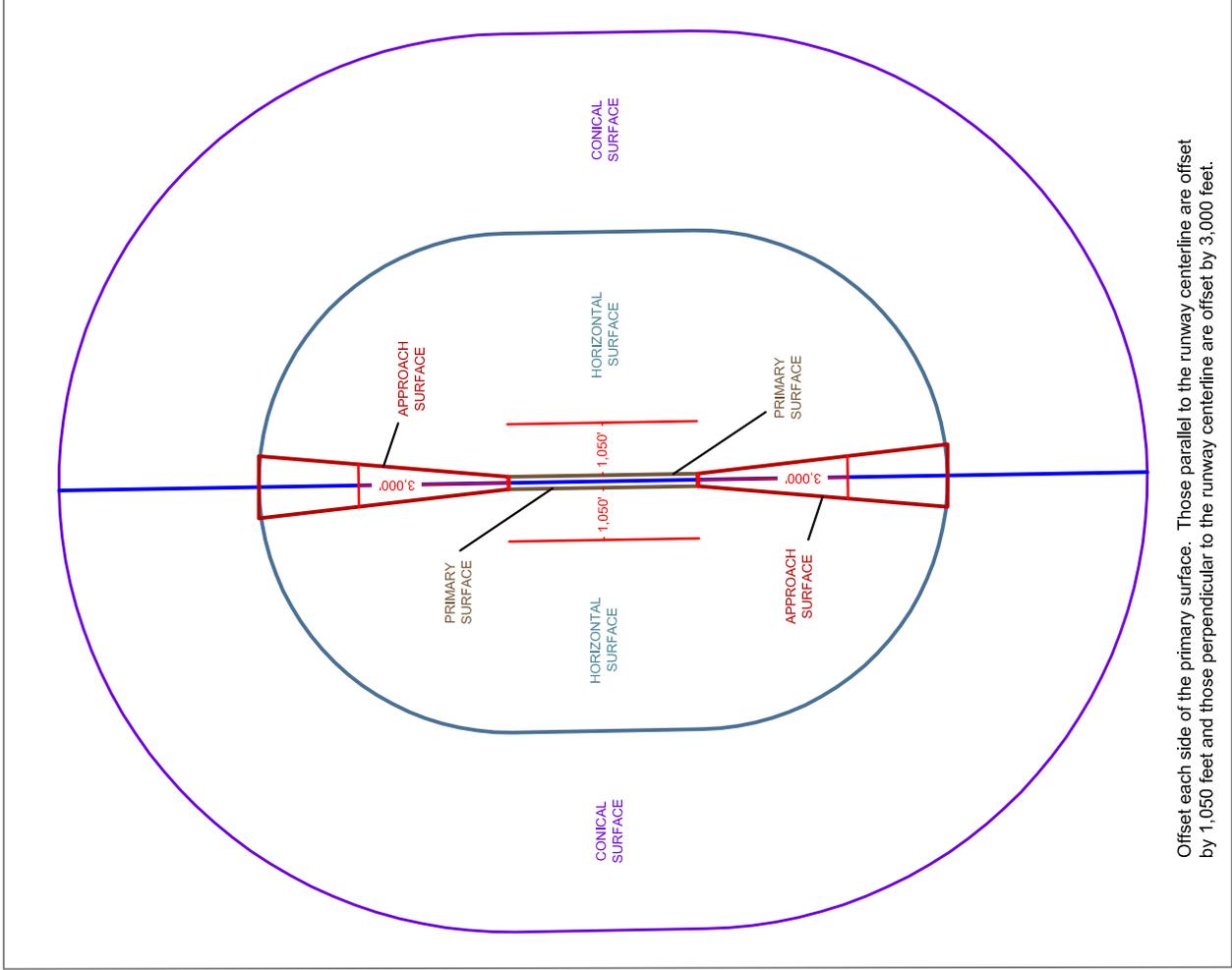
Exhibit 3 Constructing the Approach Surface for Auburn Municipal Airport in King County, Washington.



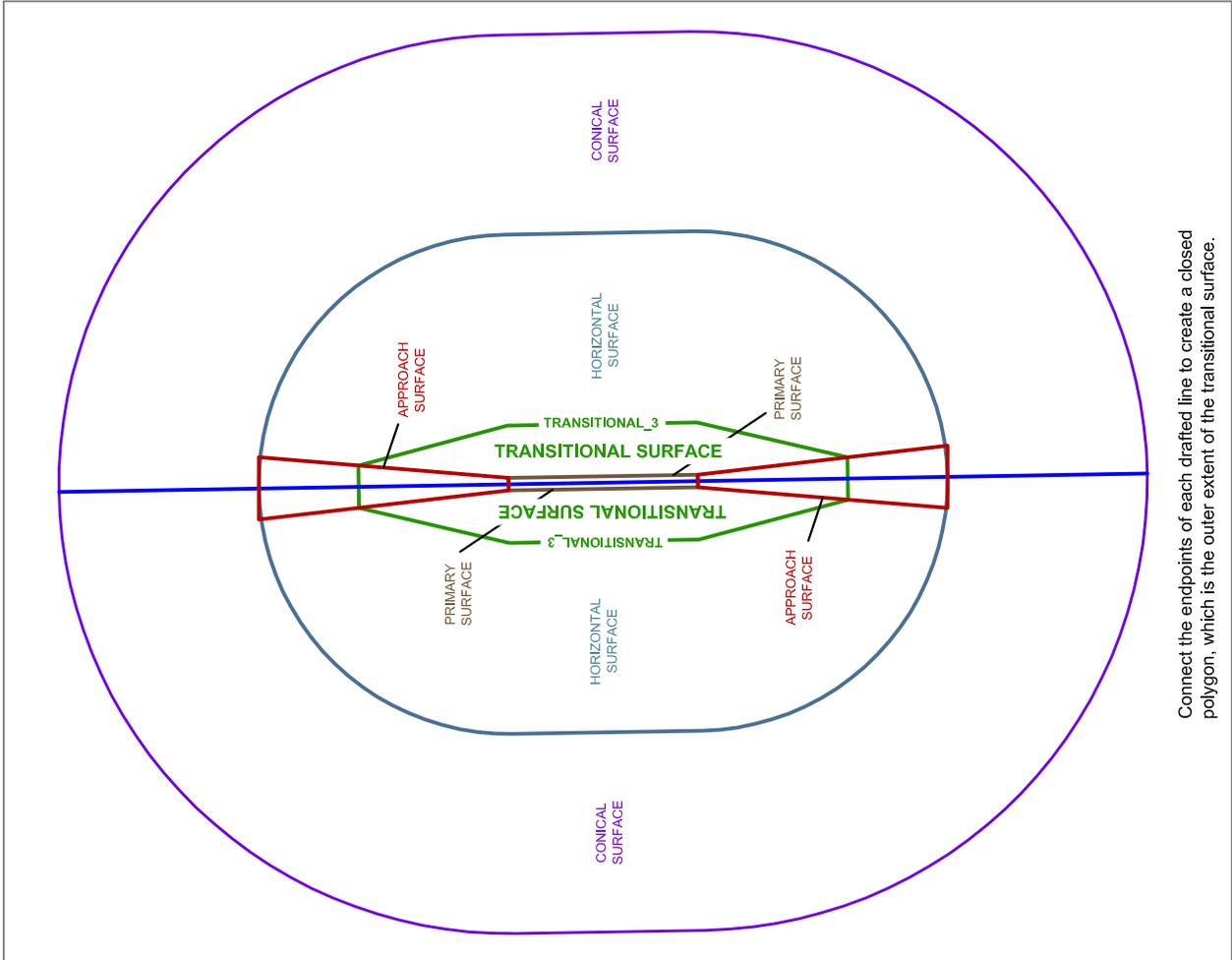
Offset the horizontal surface by 4,000 feet to create the outer extent of the conical surface.

Extend the runway centerline to intersect with the outer edge of the conical surface. The conical surface has a slope of 20:1 and can be divided at 50-foot vertical increments, which equates to 1,000 feet in the horizontal direction; however, this is not required per FAR Part 77 Guidance.

Exhibit 4 Constructing the Conical Surface for Auburn Municipal Airport in King County, Washington.

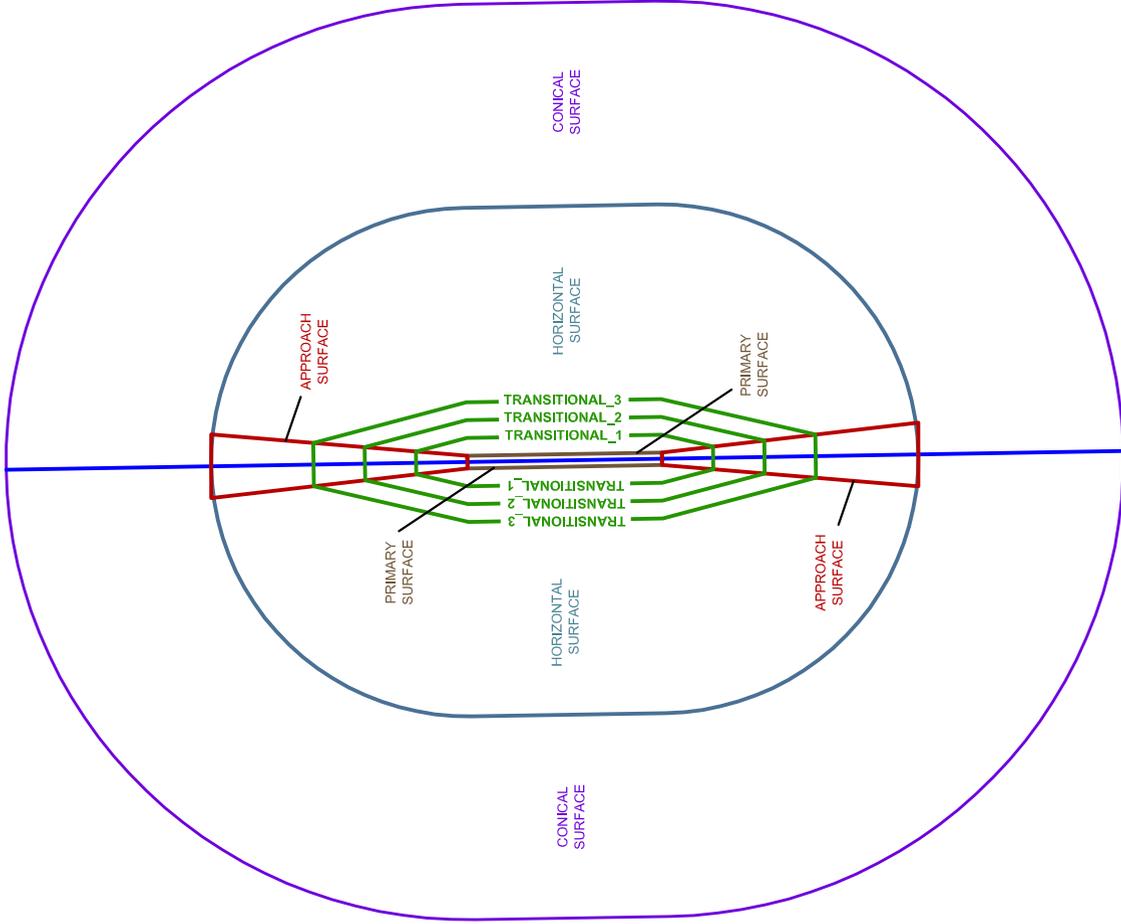


Offset each side of the primary surface. Those parallel to the runway centerline are offset by 3,000 feet and those perpendicular to the runway centerline are offset by 1,050 feet.

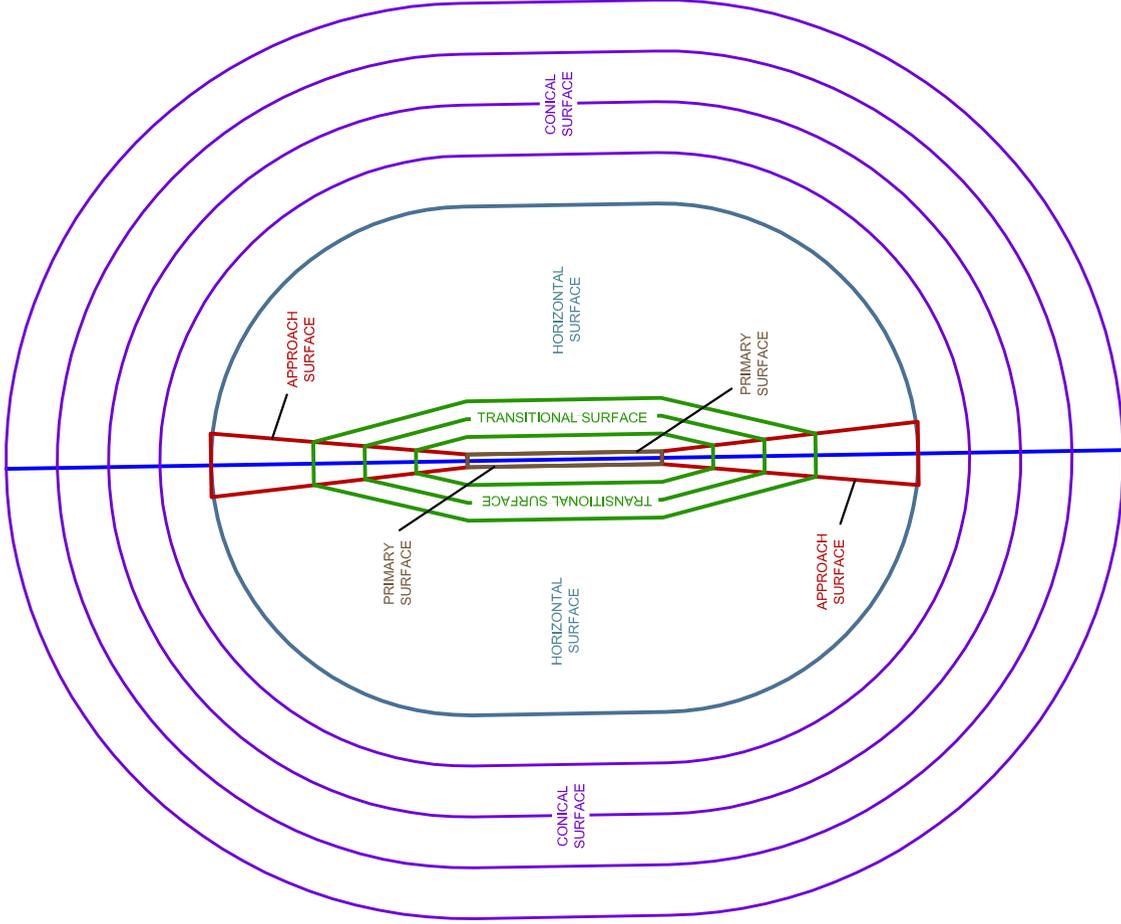


Connect the endpoints of each drafted line to create a closed polygon, which is the outer extent of the transitional surface.

Exhibit 5 Constructing the Transitional Surface for Auburn Municipal Airport in King County, Washington.



The transitional surface has a slope of 7:1 and can be divided at 50-foot vertical increments, which equates to 350 feet in the horizontal direction; however, this is not required per FAR Part 77 Guidance.



FAR Part 77 Surfaces include: primary, horizontal, approach, conical, and transitional.

Exhibit 6 FAR Part 77 Surfaces for Auburn Municipal Airport in King County, Washington.