



Airports and Compatible Land Use Guidebook

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Aviation Division

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Contents

| | |
|---|------|
| Executive Summary | iii |
| Acknowledgements | xi |
| Chapter 1 An Overview of Airport Land Use Compatibility Planning | 1-1 |
| Chapter 2 Airport Land Use Compatibility Planning Step by Step | 2-1 |
| Chapter 3 Airport Land Use Compatibility Implementation Strategies and Toolkit ... | 3-1 |
| Appendices | |
| Appendix A Formal Consultation: Airport and Compatible Land Use Program Guidebook | A-1 |
| Worksheet A Airport Land Use Compatibility Consultation | A-7 |
| Appendix B Learning More About: Describing and Evaluating Airport Noise Impacts..... | B-1 |
| Appendix C Learning More About: The Airport Influence Area and Evaluating Aircraft Operations | C-1 |
| Appendix D Learning More About: Protecting and Evaluating Airspace for Airports | D-1 |
| Appendix E Learning More About: Describing and Evaluating Airport Safety Concerns.... | E-1 |
| Appendix F Compatibility Criteria | F-1 |
| Appendix G Learning More About: The Legal Framework for Compatibility Planning | G-1 |
| Appendix H Worksheets | H-1 |
| Worksheet 1A State Laws Applicable to Airport Land Use Compatibility in Your Community | H-1 |
| Worksheet 1B Purpose and Objectives of Airport Land Use Compatibility Planning | H-2 |
| Worksheet 1C Challenges to Airport Land Use Compatibility Planning.... | H-3 |
| Worksheet 1D Airport Data Checklist: Context, Features, and Activity.... | H-4 |
| Worksheet 3A Compatibility Status of Existing Land Uses | H-7 |
| Worksheet 3B Potential New Incompatible Uses | H-10 |
| Worksheet 3C Compatibility Concerns Based on Current Policy | H-11 |
| Worksheet 4A Current Policy | H-12 |
| Worksheet 4B Compatibility Policy Findings | H-13 |
| Worksheet 4C Alternatives Analysis | H-14 |
| Worksheet 4D Airport Influence Area Adjustments..... | H-15 |
| Worksheet 6A Implementation Check | H-16 |
| Worksheet 7A Airport Land Use Compatibility Planning Checklist | H-17 |
| Appendix I Model Documents..... | I-1 |
| Appendix J Comprehensive Plan Goals and Policies | J-1 |
| Glossary | 1 |
| Acronyms | 13 |
| Bibliography | 17 |

One of the main challenges facing aviation today is the encroachment of incompatible land uses near and around airports. Development of incompatible land uses can degrade airport operations, impede airport expansion, and reduce quality of life for airport neighbors. Encroachment is a key factor contributing to escalating operating costs and restriction of airport operations. It has even resulted in closures of numerous general aviation airports in the United States.

The *Airport and Compatible Land Use Program Guidebook* is designed to help airports, communities, and jurisdictions work cooperatively and proactively toward preventing incompatible development around airports in Washington State. Jurisdictions can use the tools and resources found in the guidelines to develop policies and development regulations that discourage the encroachment of incompatible land use adjacent to public use general aviation facilities. It does not prescribe a one size fits all approach to land use compatibility planning, rather it provides recommended best management practices for local land use jurisdictions. The guidebook will be revisited and updated on a regular basis to reflect new and emerging best management practices for aviation land use compatibility planning.

Washington's Airport System

The *Washington Aviation System Plan* (WASP) encompasses 138 public-use airports that have statewide significance.

Washington has 65 airports listed in the 2009–2013 National Plan of Integrated Airport Systems (NPIAS). Airports on the NPIAS are deemed as having national significance and are eligible for federal funding. The high number of non-NPIAS airports in Washington has important funding implications because these airports are not eligible to receive federal grants for facility improvements and land use compatibility measures.

Of the 138 public-use airports in Washington, almost 80 percent are publicly-owned, either by municipalities, including port and airport districts, or by the state. Policy decisions involving publicly-owned airports in the state are typically made by elected officials of the entity owning the airport.

Funding to develop, maintain, and operate airports is derived from a variety of sources including user fees, revenues from land and facility leases and rents, local government funds, and federal and state grants. For those airports in NPIAS, a substantial proportion of development and major maintenance funding comes from the FAA grant program. State grants serve a similar function for the smaller NPIAS airports and others in the state airport system.

Why should communities work to protect public-use airports?

The state's system of 138 public use airports contributes significantly to its economy and serves a variety of roles and functions. Airports provide unique transportation access as part of Washington's multi-modal transportation system. They are crucial on a local, statewide, national, and global level as they efficiently move people and goods, promote business and commerce, and contribute to a better quality of life.

Washington's airports serve a wide range of transportation, economic and emergency activities, including:

- Business travel
- Tourism
- Freight, express, and mail services
- Agricultural
- Disaster management
- Firefighting
- Emergency medical transportation
- Aviation-related business
- Search and rescue
- Access to remote communities
- Recreation

Why is land use compatibility a concern for airport preservation?

Airport activities affect adjacent areas.

Most people are familiar with the negatives associated with proximity to an airport. The effects generated by airports affecting adjacent properties may include:

- Noise
- Vibration
- Smell
- Light
- Low-flying aircraft
- Safety risks – real and perceived
- Future increases in airport operations

Adjacent land uses also affect airport activities.

Fewer people understand the effect that adjacent land uses can have on airport activities. Development around an airport can reduce property available for operations and safety areas, create obstructions to the airspace needed for aircraft to safely approach and depart the runway, reduce clear airspace needed to support advanced technologies, and generate opposition to existing and future airport activities.

These conflicts often degrade usefulness of an airport and have severe consequences for communities.

Ultimately, incompatible development reduces opportunity for economic development, reduces transportation access, reduces the value of public investment in airport infrastructure, and reduces quality of life for communities.

Encroachment of Incompatible Land Uses

Encroachment of incompatible land uses is a key factor contributing to constraints on expansion and restrictions on operations of airports in the U.S. In many cases, it can even lead to airport closures.

Why is encroachment occurring?

- Washington's population has doubled in the last 30 years.
- Urban areas are expanding and communities are pursuing denser development.
- Local land use authorities are either unaware of or not compliant with the requirements of Washington's Growth Management Act.
- Property adjacent to the airport may have services extended to it and be affordable due to its proximity to the aviation facility.
- Many airports are surrounded by flat, undeveloped land that is attractive for development because the land, in many cases, is served by utilities and other infrastructure.
- Communities underestimate the adverse impacts of incompatible land use development on airport operations.

What is WSDOT's role in planning for airport land use compatibility?

[RCW 37.70.547](#) of Washington's Growth Management Act requires towns, cities, and counties to discourage development of incompatible land uses adjacent to public use airports through adoption of comprehensive plan policies and development regulations.

WSDOT Aviation's role under the Growth Management Act is to address this issue by advocating for the preservation of public use airports and providing decision makers with the best available information about airport land use compatibility. The state's program emphasizes airspace protection and discourages residential development, schools, hospitals, and other medical facilities adjacent to airports, especially in the extended centerline of the airport runway. The program identifies most industrial and commercial land uses as airport-compatible. WSDOT does not have regulatory authority over land use decisions; however, we offer a technical assistance program to help towns, cities and counties address aviation issues.

What is the purpose of the compatibility planning checklist?

WSDOT Aviation has provided a step-by-step checklist to make airport land use compatibility resources easier to use and understand. The checklist communicates state guidelines and best management practices, and directs users to more detailed reference materials.

How should you use this checklist?

This checklist outlines a six step process for airport land use compatibility planning. The steps take you through research and analysis that will help your jurisdiction make informed decisions about airport land use compatibility. The products you develop as you move through the checklist provide background materials that will help the jurisdiction “show their work” by demonstrating how they arrived at their decisions. This type of transparency supports public outreach programs and is useful for supporting local decision-making if challenged before the Growth Management Hearings Boards. This checklist will help you craft defensible, objective policies and zoning regulations.

Step 1: Getting Started and Gathering Data

In this step, you will begin your work on airport land use compatibility planning by laying a foundation for your process. Your other major task in this step will be to gather the airport and land use data that will enable you to address airport land use compatibility issues.

You will know you have been successful when:

- You have conducted formal consultation with aviation stakeholders.
- You have identified applicable state laws.
- A process is in place to help stakeholders work together.
- You can describe the airport’s role, features, and activity.
- You know what land uses exist around the airport and what land use plans are in place.
- You have identified the initial study area.

Step 1: Products

- Record of consultation meeting
- Creation of a compatibility planning working group.
- Findings that outline your airport land use compatibility planning responsibilities under state law.
- Understanding of the airport’s context within the community, state, and nation.
- Inventory of airport facilities, activities, and services for use in subsequent land use compatibility planning steps and in the transportation element of the comprehensive plan as well as the capital facilities element, when applicable.
- Summary of data regarding compatible and incompatible land uses around the airport.
- Map of the initial study area.

Step 2: Delineate the Airport Influence Area

Now that you have learned about the airport and its setting and have created a framework for your planning process, the next step is to define the area you need to consider for land use compatibility planning.

You will know you have been successful when:

- You can define the noise, airspace protection, and safety impacts of the airport and know what areas in the airport environs are affected.
- You have designated an airport influence area.

Step 2: Products

- Map of noise contours (if applicable).
- Overall boundary of the airport influence area.
- Map of the airport influence area.
- Airport airspace map showing FAR Part 77 *Imaginary Surfaces and Elevations*.
- Map of compatibility zones applicable to each runway end.

Step 3: Identify Compatibility Concerns

You have set a foundation that described key information about your airport and community. You have also identified the airport influence area that is relevant. Now it is time to examine the level of compatibility in your community. This step will help you understand the various issues involved in determining compatibility.

You will know you have been successful when:

- You have determined the compatibility status of existing land uses in the airport influence area.
- You have identified potential compatibility conflicts that could arise from future development.
- You have identified the particular compatibility concerns that will require further review in the next step.

Step 3: Products

- List of current community policies affecting land use development in the airport influence area.
- Evaluation of current compatibility status.
- Identification of potential future compatibility conflicts.
- List of specific compatibility issues to be addressed by new policies.

Step 4: Prepare Comprehensive Plan

Steps 1 through 3 led you through the research and analysis needed to describe and assess the interactions between airports and surrounding land uses. You now know what constitutes compatible land uses around your airport and have identified key challenges to prevention of more incompatible uses. What are your options for addressing those challenges? This step will help you think through the various compatibility strategies available, then evaluate and incorporate the best strategies into the draft of your comprehensive plan.

You will know you have been successful when:

- You have weighed the comparative advantages and disadvantages of available planning strategies.
- You have identified preferred planning strategies.
- You have decided upon specific compatibility criteria.
- You have fully considered airport land use compatibility measures in your comprehensive planning process and incorporated compatibility policies into the draft comprehensive plan where appropriate.
- You are ready to circulate the proposed comprehensive plan for review and adoption.

Step 4: Products

- List of current policies affecting airport land use compatibility in your community whether positively or negatively ([Worksheet 4A](#)).
- Assessment of the adequacy of current policies ([Worksheet 4B](#)).
- Evaluation of alternative compatibility strategies ([Worksheet 4C](#)).
- Draft of specific compatibility criteria.
- Adjustment of airport influence area boundary if necessary ([Worksheet 4D](#)).
- Draft comprehensive plan policies.
- Draft comprehensive plan land use map.

Step 5: Adopt the Comprehensive Plan

This short step takes the comprehensive plan update you prepared in Step 4 through the adoption process. Particular emphasis is given to gaining support for the airport land use compatibility measures you have incorporated into the draft plan.

You will know you have been successful when:

- Airport stakeholders feel that their concerns regarding compatibility matters have been understood and appropriately considered in the comprehensive plan update.
- You have gained public acceptance of the importance of airport land use compatibility planning.

- WSDOT Aviation provides comments supporting the compatibility measures you propose to take in your comprehensive plan update.
- Your community's decision-makers have adopted a comprehensive plan update that contains appropriate measures to protect the airport from encroachment by incompatible land uses.

Step 5: Products

- A strategy to gain public and decision-maker support of the compatibility measures.
- Information materials describing the importance of the airport and airport land use compatibility.
- An adopted comprehensive plan incorporating airport land use compatibility measures.

Step 6: Implement the Airport Land Use Compatibility Policies

Congratulations! You have shepherded airport land use compatibility matters through the research and analysis process to successful reflection of the concerns in your draft comprehensive plan update which has now been adopted by your community's decision-makers. But, you can't stop there. The one final step involves preparing implementing regulations, getting them adopted, and then using them on a day-to-day basis to ensure that compatibility concerns continue to be recognized and avoidable conflicts do not occur.

You will know you have been successful when:

- You have proposed revised development regulations to implement the policies.
- You have begun to put the policies to use.

Step 6: Products

- Draft and adopted implementing regulations such as an airport overlay zoning ordinance that contains the specific compatibility criteria to be met
- Identification of continuing actions and specific points in the development review process where airport land use compatibility concerns will be addressed

Public Outreach

WSDOT Aviation conducted an extensive public outreach process to obtain feedback on the *Airports and Land Use Compatibility Program Guidebook*. Among its outreach efforts, WSDOT released a draft copy of the guidebook on May 6 at the annual Washington Airport Managers Association meeting in Wenatchee. Airport sponsors, elected officials, local planners, and other airport groups were invited to review and comment on the draft guidebook. The 30-day review period began on Monday, May 10.

Stakeholders were also encouraged to recommend real or hypothetical land use challenges for the guidebook's scenarios section. WSDOT staff selected several scenarios and wrote appropriate responses to the challenges presented.

Additionally, WSDOT held four community meetings across the state to obtain feedback on the guidebook. The meetings were scheduled as follows:

- Monday, May 24, 3–5 p.m., Arlington Airport office, 18204 59th Drive NE, Arlington, WA 98223
- Tuesday, May 25, 3–5 p.m., Port of Chehalis Office, 321 Maurin Road, Chehalis, WA 98532
- Wednesday, May 26, 3–5 p.m., Yakima Library, downtown branch, 102 N Third Street, Yakima, WA 98901
- Thursday, May 27, 3–5 p.m., Spokane Library, downtown branch, 906 West Main, Spokane, WA 99201

WSDOT incorporated comments received during the 30-day comment period and re-released the draft guidebook for an additional 10 day final public comment period on Tuesday, October 26.

Use Your Resources

This guidebook gives you concrete tools to assist you in your planning efforts. Remember that effective, proactive land use planning benefits all parties and interests. It is important that local jurisdictions, planners and airports work cooperatively to achieve their planning goals.

WSDOT Aviation is also a resource. The department provides technical assistance that supports and facilitates informed decision making. You can contact our planning department for airport land use compatibility technical assistance at 360-651-6300. More information about WSDOT Aviation's Land Use Compatibility Program is located at www.wsdot.wa.gov/aviation/planning.

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Chapter 1

Introduction

This chapter provides a high-level overview of airport land use compatibility planning and its relationship to community comprehensive planning. The intent is to give the reader a basic understanding of what is meant by “compatibility” in the context of airports and neighboring land uses. The material presented here sets the stage for the compatibility planning process outlined in [Chapter 2](#).

In this chapter, you will learn about:

- The different types of airports in Washington State.
- What types of development are incompatible with airports.
- How incompatible development can affect airports.
- How to deal with compatibility issues.

Airports in Washington State

This guidebook focuses on Washington’s 138 public-use, general aviation airports and seaplane bases, as state law is directed at protecting them from incompatible land use. Washington’s airports are part of the communities they serve and are integral parts of the state’s transportation system. Airports range in size from the busiest airline airports in the metropolitan areas to community airports serving businesses and other private aircraft to small landing strips in outlying locations. There are airports in virtually every county and in or near most cities and towns in the state. The state’s airports provide a wide range of services to pilots, passengers, and the general public.



All airports that serve general aviation activity are considered “general aviation airports” under the Growth Management Act (GMA).



Economic Importance of Airports

Airports are valuable transportation assets and economic engines. They are crucial on a local, statewide, and national level as they efficiently move people and goods. Many businesses depend on the fast and convenient links to places, people, and products that airports provide.

The magnitude of this impact is impressive: approximately 17 million passengers now land and take off from a Washington airport every year and more than 600,000 tons of air cargo pass through our state airports. According to a 2001 study, the aviation system contributes 170,000 jobs, \$4 billion in wages, and \$18.5 billion in sales output to the Washington economy each year.

At the 2006 Washington State Governor's Economic Development Conference, transportation was identified as one of several proposed future growth strategies for Washington. Transportation, including air, rail, port, and highway, was also described as critical to continued economic development and success of the state in the global economy. The governor's strategic economic plan stressed the importance of long-term planning for Washington's transportation needs and the continued development of its economic future.

These conclusions were again emphasized by the Washington State Aviation Planning Council in its July 2009 report. The Council recognized that:

“The importance of Washington's aviation system is even greater than the revenue, employment, and sales data suggest. The state's aviation system is an essential function of its overall transportation system, which is the backbone of a vibrant and healthy economy.”

 Long-Term Air Transportation Study (LATS), *Recommendations of the Washington State Aviation Planning Council*, July 2009. www.wsdot.wa.gov/nr/rdonlyres/6caf7b7b-37b8-44d3-b259-ab020b1ad995/0/council_report_print_070109_lowres.pdf

 See the General Aviation Manufacturers Association report *General Aviation's Contribution to the U.S. Economy* (May 2006) available at: www.nasao.org

Kenmore Air Harbor SPB



Kenmore Air Harbor SPB is one of Washington's 16 commercial service airports that provide scheduled passenger service. The seaplane base is home to Kenmore Air, which operates an average of 80 daily arrivals and departures. The airport also acts as a U.S. Customs Service Port of Entry. The Lake Union base serves over 70,000 resident and international passengers annually. The seaplane base contributes significantly to the state's economy and offers unique access to locations both foreign and domestic.

WSDOT's 2001 economic study is in the process of being updated. Look for the newest data on the WSDOT Aviation website at: www.wsdot.wa.gov/aviation

Airport Types and Roles

Aviation is broadly classified under three categories: airline, general aviation, and military. Airlines provide scheduled commercial service for passengers or air cargo. Flying by private aircraft, both corporate and business, is considered general aviation. Airline and general aviation activity together comprise civil aviation. The third category, military, consists of flights by aircraft operated by the various branches of the U.S. military.

Airports can be divided into the same three categories. However, just because an airport is placed in a particular category does not mean that it exclusively serves that type of aviation. For example, airports that offer scheduled passenger service are usually called commercial or primary service airports. However, all commercial or primary service airports in Washington also serve general aviation and may have some military flights as well. Even some military airports in the country are joint-use, although most—including all the ones in Washington—are restricted solely to military aircraft.

General aviation airports serve many roles in support of a wide range of users including:

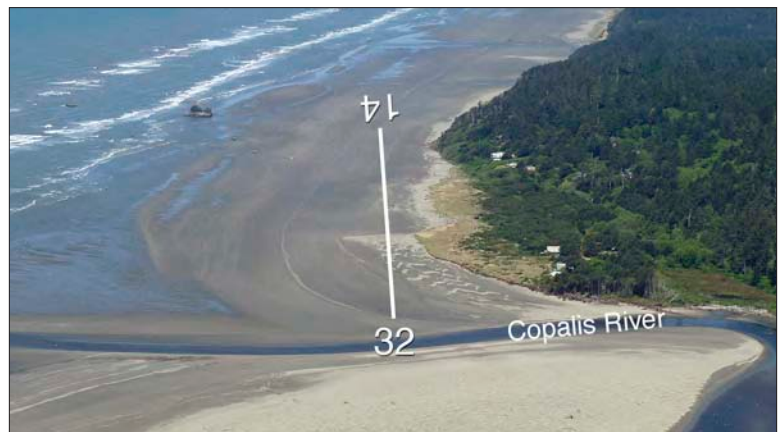
- Local companies that use aircraft for essential business travel.
- Businesses that provide aviation-related services at the airport to pilots and their aircraft.
- Specialized aviation businesses or functions such as aerial photography, agricultural applications, and transmission line inspection.
- Flight instructors and students.
- Visiting pilots and their passengers traveling to the local community for business, personal, or recreational reasons.
- Sheriffs and police departments with air patrol and support units.
- Pilots and aircraft owners that fly for personal business or recreational purposes.

Military Airports



While the focus of this guidebook is on civil airports, the importance of military air bases to nearby communities should not be overlooked. These facilities are essential for national defense. In addition, they often are the primary economic generators of their communities. Maintenance of compatible land uses is a factor considered when decisions are made to continue, realign, or close a military base. [RCW 36.70A.530](#) requires jurisdictions to notify the commander of the military installation of its intent to amend its comprehensive plan or development regulations that address lands adjacent to military installations to ensure those lands are protected from incompatible development.

Copalis State Airport



Located on the beach in Grays Harbor County, Washington. It is the only airport in the U.S. that is located on an ocean beach. Landing is only available during [low tide](#).

Airports and Disaster Relief

Washington's airports are critical resources during emergencies. General aviation airports and aircraft also play central roles in post disaster response. Airports provide a base for a variety of emergency functions. Additionally, airports are especially important when emergencies or disasters damage or prevent the use of other transportation modes. Emergencies may include extreme weather, earthquakes, flooding, wildfire, mudslides, tsunamis, forest fires, volcanic activity, etc.

Aviation facilities and aviation assets may serve emergency functions, including:

- Emergency air medical transportation
- Rapid insertion of medical teams and relief workers
- Evacuation
- Firefighting
- Search and rescue operations
- Logistical and supply chain support to surrounding communities
- Base of operations
- Access to communities when ground transportation is disrupted

The importance of Washington's air transportation in post disaster response is accentuated by the state's unique geographic and topographical features, which produce an unusually high reliance on aviation. Given this fact, maintaining a healthy and robust aviation system is key to our state's ability to respond swiftly in times of need.

Chehalis, Washington



Search and Rescue



Fire Suppression



Mt. St. Helens



State and National Aviation Systems

Each airport in our state is part of a greater aviation system, just as individual roads are part of an extensive highway system. Both the state and federal governments have identified and classified the airports that have particular importance within the state and national aviation systems.

An airport's sponsor's acceptance of federal or state grant funds obligates the sponsor to meeting certain grant assurances as described in this chapter.

Table 1-1



| Classification | No. of Airports | Description |
|---------------------|-----------------|---|
| Commercial Service | 16 | Accommodates at least 2,500 scheduled passenger enplanements per year for at least three years. |
| Regional Service | 19 | Serves large or multiple communities; all NPIAS Relievers; at least 40 based aircraft and 4,000-foot-long runway (some exceptions). |
| Community Service | 23 | Serves a community; at least 20 based aircraft; paved runway. |
| Local Service | 33 | Serves a community; fewer than 20 based aircraft; paved runway. |
| Rural Essential | 38 | Other land-based airports, including residential airparks. |
| Seaplane Bases | 9 | Identified by FAA as a seaplane base, unless it is a commercial service airport. |
| System Total | 138 | |

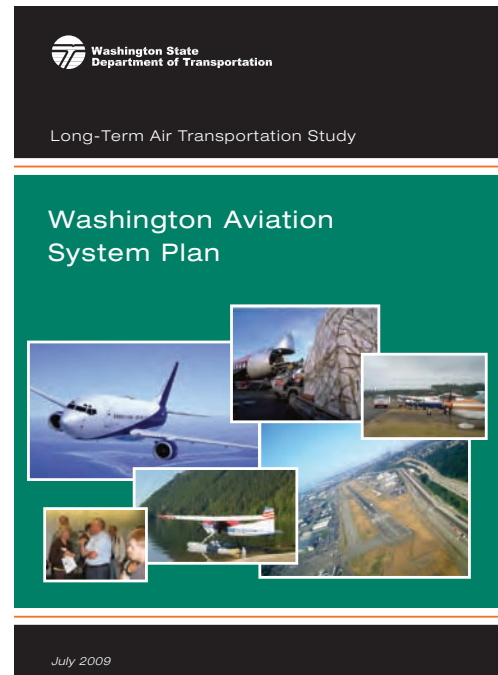
Washington Aviation System Plan

The *Washington Aviation System Plan*, or WASP, encompasses public-use airports that have statewide significance. The 2009 WASP includes 138 airports.

The WASP divides public-use airports into six classifications based on the characteristics of the airport and geographic area it serves. The WASP classification of airports is used to help set airport improvement funding assistance consistent with the level of service provided.

All airports in the state’s aviation system, whether large or small, may play an essential role in disaster mitigation and later recovery efforts.

The number of airports in each of the six classifications is shown in [Table 1-1](#).



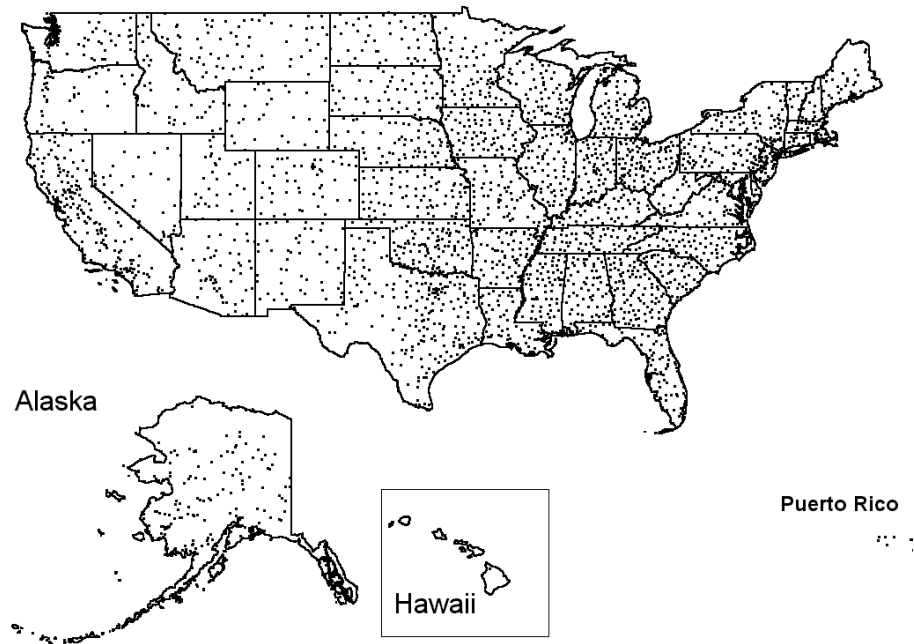
National Plan of Integrated Airport Systems

Nearly half of all public use airports in Washington are considered to be nationally significant.

This national system of airports is known as NPIAS, the *National Plan of Integrated Airport Systems*. The NPIAS is largely used to determine an airport’s eligibility to obtain federal improvement grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring the NPIAS airports up to current design standards and add capacity to the system.

The FAA is required to provide Congress with a five-year estimate of AIP eligible development every two years.

NPIAS Airports



 A copy of the NPIAS can be found at: www.faa.gov/airports_airtraffic/airports/planning_capacity/npias

Under the federal airport classification system, airports are designated as primary airports, commercial service, reliever, or general aviation based upon the type of service they provide to the community. Airports that are designated primary airports provide scheduled passenger service and have more than 10,000 annual enplanements. Commercial service airports have between 2,500 and 10,000 annual enplanements. Reliever airports provide general aviation access to large metropolitan areas attracting smaller GA aircraft away from busy commercial airports to enhance the commercial airports' efficiency, capacity, and safety. Washington has 65 airports listed in the 2009–2013 NPIAS.

Who operates Washington's airports?

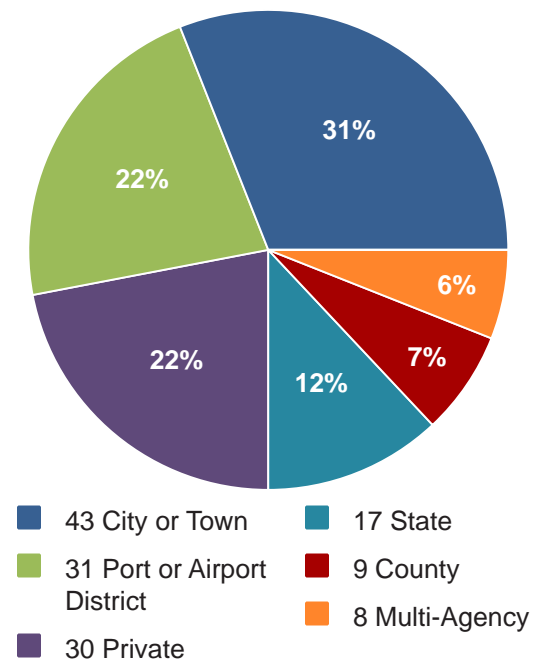
Of the 138 public-use airports in Washington, almost 80 percent are publicly owned, either by municipalities, including port and airport districts, or by the state. Several airports are owned by a combination of public entities. The state-owned airports are mostly small facilities which provide essential services to recreational or remote areas. Most of the privately owned, public-use airports also are classified as rural essential or seaplane bases.

Policy decisions involving publicly-owned airports in the state are typically made by elected officials of the entity owning the airport. Day-to-day operations are generally administered by an airport manager. Larger airports usually have a full-time manager, frequently supported by other staff, while low-activity airports may have a volunteer manager, part-time contractor, or local official who serves as airport manager in addition to other roles in local government.

Funding to develop, maintain, and operate airports is derived from a variety of sources including user fees, revenues from land and facility leases and rents, local government funds, and federal and state grants. The proportion of funding coming from each of these sources varies from airport to airport. Larger airports are more likely to be self-supporting than the small ones with few aircraft or services. For those airports in NPIAS, a substantial proportion of development and major maintenance funding comes from the FAA grant program. State grants serve a similar function for the smaller NPIAS airports and others in the state airport system.

Airports that do not receive federal funding are often referred to as non-NPIAS airports. These airports generally serve smaller towns and cities, provide access to remote locations, or serve recreation areas. These airports are typically funded by the state or through private funding.

Public-Use Airports by Ownership



State law authorizes formation of public port districts for the purpose of supporting economic development. Ports are quasi-governmental entities that may own land and often operate a variety of public infrastructure, including airports. There are 75 port districts in Washington State.

com•pat•i•ble

Capable of existing or working together in a harmonious or agreeable manner or in combination with another activity.

Airports and Surrounding Land Uses

Evergreen Field

What is compatibility?

Most people are familiar with the negatives associated with being located near an airport, particularly such things as noise, vibration, odors, and accident risks. Fewer people understand the effect that adjacent land uses can have on airport activities. Development around an airport can have direct adverse consequences to airport safety, efficiency, operation, and economic viability. Tall buildings, towers, power lines, and even tall trees can be hazardous obstructions for landing and departing aircraft. In addition, development near an airport may reduce property available for aviation operations and safety areas. Indirectly, incompatible development can lead to demands for limitations on the airport activity. Ultimately, incompatible development around public use airports may result in loss of the facility. History shows us that incompatible development has the following consequences:

- Reduces the public's access to air transportation and the benefits it provides.
- Reduces the value of public investment in airport infrastructure.
- Reduces opportunity for economic development and diminishes a community's capacity to deal with natural and human caused disasters.
- Reduces quality of life for people living in developments located near airports.

Communities can address airport land use compatibility in a variety of ways based on the specific characteristics of an individual airport facility as well as numerous other factors that are unique to their area. Approaches that may work well in outlying communities may be impossible to achieve in urban locations. To determine the best approach for any particular airport and community, the types of land use interactions must first be understood.



These photos show the spread of urban development around Evergreen Field in Vancouver, Washington. The airport closed in summer 2006 to make way for a mixed-use development including retail, office, and residential units after the original owner passed away and his heirs sold the land to developers.

Types of Land Use Interactions Between Airports and Communities

Airports and nearby communities interact in a variety of ways, both physical and economical. Economically, airports can be important attractors of business and income to a community. The physical interactions are the focus here, and particularly the interactions that occur between all types of airports and communities:

- The airport influence area is the area where an aircraft flies during the final phases of flight. This area is most impacted by noise, light, vibration, fumes, and low-flying aircraft.
- Noise addresses the areas of concentrated impacts that are most disruptive to land use activities.
- Airspace protection deals with aspects of land uses that can cause or contribute to aircraft accidents.
- Safety is concerned with the consequences of accidents when they occur.

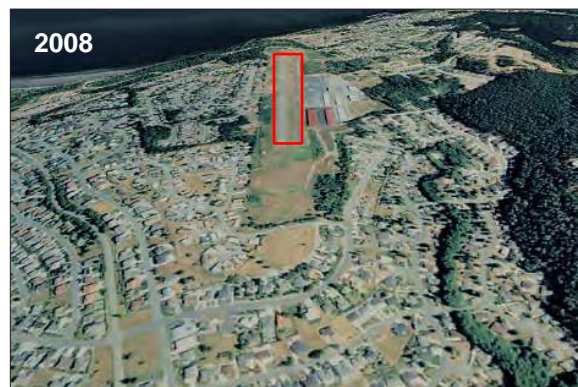
Encroachment of Incompatible Land Uses

Encroachment of incompatible land uses is a key factor contributing to constraints on expansion and restrictions on operations of airports in the U.S. In many cases, it can even lead to airport closures.

Why is encroachment occurring?

- Communities underestimate the adverse impacts of incompatible land use development on airport operations.
- Washington's population has doubled in the last 30 years.
- Urban areas are expanding and communities are pursuing denser development.
- Local land use authorities are either unaware of or not compliant with the requirements of Washington's Growth Management Act.
- Property adjacent to the airport may have services extended to it and be affordable due to its proximity to the aviation facility.
- Many airports are surrounded by flat, undeveloped land that is attractive for development because the land, in many cases, is served by utilities and other infrastructure.

Anacortes Airport



Consequences of Incompatible Land Uses Near Airports

Consequences to the aviation system and its users:

- Delays and constraints to airport development, leading to limitations on system capacity.
- Restrictions on aircraft operations, leading to system delays and travel time penalties.
- Constraints to runway approach protection, leading to runway capacity constraints and safety risks.
- Litigation and related costs.
- Increased development costs.
- Lost value of public investment.
- Increased risk of aviation accidents caused by the presence of tall structures, visual obstructions, and wildlife attractants.

Consequences to people who live near airports:

- Exposure to noise.
- Exposure to emissions.
- Exposure to aviation accident risk.
- Decline in transportation access.
- Consequences to concerned local and regional jurisdictions.
- Local and regional economic impacts due to constraints on airport growth.
- Irresolvable political disputes.

What land use types pose concerns?

Some types of compatibility conflicts between airports and land uses are obvious. Houses and schools, for example, are generally incompatible near airports for reasons of noise, safety, fumes, vibration, and low-flying aircraft. Others are not as readily recognized or understood—uses that concentrate people in locations where aircraft accident risks are greatest, tall structures that impinge upon airport airspace, or features that attract birds or animals to areas where aircraft operate. Some examples of the obvious and not-so-obvious compatibility conflicts are listed in [Table 1-2](#).

Reid-Hillview Airport San Jose, California



High intensity uses along the extended runway centerline can pose a substantial risk. In this example, a mall was constructed along the extended centerline for two parallel runways.

In general, to avoid compatibility conflicts, land uses closest to the ends of runways should ideally consist of open areas, agricultural land, commercial or industrial uses. Professional offices and mixed use commercial development can also be compatible if located farther away from the runway ends.

Because of noise and impacts within the airport influence area, single-family residential uses are best kept away from anywhere that aircraft are regularly flying to reach or leave the airport. Often, multi-family residential can be a better option than single-family in locations where aircraft accident risks are low, but noise impacts are present.

For additional discussion of compatibility conflicts, see [Chapter 3](#).

Table 1-2
Compatibility Concerns Represented by Particular Land Uses

| Land Use Type | Compatibility Concerns |
|--|---|
| Single-Family Residential | <ul style="list-style-type: none"> • Noise can be disruptive in outdoor areas as well as indoors with open windows. • Aircraft overflight can be annoying, especially where ambient noise levels are low such as in suburban or rural areas. |
| Multi-Family Residential | <ul style="list-style-type: none"> • Noise can be disruptive in outdoor areas as well as indoors with open windows, although less sensitive than for single-family residential. • High density presents concern for safety of residents in areas exposed to significant risk of aircraft accidents. |
| Schools K-12 | <ul style="list-style-type: none"> • Noise can disrupt the learning environment. • Special concerns for safety of children in areas exposed to significant risk of aircraft accidents. |
| Hospitals/Nursing Homes | <ul style="list-style-type: none"> • Special concerns for safety of patients and the elderly in areas exposed to significant risk of aircraft accidents. |
| Retail Centers | <ul style="list-style-type: none"> • Large numbers of people could be at risk from aircraft accidents if the use is located in areas exposed to high levels of aircraft accidents. |
| Business Parks | <ul style="list-style-type: none"> • Safety concerns for places with high-intensity uses. • Tall buildings can be airspace obstructions. |
| Assembly Facilities | <ul style="list-style-type: none"> • Large numbers of people could be at risk from aircraft accidents; outdoor stadiums have greatest exposure. |
| Industrial Uses | <ul style="list-style-type: none"> • Smoke, steam, and thermal plumes can be hazards to flight. • Tall structures can be airspace obstructions. • Possible release of hazardous materials if damaged during an accident. |
| Agricultural Uses | <ul style="list-style-type: none"> • Potential wildlife attractants as well as a source of dust and smoke. |
| Water/Natural Areas | <ul style="list-style-type: none"> • Potential wildlife attractants. |
| Power Plants | <ul style="list-style-type: none"> • Smoke, steam, and thermal plumes can be hazards to flight. • Tall structures can be airspace obstructions. • Potential disruption of service if damaged during an accident. |
| Critical Community Infrastructure (emergency services and communications) | <ul style="list-style-type: none"> • Potential disruption of service if damaged during an accident. |

Addressing the Land Use Compatibility Issue

First, it is important to recognize that the responsibility for airport land use compatibility does not rest just with WSDOT Aviation or any other single party. Many participants have a role to play in the process and a stake in its outcome.

The process can be thought of as puzzle with each participant as having a part of a puzzle—the planning effort is not complete without every piece. The responsibilities for preserving and enhancing airport land use compatibility rest at all levels of government as well as with the private sector. Each entity has its own distinct role to play.

Who is responsible for airport land use compatibility?

The responsibilities for preserving and enhancing airport land use compatibility rest at all levels of government as well as with the private sector. Each entity has its own distinct role to play. While the respective responsibilities—and the limitations on authority—are largely defined by law local planning depends on participation from a diverse range of interests and stakeholders to define community needs and identify solutions. Participation is critically important for influencing outcomes. It is the nature of the planning process that interests that are not represented are often not addressed. Airport advocates wishing to preserve aviation facilities should ensure their place at the table so they can work cooperatively with other citizens and local leaders to educate them about the importance of air transportation for their community.

This section outlines the primary roles of each of the players. A further look at the legal framework behind the different roles is contained in the final section of this chapter.

WSDOT Aviation's responsibilities under the Growth Management Act include addressing land use and airport compatibility concerns. The state agency having overall responsibility for overseeing implementation of the act is Growth Management Services (GMS), a unit of the Department of Commerce Local Government Division. GMS provides technical and financial resources to help local governments to undertake planning and other work essential to their compliance with provisions of the act.

Washington State Department of Transportation

The State of Washington has a lead role in promoting land use compatibility around the airports in the state. This role derives from the state's broad interest in all modes of transportation in recognition of the benefits that transportation brings the state and its citizens. The specific responsibility as the primary steward and advocate of the state's aviation interests is assigned to WSDOT Aviation. WSDOT Aviation's role extends to advocating for promotion of safe air transportation, preservation of aviation facilities, provision of airport capacity to meet demand, and technical assistance.



State law addressing airport hazards dates back to the mid 1940s. [Chapter 14.12 RCW](#) focuses on obstructions to airport airspace and gives counties and cities the power to adopt and enforce airport hazard zoning.

“It is hereby found that an airport hazard endangers the lives and property of users of the airport and of occupants of land in its vicinity, and also, if of the obstruction type, in effect reduces the size of the area available for the landing, taking-off and maneuvering of aircraft thus tending to destroy or impair the utility of the airport and the public investment therein.”

While not exclusively directed at airports or airport land use compatibility, broader legislative attention to land use planning matters took place with the enactment of the Growth Management Act (GMA) ([RCW 36.70A](#)) in 1990. The basic purposes of the act are identified through 13 GMA goals. These goals were identified with the purpose of addressing uncoordinated and unplanned growth, that may otherwise pose a threat to the environment, sustainable economic development, and to the health, safety, and public welfare of residents of the state.

Legislation adopted in 1996 was aimed more specifically at airport land use compatibility. [RCW 36.70.547](#) and other sections that refer to it (including [RCW 35.63.250](#), [35A.63.270](#), and [36.70A.510](#)) requires towns, cities, and counties to “discourage the siting of incompatible uses” adjacent to general aviation airports through adoption of comprehensive plan policies and development regulations. *Note: In the context of this statute, all airports that serve general aviation, meaning all public-use airports in the state, are considered to be general aviation airports.* Formal consultation with WSDOT Aviation is required before such plans and regulations may be adopted or amended. Additionally, WSDOT Aviation is tasked with providing technical assistance to the communities and aviation stakeholders to help them meet the requirements of the law. (See Appendix ___ for more details on the consultation process.)

The technical assistance includes establishing airport land use compatibility guidelines. WSDOT Aviation does not have regulatory authority over land use decisions, however, cases decided by the state’s Growth Management Hearing Boards direct local government to “give substantial weight to WSDOT Aviation’s comments and concerns related to matters affecting safety at general aviation airports.” (See Stephen Pruitt and Steven Van Cleve vs. Town of Eatonville, heard by the Central Puget Sound Growth Management Hearings Board [CPSGMHB; Case No. 06-3-0016].)

In conclusion to the *Long-Term Air Transportation Study* (LATS) in July 2009, the Washington State Aviation Planning Council recommended policies that clarify Washington’s position and responsibility in relation to its local, regional, and federal aviation partners as the primary steward and advocate for protecting Washington State’s aviation system interests.

“The challenge of meeting Washington’s aviation capacity is shared between many entities including the FAA, local and regional agencies, airlines, and publicly and privately owned airports. The Council believes that the State needs to exercise a leadership role as the primary steward for a healthy and viability aviation system. In this role, it will provide the FAA with support to help it better manage the national aviation system and clarity about its funding priorities. The state will also provide policy direction and support local and regional agencies in fulfilling their distinct aviation roles.”

 More information about WSDOT Aviation is available at: www.wsdot.wa.gov/aviation

 Growth Management Hearings Board Decisions are available at: www.gmhb.wa.gov

Federal Aviation Administration

The FAA plays a very focused role in airport land use compatibility. Its involvement stems from its primary areas of responsibility—the safe and efficient operation of airports and the national aviation system. In these matters, the FAA role is preeminent. Federal law preempts local regulations in the area of aircraft safety, navigable airspace, flight operations, and noise control.



Even in these fields though, the FAA's authority is directed primarily at the operators of airports and aircraft. The FAA has little ability to prevent the development of incompatible land uses near airports. However, the FAA strongly encourages local jurisdictions to protect airports through their local land use authority. The U.S. Constitution reserves to the states the authority over local land use matters. Thus, the FAA cannot dictate the decisions made by airports and local land use entities, it can only influence them—albeit sometimes very strongly. The two mechanisms by which the FAA most strongly influences local land use decisions are through regulations designed to protect airport and en route airspace; and via its grant program.

FAA Grant Program

As authorized under the Airport and Airway Improvement Act of 1982, the FAA's grant program—the Airport Improvement Program (AIP)—provides the majority of funding for facility improvements and land acquisition for airports within the NPIAS. In exchange for receipt of grant funding, however, airports must promise to take steps, to the extent possible, to prevent creation of airspace hazards and incompatible land uses. The FAA can withhold funds from a grantee or require repayment of funds if the grant assurances are not met. The grant assurance language is quite general, but two particular assurances address the actions that the FAA expects the airport sponsor to take. The grant assurances say that the airport sponsor must agree that:

20. **Hazard Removal and Mitigation.** It 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.
21. **Compatible Land Use.** It 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.

 The full set of FAA grant assurances is available at: www.faa.gov/airports/aip/grant_assurances

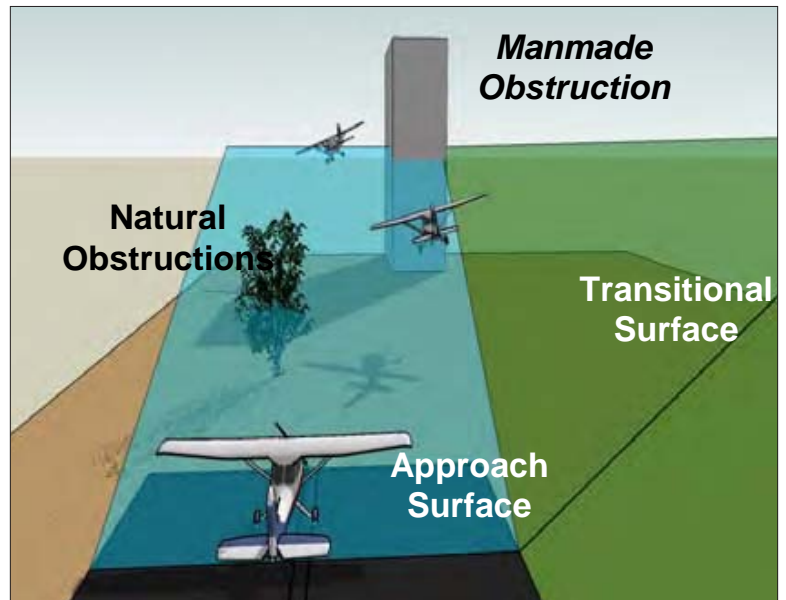
Airspace Protection

The other way in which the FAA gets involved in local land use actions is with regard to protection of airport and en route airspace. However, beyond the obligation that the FAA puts on airports when they accept grant funds, the agency does not have the authority to prevent airspace hazards from being created. This is a local responsibility and is not mandatory. The FAA's function is to set the standards used to determine whether tall structures would adversely affect the airspace and, additionally, to evaluate individual proposals relative to these standards. Other airspace hazards include smoke, glare, wildlife, and electronic signals. The standards and the review process are both defined in Part 77 of the Federal Aviation Regulations (14 CFR Part 77).

The one facet of the federal regulations that does create a mandatory local responsibility is the notification process. Part 77 requires that notification be submitted to the FAA before any tall structure is constructed or erected that could penetrate the airspace surfaces defined in the regulations. Certain other land use features or activities are also subject to the notification process (for example, uses involving electromagnetic radiation or laser lights). The notification responsibility rests with the project proponent, not the local government agency that has approval authority. Substantial fines can be levied for failure to comply with the notification requirements.

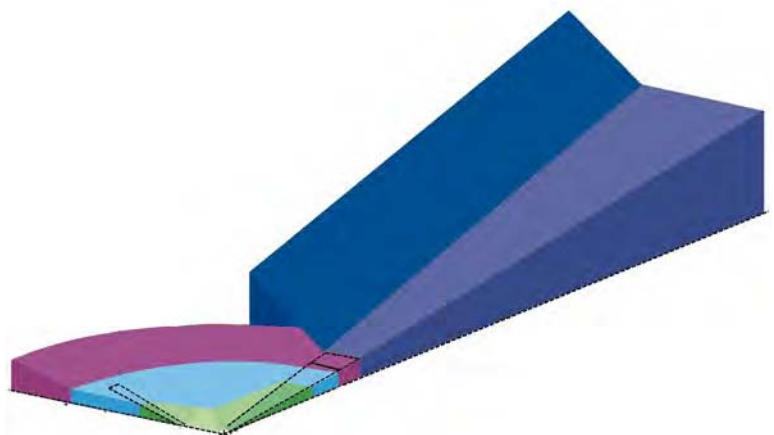
📖 See U.S. Code Title 49, Sections 44718, Structures Interfering with Air Commerce and 46301(a), Civil Penalties.

Airspace Protection



It is important to note that the FAA relies on local jurisdictions with land use authority to protect critical airspace. The FAA has no direct land use authority and must rely on local decision makers to protect airspace from both naturally occurring and man-made airspace obstructions.

FAR Part 77 Imaginary Airspace Surfaces



www.wsdot.wa.gov/aviation/planning/civapimagsurf.htm

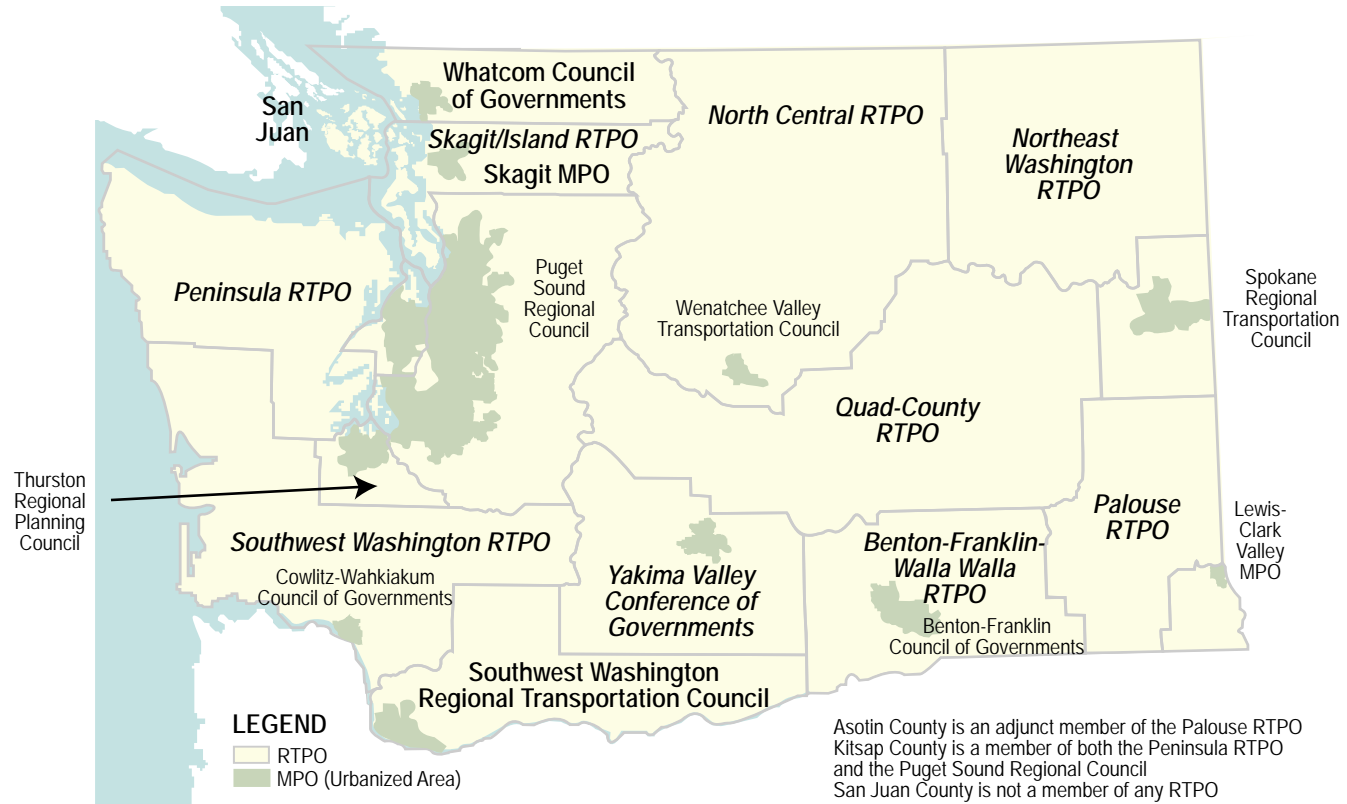
Regional Transportation Planning Organizations

Regional Transportation Planning Organizations (RTPOs) occupy a special niche in the overall spectrum of agencies having responsibilities for airport land use compatibility planning in Washington. As enabled by state law, RTPOs are voluntary associations of local governments within a county or contiguous counties. They were authorized as part of the 1990 GMA to ensure local and regional coordination of transportation plans. RTPO members include cities, counties, WSDOT, tribes, ports, transportation service providers, private employers, and others. Among the duties taken on by these organizations is review of local countywide planning policies and the transportation-related provisions in local comprehensive plans.

The level of involvement of RTPOs in airport land use compatibility planning varies from one organization to another. As the RTPO for the state’s most populated area, the Puget Sound Regional Council (PSRC) specifically reviews airport compatible land use policies as part of its comprehensive plan review and certification process. The process requires cities and counties to report on actions taken to discourage the siting of incompatible land uses near airports. PSRC also offers technical assistance to local planners to assist them in identifying key airport land use compatibility issues and to help in developing policies and planning provisions to address those issues.

 More information about Washington’s Metropolitan Planning Organizations (MPOs) and RTPOs, including information about the review and certification process, is available at: www.wsdot.wa.gov/planning/regional/

Regional and Metropolitan Transportation Planning Organizations



Local Government

To a great extent, the ultimate responsibility for airport land use compatibility rests with local government bodies—towns, cities, and counties. Although local comprehensive plans, plan policies, and regulations must be consistent with state law and countywide planning policies, local government has discretion to determine how development occurs within the community. Also, the federal preemption doctrine does not affect the local government’s ability to use its police powers, particularly land use controls, to anticipate, abate, mitigate, and otherwise respond to other land use concerns provided they are reasonable and do not restrict airport operations.

The local government level is where day-to-day decisions are made on whether development proposals are compatible with airport activity. Airport compatibility issues may be addressed in a variety of local planning documents.

Countywide Planning Policies – Counties develop these policies in cooperation with their cities. The policies provide a common framework for local planning efforts within each county. Countywide planning policies address numerous issues, including siting major public capital facilities, defining transportation strategies and facility needs, and facilitating joint planning. Basic airport land use compatibility goals and intergovernmental coordination mechanisms should be addressed.

Comprehensive Plans – Comprehensive plans guide land use development within towns, cities, and counties. They determine where development is or is not desirable and set the tone for the development size and intensity. The plans are the centerpiece of local planning and the starting point for the planning of individual projects. Development regulations—zoning, subdivision, and other controls—must be consistent with comprehensive plans. State agencies are required to comply with comprehensive plans and development regulations of jurisdictions planning under the GMA. Establishment of land use patterns to avoid compatibility conflicts with airports must be a consideration in preparation of these plans.

What is a Comprehensive Plan?

The comprehensive plan expresses a community’s vision about itself and what it would like to become. The plan forms the policy framework from which all future community planning actions will be judged, and it is the starting point for any discussion regarding local land use. It enables the community to compare how it looks now with what it wants to look like in 20 years.

The comprehensive plan¹ is developed cooperatively by elected officials, the planning commission, planning staff, and the public. Consultants are often engaged for all or part of the work effort. Elected public officials adopt the plan following a series of public hearings. The time range for the comprehensive plan is generally 20 years. Periodic amendments every five to seven years are usually required. Comprehensive plans generally cover the following topic areas or elements:

- Capital Facilities
- Land Use
- Utilities
- Transportation
- Economic Development
- Natural Resources
- Rural (county comprehensive plans only)
- Housing
- Parks and Recreation

¹Adapted from *What is a Comprehensive Plan?* by David Martineau, Planning Director, City of Colville. Presented at the Spring 2006 meeting of the Washington State Community Airports Association (CAA), Wenatchee, Washington.

Sub-Area Plans – These planning documents address a portion of a municipality. They address a smaller geographic area than the comprehensive plan, but often influence airports depending on their scope and approach. Limits on development in areas subject to airport impacts should be described.

Development Regulations/Zoning – These regulations are set by local jurisdictions to implement the comprehensive plan. They specify the types, intensity, and density of activities that may take place in a given location and establish limits on the physical size and shape of the development. Specific limitations on the number of occupants, the heights and overall sizes of structures, and requirements for sound attenuation are appropriate elements of local zoning.

Environmental Review – This is a formal process for soliciting public comment on the effects of a particular development proposal or planning effort. The procedural and analysis requirements are set forth in the State Environmental Policy Act (SEPA). The SEPA process provides a way to identify possible environmental impacts that may result from governmental decisions. These decisions may be related to issuing permits for private projects, constructing public facilities, or adopting regulations, policies or plans. Information provided during the SEPA review process helps agency decision makers, applicants, and the public understand how a proposal will affect the environment. This information can be used to change a proposal to reduce likely impacts, or to condition or deny a proposal when adverse environmental impacts are identified. As part of a SEPA document regarding development near airports, the compatibility of the proposed development with airport activities should be addressed.

Under the National Environmental Policy Act (NEPA), similar environmental review requirements are established at the federal level. NEPA comes into play with regard to actions by federal agencies including the provision of grants for airport improvements. Local land use actions are not subject to NEPA.

 For additional information regarding SEPA and its process visit: www.ecy.wa.gov/programs/sea/sepa/e-review.html

 Information about the NEPA process can be found at: www.epa.gov/compliance/basics/nepa.html

 For more information about the planning process in Washington State, see the Department of Commerce Short Course on Local Land Use Planning at: www.commerce.wa.gov/site/395/default.aspx

Airports

Airports are the only participants in the airport land use compatibility process that have the ability, although limited in many ways, to address the issue from two perspectives—through their long-range planning of future airport development and with actions affecting day-to-day operation of the airport.

Chief among actions in the first category are decisions regarding the configuration of the airport. Airports can decide whether to build or extend a runway, for example. They also can purchase property either to eliminate highly incompatible land uses or to prevent future incompatible development. Funding is typically the major limitation, however, acquisition of property within runway protection zones is eligible for FAA grants.

An airport master plan is the primary mechanism by which airports determine the future direction of airport development. These development actions can have direct implications on the airport's impacts on nearby land uses. The master planning process also can affect airport impacts more indirectly by not seeking to attract types of aircraft that generate the greatest impacts. Airports, though, cannot exclude aircraft based on noise or safety and ultimately it is the pilot's decision as to whether the aircraft can safely operate at the airport.

In terms of day-to-day operations, airports can seek the cooperation of local pilots to identify noise sensitive areas and to help spread the word to avoid overflying these locations to the extent practical and safe. Airports also can work with the FAA to modify manner in which aircraft are flown at the airport. There are significant limitations as to what types of modifications are acceptable to the FAA, but changes to such things as traffic pattern locations, instrument approach procedures, and preferential runway designation may be open to consideration.

Airport Users

Airport users, especially aircraft owners, operators, and pilots, have an informal but important role in airport land use compatibility matters. Foremost, when operating their aircraft, they should do so safely and in a manner that minimizes noise impacts on the land uses below. Individual pilots should encourage other pilots to do the same. Beyond these actions, airport users need to be engaged in planning for their airport and the surrounding community. Participating in public meetings and speaking out regarding compatibility concerns is essential.

Airport Master Plan and Airport Layout Plans

Two distinct, yet interrelated, types of plans used to guide airport development are the Airport Master Plan (AMP) and Airport Layout Plan (ALP).

An AMP is a comprehensive document intended to guide development on an airport. The planning period is normally 20 years. A typical AMP will contain most of the aviation-related information needed to prepare a land use compatibility plan. Almost all AMPs will contain:

- An inventory of airport facilities.
- Data on current and forecast activity levels.
- Assessment of future development needs and alternatives for meeting the needs.
- Text and drawings describing proposed improvements.

The AMP itself or an accompanying environmental document also will usually contain depictions of current and projected noise contours.

An ALP is a conceptual map depicting current and proposed airport features including runways, taxiways, navigational aids, buildings, aircraft parking areas, and other infrastructure. Airport property boundaries and the limits of required clear areas such as runway protection zones and runway object free areas are shown as well. Data tables (sometimes on a separate sheet) provide additional information about the airport runways, approaches, and other features, as well as the critical aircraft that the airport is designed to accommodate.

Additional drawing sheets typically will illustrate the airport airspace (FAR Part 77 surfaces), the runway approach surfaces and any obstructions to them, and details of the airport terminal or building area.

Even airports that do not have a current AMP may have a current ALP. ALPs are typically updated more regularly than AMPs. In addition to being listed in the NPIAS, to be eligible for FAA grant funds, an airport must have a current ALP approved by the FAA. Completion of an ALP is also an eligibility requirement for WSDOT Aviation's grant program.

See FAA Advisory Circular 150/5070-6B, *Airport Master Plans*, to learn how the master plan process works, including how your airport can apply for federal funds when/if eligible.

Legal Framework for Compatibility Planning

The legal tools needed to address airport land use compatibility issues are provided by a variety of state and federal laws, regulations, and legal decisions. Some of this framework sets mandatory requirements for airports or local land use entities. Other pieces merely enable airport or local action, but are not mandatory. Ultimately, the responsibility for ensuring compatibility between an airport and surrounding land uses rests with the airport operator and its neighboring land use jurisdictions.

Summarized in this section are the major state laws, regulations, and state Growth Management Hearings Board decisions that have an important bearing on airport land use compatibility and the issues discussed earlier in this chapter.

Aeronautics Laws

Laws pertaining to aeronautics are mostly gathered under [Title 14 RCW](#).

- **RCW 14.07 and 14.08 *Municipal airports act*** – Adopted in 1941 and amended in 1945, the act provides for the acquisition and sponsorship of airports by Washington cities, towns, counties, port districts, and airport districts.
- **RCW 14.12 *Airport zoning*** – This act establishes definitions and criteria, and allows local jurisdictions to adopt zoning controls to protect critical airspace from buildings, structures, or other airspace obstructions. The law provides direction and guidance to cities and counties on how to manage airport hazards.

Planning Enabling Act

Washington's Planning Enabling Act ([Chapter 36.70 RCW](#)) is a set of state laws that describe planning authorities and responsibilities for towns, cities, and counties. Sections particularly applicable to airport land use compatibility planning include the following:

- **RCW 36.70.320 *Comprehensive plan*** – Under this section, counties are required to prepare a “comprehensive plan for the orderly physical development of the county, or any portion thereof...” [RCW 35A.63.060](#) establishes similar comprehensive planning requirements for cities and towns. The two required elements of comprehensive plans are a land use element and a circulation element ([RCW 36.70.330](#)). Other elements are optional ([RCW 36.70.350](#)).
- **RCW 36.70.547 *General aviation airports*** – This section mandates that:
“Every county, city, and town in which there is located a general aviation airport that is operated for the benefit of the general public, whether publicly owned or privately owned public use, shall, through its comprehensive plan and development regulations, discourage the siting of incompatible uses adjacent to such general aviation airport.”

Plans may only be adopted following formal consultation with airport owners and managers, private airport operators, general aviation pilots, ports, and the aviation division of the department of transportation. WSDOT Aviation is also tasked with providing technical assistance to local agencies preparing plans and regulations consistent with this section.

This section applies to every county, city, and town, whether operating under [Chapter 35.63, 35A.63, 36.70, or 36.70A RCW](#), or under a charter.

Growth Management Act

Adopted in 1990, the GMA ([Chapter 36.70A RCW](#)) was enacted in response to rapid population growth and concerns with suburban sprawl, environmental protection, quality of life, and related issues. The act expands the Planning Enabling Act requirements for comprehensive planning in the state's most populous and rapidly growing counties. Twenty-nine counties are either required to fully plan under the GMA or have chosen to do so. These counties make up about 95 percent of the state's population. The remaining ten counties have limited planning requirements under the act.

Several sections are important to airports.

- **RCW 36.70A.070 *Comprehensive plans – mandatory elements*** – This section lists eight elements that must be included in comprehensive plans. Most of the elements potentially affect airports in that they guide the development that may occur in nearby areas. The land use element is particularly significant to land use compatibility matters and the rural element also may be consequential to some airports. The transportation element requires an inventory of facilities and services needs, including general aviation airports “to define existing capital facilities and travel levels as a basis for future planning.”
- For airports located near the edge of urban areas, airport land use compatibility should be considered in determining the location of the urban growth boundary.
- **RCW 36.70A.110 *Comprehensive plans – Urban growth areas*** – Each county that is required or chooses to plan under the GMA must designate an urban growth area or areas within which urban growth is to be encouraged and outside of which growth can occur only if it is not urban in nature. Urban growth area boundaries must be reviewed at least every ten years and adjusted as necessary to accommodate the urban growth projected to occur in the county for the succeeding 20-year period ([RCW 36.70A.130](#)).
 - **RCW 36.70A.200 *Siting of essential public facilities – Limitation on liability*** – This section deals with essential public facilities that are typically difficult to site. Airports are explicitly identified as an example of this type of facility. Others include state education facilities, state or regional transportation facilities, state and local correctional facilities, solid waste handling facilities, and in-patient facilities including substance abuse facilities, mental health facilities, group homes, and secure community transition facilities. Counties and cities planning under GMA must have a process for identifying and siting essential public facilities. No local comprehensive plan or development regulation may preclude the siting of essential public facilities.
 - **RCW 36.70A.210 *Countywide planning policies*** – Recognizing that counties are regional governments within their boundaries and that cities are primary providers of urban governmental services within urban growth areas, this section establishes requirements for adoption of countywide planning policies. Such policies are to serve as a countywide framework from which county and city comprehensive plans are developed and adopted and made consistent with each other. Specific topics to be covered by the policies are listed.
- Although airport land use compatibility is not explicitly listed as a topic for countywide planning policies, the statutes allow topics other than those listed to be addressed.
- **RCW 36.70A.510 *General aviation airports*** – This section requires cities and counties planning under [RCW 36.70A.040](#) to adopt and amend comprehensive plans and development regulations to address land use compatibility adjacent to airports consistent with [RCW 36.70.547](#).

Findings of the Washington State Growth Management Hearings Boards

The following four decisions are ones most directly relevant to airport land use compatibility matters. The implications are noted here along with a brief indication of the topic addressed by the decision.

- **Stephen Pruitt and Steven Van Cleve vs. Town of Eatonville – Central Puget Sound Growth Management Hearings Board (CPSGMHB; Case No. 06-3-0016)** – Legitimized WSDOT’s role in defining the compatibility policies that need to be incorporated into a community’s comprehensive plan. Guidelines developed by WSDOT could include minimum standards that would be given great weight by growth management hearing boards. However, these guidelines would be recommendations and not regulatory in nature.
- **State of Washington Department of Corrections and Department of Social and Health Services vs. City of Tacoma – Central Puget Sound Growth Management Hearings Board (CPSGMHB; Case No. 00-3-0007)** – Expansion of essential public facilities must also be accommodated by local agencies. A community’s comprehensive plan therefore must support planned expansion of any airport that lies within the area covered by the plan. Guidance for expansion of airport facilities, volume of traffic, and changes in aircraft fleet mix can be taken from an airport’s master plan. Where a current airport master plan does not exist, the required facility planning can be done as a component of development of the comprehensive plan.
- **Port of Seattle vs. City of Des Moines – Central Puget Sound Growth Management Hearings Board (CPSGMHB; Case No. 97-3-0014)** – The requirement to accommodate expansion of essential public services includes necessary supporting facilities and services. While this is likely to be most important at larger commercial service airports, it clearly establishes that comprehensive plans must facilitate all elements necessary for an airport to function. At commercial airports this could include such off-airport facilities as rental car facilities, airport shuttle businesses, air freight consolidators, and airline catering companies.

Jurisdictional Regions for the Growth Management Hearings Boards

Eastern Panel



The eastern region includes all counties and cities east of the crest of the Cascade Mountains which are required to plan or choose to plan under the Act.

Western Panel



The western region includes all counties and cities west of the crest of the Cascade Mountains which are required to plan or choose to plan under the Act, but are not within the Central Puget Sound Board’s jurisdictional boundaries

Central Puget Sound Panel




The Central Puget Sound region includes King, Snohomish, Pierce, and Kitsap Counties and the cities within those counties.

Maps only depict counties fully planning under the GMA.

- ***Hapsmith et al vs. City of Auburn – Central Puget Sound Growth Management Hearings Board (CPSGMHB; Case No. 95-3-0075c)*** – Although this decision specifically addresses mitigations for a new essential public facility, it suggests that the external impacts of these uses need to be addressed. Compatibility policies contained in comprehensive plans can be viewed as a form of mitigation in that they are intended to minimize the noise and safety effects of airports. This case does not provide any guidance on the substance of mitigation. However, it does legitimize including mitigation of impacts as one more reason to include compatibility policies in comprehensive plans.

Additional decisions of interest include these:

- Local jurisdiction required to consult with airport prior to adoption of comprehensive plan amendments having an effect on the airport.
 - *Son Vida II v. Kittitas County*, EWGMHB 01-1-0017 (FDO March 14, 2002)
 - *NFRD v. City of Yakima*, EWGMHB 02-1-0009 (FDO December 5, 2002)
 - *McHugh v. Spokane County*, EWGMHB 05-1-0004 (FDO December 16, 2005)
- High-density residential zones adjacent to airports are inappropriate/incompatible uses; jurisdictions must preclude uses non-compatible with an airport to comply with GMA.
 - *CCARE v. Anacortes*, 01-2-0019 WWGMHB (FDO December 12, 2001)
 - *Klein v. San Juan County*, 02-2-0008 WWGMHB (FDO October 18, 2002)
 - *Futurewise v. Whatcom County*, 05-2-0013 WWGMHB (FDO September 20, 2005)

 For more information about state laws and Growth Management Hearings Board decisions affecting airport land use compatibility, see Mead & Hunt's briefing paper, *Implications of the Designation of Airports as Essential Public Facilities*. That report, along with numerous other resources on this topic, is available in the appendices resources section. Also, more information about decisions of Washington's Growth Management Hearings Boards are available on their website at: www.gmhb.wa.gov

Introduction

This chapter will take you step by step through the process of identifying and evaluating airport land use compatibility issues that affect your community. Then you will learn how to incorporate the results into the amendment of your comprehensive plan and development regulations. You will also learn about:

- The types of airport and land use data important to your analysis.
- Where to find airport related data for your analysis.
- Specific types of airport land use compatibility concerns.
- Land use strategies available for addressing these concerns as part of the comprehensive plan and development regulations amendment or adoption process.
- The importance of coordination with WSDOT Aviation and the airport and aviation stakeholders in your community.

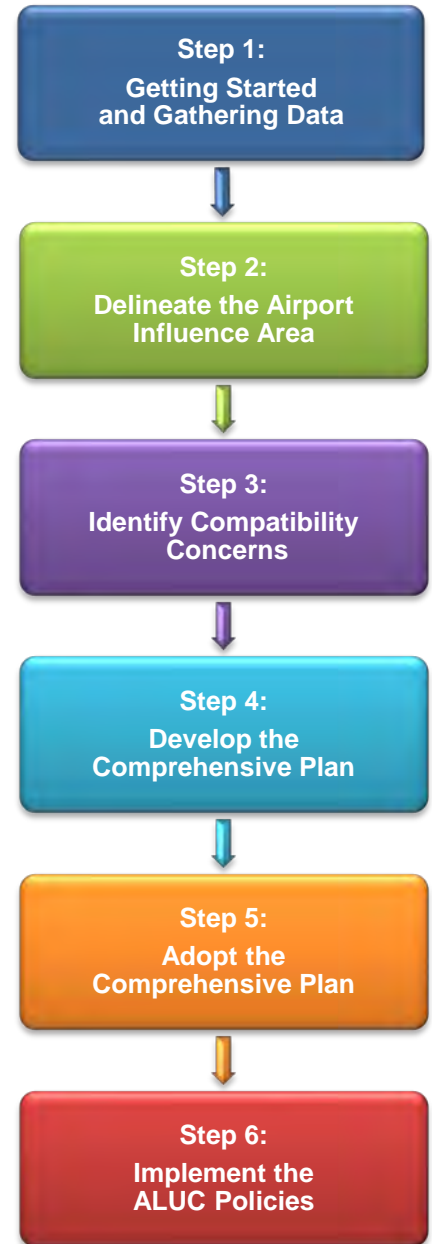
What is the purpose of the compatibility planning checklist?

WSDOT Aviation has provided a step-by-step checklist to make airport land use compatibility resources easier to use and understand. The checklist communicates best management practices and directs users to more detailed reference materials.

How should you use this checklist?

This chapter outlines a six-step process for airport land use compatibility planning and provides a [checklist](#) that takes you through each step. The steps take you through research and analysis that will help your jurisdiction make informed decisions about airport land use compatibility. The products you develop as you move through the checklist provide background materials that will help the jurisdiction “show their work” by demonstrating how they arrived at their decisions. This type of transparency supports public outreach programs and is useful for supporting local decision making if challenged before the Growth Management Hearings Board. This checklist will help you craft defensible, objective policies and zoning regulations.

Step by Step Compatibility Process



This guidebook is not just for beginners! The step-by-step method described in the following pages is a cyclical process that can be used to review and update goals, policies, and regulations as needed. Such review is appropriate during comprehensive plan updates as well following completion of significant airport planning efforts, such as the master plan or airport layout plan.

How will WSDOT use this checklist?

WSDOT's interest is to preserve the airport as part of the state transportation system. Our role is to provide technical assistance recognizing the uniqueness of every individual community and airport. We will focus on reviewing the community's airport land use compatibility goals, policies, and regulations proposed for adoption. We use our technical expertise to assist communities in making fully informed decisions. If WSDOT identifies deficiencies or inconsistencies within preferred policies or development regulations, we will address them in our official comment letter. WSDOT's comments to a local jurisdiction may:

- Express support for strong elements in the community's goals, policies, and regulations.
- Point out advantages and disadvantages of the community's preferred approach.
- Clarify technical elements that have been misinterpreted.
- Raise issues that might not have been addressed.
- Suggest that additional information be provided to explain and support decision making.
- Recommend alternatives.

| Steps | Tasks and Goals | Products |
|--|--|---|
| <p style="text-align: center;">Step 1: Getting Started and Gathering Data</p> | <ul style="list-style-type: none"> • Formal Consultation • Identify applicable state laws. • Inventory airport's attributes. • Evaluate existing land uses. • Inventory land use plans. • Define area for initial study area. | <ul style="list-style-type: none"> • Consultation record • Documentation of applicable state laws • Inventory of airport facilities, activities, services and context. • Summary of land uses inventory • Map of initial study area |
| <p style="text-align: center;">Step 2: Delineate the Airport Influence Area</p> | <ul style="list-style-type: none"> • Review airport, aircraft, and topographic features. • Delineate the airport influence area. • Define impacts within the airport influence area. | <ul style="list-style-type: none"> • Airport influence area boundary. • Airspace map (FAR Part 77 Imaginary Surfaces and Elevations) • Map of areas impacted by airport operations • Inventory of topographic features or constraints |
| <p style="text-align: center;">Step 3: Identify Compatibility Concerns</p> | <ul style="list-style-type: none"> • Examine the level of compatibility • Determine the compatibility status of existing land uses in airport influence area. • Identify compatibility challenges. | <ul style="list-style-type: none"> • List of current community policies. • Evaluation of compatibility status. • Identification of potential compatibility conflicts. • List of specific compatibility issues to be addressed by new comprehensive plan policies |
| <p style="text-align: center;">Step 4: Develop the Comprehensive Plan</p> | <ul style="list-style-type: none"> • Weigh comparative advantages and disadvantages of planning strategies • Identify preferred planning strategies • Consider airport land use compatibility • Draft comprehensive plan compatibility policies | <ul style="list-style-type: none"> • List of current policies affecting airport land use compatibility positively • Assessment of adequacy of current policies • Evaluation of alternative compatibility strategies • Draft of compatibility policies. • Adjustment of airport influence area boundary if necessary • Draft comprehensive plan policies. • Draft comprehensive plan land use map |
| <p style="text-align: center;">Step 5: Adopt the Comprehensive Plan</p> | <ul style="list-style-type: none"> • A strategy to gain public and decision-maker support of the compatibility measures • Provide opportunity for public review • Gather comments from WSDOT Aviation • Adopt a comprehensive plan with appropriate measures to protect the airport from incompatible land use | <ul style="list-style-type: none"> • Information materials describing the importance of the airport and airport land use compatibility • An adopted comprehensive plan that incorporates airport land use compatibility measures • Supporting record of process and methodology |
| <p style="text-align: center;">Step 6: Implement the ALUC Policies</p> | <ul style="list-style-type: none"> • Draft and adopted implementing regulations • Public participation process • Develop continuing process to evaluate airport land use compatibility | <ul style="list-style-type: none"> • Development regulations that implement the comprehensive plan policies • Zoning map • Continuing process to evaluate compatibility concerns • Record of process and methodology |

Step 1: Getting Started and Gathering Data

In this step, you will begin your work on airport land use compatibility planning by laying a foundation for your process and identifying study area. Answering the questions listed here will enable you to define and understand the objectives of the process and who should be involved. Your other major task in this step will be to gather the airport and land use data that will enable you to address airport land use compatibility issues.



Laying the Foundation

You will know you have been successful when:

- You have identified applicable state laws.
- A process is in place to help stakeholders work together.
- You can describe the airport’s role, features, and activities.
- You know what land uses exist around the airport and what land use plans are in place.
- You have identified the study area.



What are your jurisdiction’s responsibilities?

Washington state law ([RCW 36.70.547](#)) requires all towns, cities, and counties in the state to discourage development of incompatible land uses near general aviation airports through adoption of comprehensive plan policies and development regulations. The lead role in compatibility planning for any particular airport thus belongs to the town, city, or unincorporated county jurisdictions that control the land uses around the airport. A primary purpose of this guidebook is to help the entities satisfy the statutory requirement. However, the manner in which compatibility planning objectives are achieved will not be the same from one jurisdiction to another. Characteristics of the community and its natural environment, as well as those of the airport, will dictate different approaches.

For specific statutory requirements see:

- [RCW 36.70A.070](#) *Comprehensive plans – Mandatory elements*
- [WAC 365-196-430](#) *Transportation element*
- [RCW 36.70.330](#) *Comprehensive plan – Required elements*
- [RCW 47.80.030](#) *Regional transportation plan – Contents, review, use*

To begin the planning process, local planners should answer these questions:

- **Which particular state laws affect your jurisdiction’s planning responsibilities related to airports?** Many of the laws apply to all jurisdictions, while others are relevant only to certain types. [Chapter 1](#) briefly describes the most significant statutes and provides links to the full text. Use [Worksheet 1A](#) to note your observations and questions as to how the state laws apply to your jurisdiction.
- **Beyond the basic requirements of state law, what are the primary purposes and objectives to be achieved in compatibility planning for the airports in your jurisdiction?** Are there specific issues to be addressed that are arising either because of changes at the airport or development pressures nearby? List the top three objectives in [Worksheet 1B](#).
- **What particular challenges do you expect to face during the compatibility planning effort?** Has the airport been controversial and generated community opposition? Is data about the airport readily available or will special effort be needed to get information? In [Worksheet 1C](#), identify three top challenges.
- **How do you intend to accomplish the compatibility planning study?** The outcome of the study ultimately must be reflected in the comprehensive plan and development regulations, but will the study be done as part of the comprehensive plan update or is a separate effort needed? In most cases, the analysis of compatibility issues can be done as a task within the overall comprehensive plan update process. However, if the compatibility planning issues involved are complex, a separate study may be warranted. Any such separate study would need to be completed, or largely so, in advance of the comprehensive plan update so that its recommendations can be incorporated.
- **What efforts did you take to identify the initial study area to address compatibility adjacent to the airport?** (The initial study area is the area necessary for your initial land use compatibility planning study.)
- **Can the work be done by the jurisdiction’s staff or comprehensive planning consultant or is a specialized consultant needed?** With the help of this guidebook and WSDOT Aviation’s Technical Assistance Program, planning staff should be able to address compatibility planning matters themselves. Some jurisdictions with highly complex airports may use a consultant that specializes in airport land use compatibility planning.



Formal consultation and who should be involved in airport land use compatibility planning?

State law requires that comprehensive planning be early, continuous, and collaborative. In addition, [RCW 36.70.547](#) explicitly requires “formal consultation” with aviation interests prior to adoption of a comprehensive plan or development regulations dealing with airport land use compatibility. Several stakeholders—airport owners and managers, private airport operators, general aviation pilots, ports, and the aviation division of the department of transportation—are specifically identified in state law. Other interests whose input may be helpful include the airport’s aviation service providers (fixed-base operators), airline and air taxi operators, public and private emergency response providers, local business owners, regional agencies (RTPO and/or MPO), the State Department of Commerce, the FAA, and community representatives.

An aviation working group or advisory committee can be a helpful tool for jurisdictions planning for airport land use compatibility. Not only does this type of group provide a method for meeting public involvement and consultation requirements, it is also a way to form long-lasting relationships that extend beyond airport land use compatibility planning. The group can be used to give input on relative advantages and disadvantages of various approaches and communicate with stakeholder groups about progress of work.



Department of Commerce
Innovation is in our nature.

Other resources on citizen participation in the planning process are provided by Department of Commerce Growth Management Services at: www.commerce.wa.gov/site/420/default.aspx

What do I need to know about the airport?

Once you have determined what needs to be accomplished and who should be involved in the compatibility planning process, you next need to collect essential data about the airport. This data falls into three general categories:

Planners need this information in order to address land use compatibility adjacent to airports. Also, decision makers need this information to understand the role of the airport in the community for transportation and economic development. Collecting and communicating these airport facts is an essential part of the compatibility planning process.

Another use for the data you gather about the airport is in completing the transportation inventory element of the community comprehensive plan and the regional transportation plan. The transportation inventory should catalog air transportation facilities and describe their role as part of the multi-modal transportation system. Future plans for the facilities should also be identified.

Identification of future airport improvement needs is particularly necessary for towns, cities, and counties that own or operate an airport. State law requires that most of these entities include a list of planned airport improvements within their capital facilities plan.

Airport Context – Who owns the airport? What roles does it play within the state and national aviation systems and within the local community? Who uses it?

Airport Activity – What types of aircraft use the airport and what is the level of activity? Where do aircraft normally fly as they approach and depart the airport?

Airport Features – What physical components of the airport are significant to land use compatibility? What are the locations and sizes of these facilities? What is the projected future airport configuration?

Airport Information – Where can one find airport information for airport land use compatibility planning?

Airport Land Use – What do you need to know about land use? What information about existing and planned land uses in the airport influence area does one need? Where can one find land use documents, policies, databases, maps, and other information?

Airport Context

The first thing you should learn about the airport is how it relates in a functional sense to other airports and to the community where it resides—in other words, what is its context? Some of the questions listed here will not necessarily help you in developing compatibility policies, at least not in a direct sense.

However, what the answers will tell you is something about the importance of the airport both within the state and national airport systems and within the overall fabric and economy of your community. This information will aid in obtaining public support for the compatibility policies as discussed in [Step 5](#).

1. Who owns or “sponsors” the airport?

Who runs it?

This is an indicator of your primary partner in airport land use compatibility planning. Even before starting work on your study, you should contact the airport manager to get input on the work scope and issues that should be addressed.

Airport contact information can be found at:

www.wsdot.wa.gov/aviation/AirportDirectory/default.htm

2. What previous planning studies have been done for the airport?

Gathering this information at the outset of your work is essential. Earlier studies will help you answer many of these airport inventory questions. An airport master plan, airport layout plan drawings, FAR Part 150 study, environmental studies for a master plan or individual projects, and other planning studies, to the extent that they have been done, should contain valuable information needed for compatibility planning around the airport. Any economic studies concerning the airport also may be useful. Obtain copies of each of these.

3. What is the state classification of the airport?

WSDOT Aviation categorized airports into state classifications in the Long-Term Air Transportation Study (LATS). This classification is an indicator of the role the airport plays in the state system and the types of facilities and services needed to serve that role. It also includes facility, service, and operational performance objectives that were developed for each airport classification level as basis for prioritizing state funding to airports.

4. Who uses the airport?

Obtain information about the users of the airport. Many communities are surprised by the number of businesses located on the airport or that require proximity to it to support their activity. The airport’s importance to emergency response services such as police, fire, aeromedical, and search and rescue, and disaster relief also may not be widely recognized. Airport users and businesses have a vested interest in having compatible land uses around the airport. They will be supporters of strong land use compatibility measures.

5. What is the airport’s role in the community?

How does the airport fit into the goals of the community and the region? Has your community adopted specific policies regarding the role of the airport? How is the airport perceived by the general public? Have compatibility problems or other issues become major controversies? Knowing this status will help you understand the challenges you

may face in establishing compatibility policies for the airport. Information can be obtained from airport staff, community groups, newspaper articles, meeting minutes, and other such sources.

6. Does the airport connect with other transportation modes?

As with the airport role, this question again examines a facet of the airport’s relationship to the community and region. Is the airport an integral part of a multi-modal transportation system within your community and region or is it disassociated with the transportation network? What links does the airport have with public transportation and freight movement systems? What are the opportunities for better inter-modal connections?

7. What is the airport’s economic contribution to the community?

Airports contribute significant direct and indirect economic benefits to the local economy. Only the largest and busiest airports typically pay their own way solely from direct airport revenues and from income derived from land uses on property not needed for aviation uses. As with the contributions of other modes of transportation, most airports provide services that are essential to the economic vitality and social fabric of their communities. If an economic study has been done of your airport, review its findings and use the data in support of the need for protecting the airport from encroachment by incompatible land uses.

Corporate Aircraft



If this data is not available, other means of showing the airport’s contribution to the local economy include:

- Document the number of public and private employees on the airport through interviews with agencies and businesses based there. If you can ensure confidentially, it may also be possible to document the gross payroll of those employed on the airport.
- If your community has a branch of a regional or national business, staff from the main office may be flown to your community on a regular basis in company or chartered aircraft. This is particularly likely if your community does not have scheduled passenger service.
- If there are local manufacturers or distributors that ship their products via one of the small-package shippers at the airport (e.g., UPS), you should be able to document this through interviews with the shipper or manufacturer.
- Outside of metropolitan areas, medical specialists are sometimes flown in on a regular basis. Discussions with the commercial aviation-service providers (fixed-base operators) at the airport or staff at the local hospital can help you determine whether this exists in your community.



Airport Activity

For the most part, an airport's effects on surrounding land uses are created not by the airport itself, but by the activity that takes place there. The questions below will serve as a checklist for the types of airport activity data you will need. See the following section for suggestions on where to find this information:

1. What is the composition of aircraft operations?

Is the airport used strictly by general aviation aircraft or are there also scheduled airline flights or operations by military aircraft?

2. What types of aircraft use the airport and how often?

Obtain information on the mix of aircraft types that are based at the airport as well as those that regularly visit (transient aircraft). As discussed in [Step 2](#), different aircraft types (business jets, propeller airplanes, helicopters) have different flight characteristics and create different noise and safety issues for surrounding lands. Gather information on the number of takeoffs and landings made by each type. For the critical aircraft, identify the specific models (e.g., which specific business jets use the airport). Also consider what types of aircraft are expected to use the airport in the future. Does the airport support flight school activity, medical services, or parachute activity?

3. How many passengers does the airport serve?

If the airport has airline service, get data on the number of passengers who board there (passenger enplanements). If applicable, also obtain data on cargo tonnage shipped.

4. What is the distribution of aircraft operations by time and runway?

Get data or estimates of how much each runway is used at night (defined as 10:00 p.m. to 7:00 a.m.) versus during the day (7:00 a.m. to 10:00 p.m.). Find out how often each runway is used and in which direction. Determine if there are significant seasonal variations in these numbers. Ask if anything is expected to cause these percentages to change in the future.

5. Are there frequent aircraft maintenance operations at the airport?

Maintenance testing of aircraft requires use of high power settings with an accompanying increase of noise levels.

Commercial Operations



Military Operations

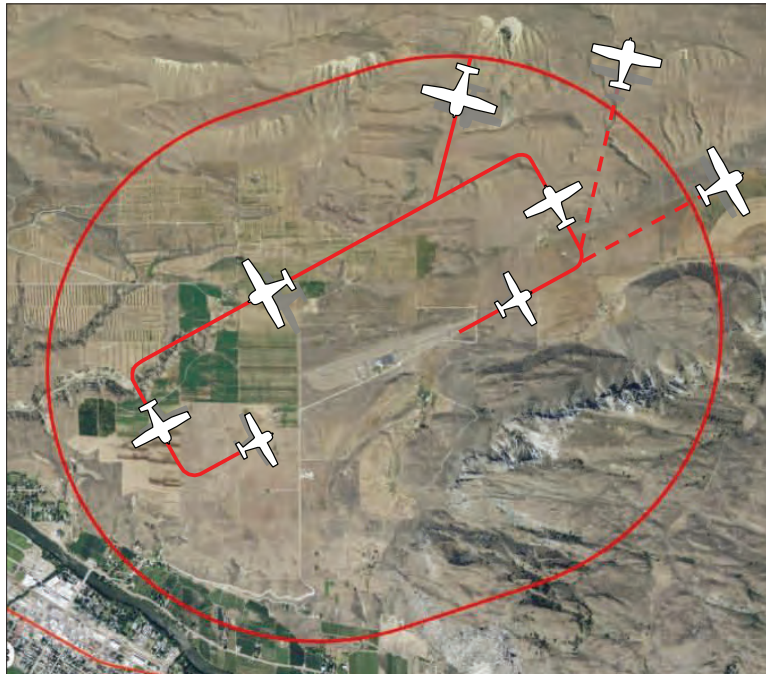


Maintenance Operations



6. **What routes do aircraft fly as they approach and depart the airport?** Federal regulations AC No. 90-66A define the recommended shape of the traffic patterns used by general aviation aircraft as they approach and depart most airports, but the specific size, altitude, and other characteristics may vary to meet local needs. Map the typical routes aircraft fly and consider that different aircraft (especially helicopters) may follow different routes. Seek information from the airport manager and pilot community on how often each route is followed.

Generalized Traffic Pattern for Tonasket Municipal Airport

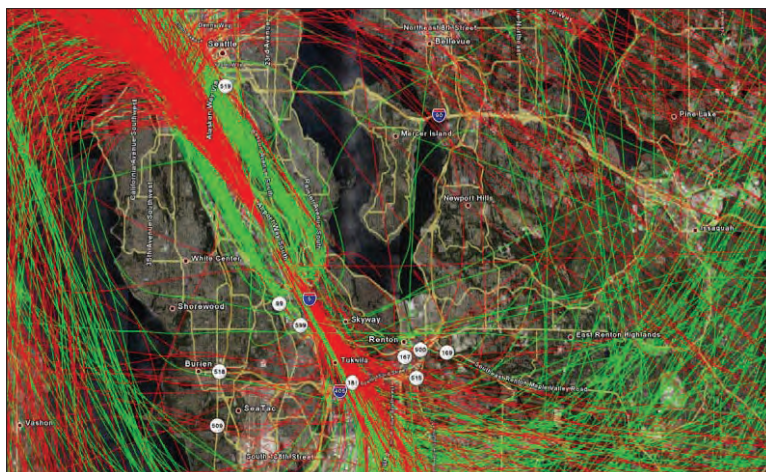


7. **What deviations from the normal traffic pattern are typical at the airport?** While certain primary traffic corridors are defined, deviations occur. Some of these variations are permanent ones dictated by the airport’s proximity to other airports, high terrain, or noise-sensitive land uses. These usually are indicated in pilots’ guides or are posted at the airport. Others are individual instances resulting from pilot techniques, other aircraft in the pattern, wind conditions, and other such factors.

8. **Does the airport receive noise complaints?** Most airports probably get at least a few complaints. Busy airports may get enough that they record and map them in a formal manner. Knowing the geographic source of complaints can be useful when drafting compatibility policies for the airport. Most airports receive the majority of noise complaints not from locations overflow on a regular basis, but from places

where overflights are more random events.

Auburn Municipal Airport Radar Tracks



Radar Tracks: This diagram shows aircraft flight tracks captured by radar. The image illustrates the variability of typical flight routes. (Photo courtesy of Renton Municipal Airport.)

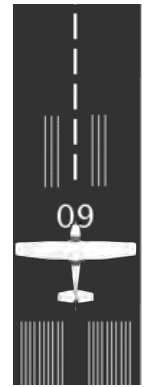


Airport Features

In order to accurately identify and map the airport's impacts on nearby land uses, you need to know the airport's physical configuration.

1. What are the characteristics of the landing surface?

Indicate the length, width, and surface type for each runway at the airport and whether the runway is lighted for nighttime use. These features determine what types of aircraft can operate at the airport. For paved runways, data on the pavement strength also can be useful to know in that pavement strength limits the aircraft that can use the airport. Ascertain the length of any displacement of the landing thresholds from the runway ends. Find the official latitude and longitude coordinates of the runway ends and displaced thresholds. This data is essential to mapping of runways and associated airport impacts relative to surrounding geographic features. Entering the data into a GIS database is desirable.



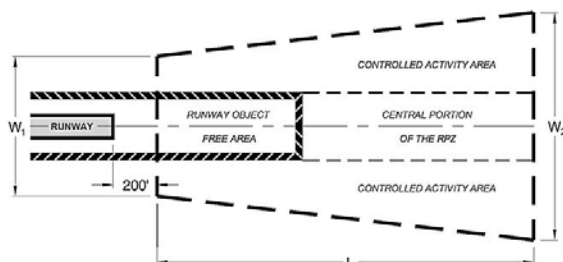
2. What types of approach capabilities does each runway end have?

Runway approaches are either visual or instrument. Visual approaches require good visibility conditions. When visibility is poor or cloud ceilings low, use of an instrument approach procedure is necessary. These procedures are established by the FAA and often require special facilities (navigational aids) at the airport. Also, aircraft must be properly equipped and pilots must be certified for instrument flight. Different types of instrument approach procedures provide varying capabilities in terms of the minimum weather conditions in which the procedures are usable. Instrument approach capabilities are particularly important to scheduled airline service and corporate aircraft operators. These users depend upon being able to land even when clouds lie over the airport.

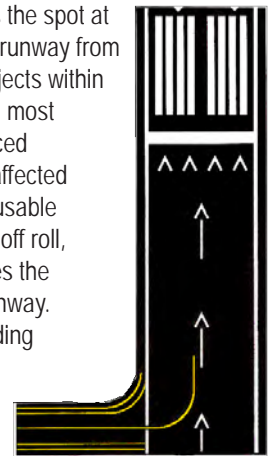
Instrument Approach Plate



The runway protection zones (RPZs) and object free areas (OFAs) are probably most important. Also look for building restriction lines (BRLs) shown on the airport layout plan as they indicate how close buildings can be to a runway. These areas generally should be on airport property. However, if they aren't, then your compatibility policies and regulations should limit development to ensure that it is consistent with the Airport Master Plan and FAA guidelines.



A displaced threshold moves the spot at which aircraft land down the runway from the end of pavement. Tall objects within the runway approach are the most common reason for a displaced threshold. Even though the affected portion of the runway is still usable for aircraft to begin their takeoff roll, a displaced threshold reduces the usability and safety of the runway. This is one reason why avoiding obstructions to runway approaches is so important.



3. Which design standards apply to the airport and does the airport meet these standards?

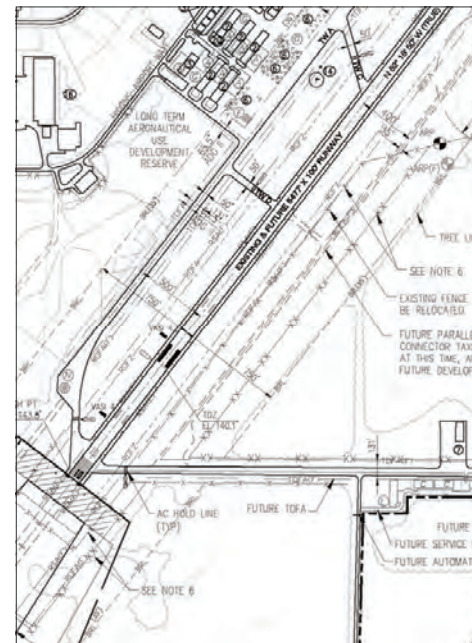
The FAA defines design standards for runways in accordance with the airport reference code (ARC) applicable to that facility. The ARC reflects characteristics (size and approach speed) of the critical aircraft expected to use the facility and the type of approach capability available. The design standards determine not only the runway dimensions, but also the sizes of critical clear areas surrounding the runway. These areas are important for the safety of aircraft occupants in case the aircraft lands short of the runway, overruns the far end, or deviates off to the side. It is equally important that these areas be kept clear of people and buildings because of the risks involved. Other FAA standards determine the heights that structures, trees, and other objects near the airport can reach without becoming obstructions to the airport airspace. Design deficiencies and existing airspace obstructions should be identified during this inventory process.

4. What is the plan for future development at the airport?

Airports that receive funding from WSDOT Aviation and the FAA must complete 20-year plans that forecast future activity and catalog future development needs. If an airport master plan has been adopted for the airport, descriptions of the planned improvements and a detailed capital improvement program listing each project typically would be included. Also in an airport master plan should be an airport layout plan and other drawings showing where the improvements are proposed. Planned changes to runways or instrument approaches can have implications that should be considered in land use compatibility planning.

| | Design Standard | Existing Condition | Compliant: |
|--|-----------------|--------------------|-----------------------------|
| Runway Designation - 1735 | | | |
| Distance from Runway Centerline to Parallel Runway Centerline | 0 | 0 | N/A for this airport/runway |
| Distance from Runway Centerline to Parallel Taxiway Centerline | 0 | 0 | N/A for this airport/runway |
| Distance from Runway Centerline to Aircraft Parking Line | 100 | 125 | Meets Standards |
| Required Runway Shoulder Width | 10 | 5 | Does not meet Standards |
| Required Blast Pad Width | 0 | 0 | |
| Required Blast Pad Length | 0 | 0 | |

WSDOT's [Airport Information System](#) Airport Facilities and Services Information Report has data on airport design standards for most airports in Washington



Also check the airport master plan or airport layout plan for any new or upgraded instrument approach capabilities planned for the airport.

One of the performance objectives specified in LATS is that airports classified as commercial, regional, or community should have instrument approach capabilities.



Airport Information

Where can I find this information about airports?

The sources outlined here should provide the bulk of the airport information you will need for airport land use compatibility planning. However, do not expect to find all the data in a single place. Be prepared to spend some time seeking out the information. Documents and databases are the first places to turn, but interviews with airport management and other people familiar with the airport and its operations are usually necessary. Remember, jurisdiction should already have the majority of information required to engage in their compatibility planning efforts.

WSDOT's Airport Information System

This is a comprehensive database of descriptive information about airports in the state. Data included in the airport information system is provided by airports and updated on an annual basis. The database contains a wide range of information on each airport in the Washington Aviation System including airport runway, facility, and service data, number and type of based aircraft, and capital development projects.

www.wsdot.wa.gov/aviation/allstateairports/default.htm

Airport Master Plan

An airport master plan (AMP) is a comprehensive document intended to guide development on an airport. The planning period is normally 20 years. A typical airport master plan will contain most of the aviation-related information needed to prepare a land use compatibility plan. Normally, an AMP is formally adopted by the airport sponsor—the entity that owns or operates the airport. It also may be adopted by reference in the comprehensive plan. Master plans for specific airports may be available on the WSDOT Airport Information System's webpage at:

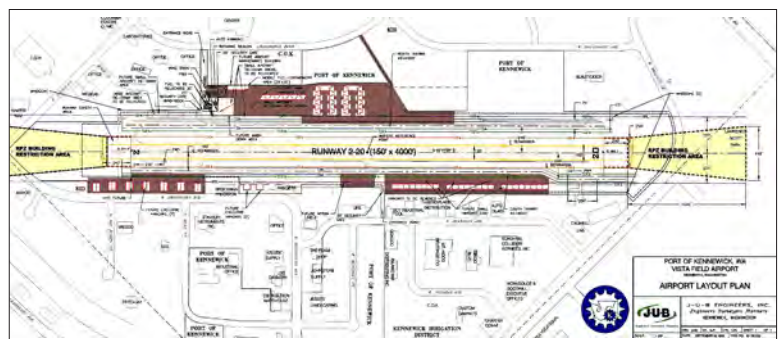
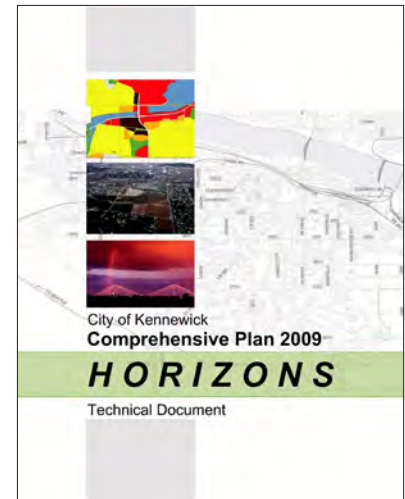
www.wsdot.wa.gov/aviation/allstateairports/default.htm

Airport Layout Plan

An airport layout plan (ALP) is a set of drawings showing the existing and planned configuration of airport facilities and the airspace around the airport. An ALP set is often accompanied by a short narrative report describing key features of the plan set.

Airport layout plans are typically updated more regularly than airport master plans and even airports that do not have a current airport master plan may have a current ALP. A current ALP is prerequisite to obtaining airport improvement funding from FAA or WSDOT.

City of Kennewick's Comprehensive Plan

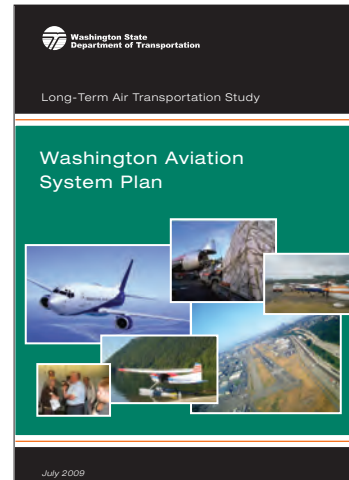


Statewide Aviation System Plan

The purpose of the *Long-Term Air Transportation Study* (LATS) is to understand what capacity currently exists in aviation facilities and what will be needed to meet future demand for air transportation. There are 138 public use airports within the system. Approximately 65 of these airports are also recognized in the national air transportation system. The Aviation Planning Council report, Aviation System Plan, and supporting technical documents includes an existing airport capacity/facility assessment, 25-year demand/market analysis, airport forecasts to 2030, statewide aviation policies, and implementation recommendations.

www.wsdot.wa.gov/aviation/systemplan/default.htm

WSDOT Aviation System Plan



National Plan of Integrated Airport Systems

The *National Plan of Integrated Airport Systems* (NPIAS) identifies more than 3,300 airports that are significant to national air transportation and thus eligible to receive federal grants under the Airport Improvement Program (AIP). It also includes estimates of the amount of AIP money needed to fund infrastructure development projects that will bring these airports up to current design standards and add capacity to congested airports. FAA is required to provide Congress with a five-year estimate of AIP eligible development every two years.

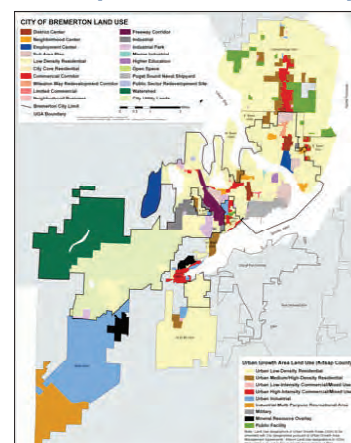
AIP 2008



Comprehensive Plan

The comprehensive plan is the starting point for any planning process and the centerpiece of local planning. Development regulations (zoning, subdivision, and other controls) must be consistent with comprehensive plans. State agencies are required to comply with comprehensive plans and development regulations of jurisdictions planning under the GMA. Many comprehensive plans are posted online. Your jurisdiction may be included on the Municipal Research Center's (MSRC) website at: www.mrsc.org/codes.aspx

Comprehensive Plan Map



Interviews

Sometimes the best way to collect information is to reach out to people who have personal knowledge about the airport. This is particularly true with respect to some of the airport activity data. Even though this data may not be recorded, these people may be able to provide usable estimates.

Airport Manager – The airport manager is usually the best overall source of data on airport activity and for supplemental information on airport facilities.

Other Airport Staff – At larger airports, other staff are likely to have more detailed knowledge of particular information such as activity data or noise issues.

Fixed Base Operators – Particularly at smaller airports, the day-to-day operation of the airport may be delegated to a fixed base operator (FBO) who has a business at the airport.

Air Traffic Control Personnel – If the airport has a control tower, interviewing the personnel will often yield excellent information on aircraft operations, runway usage, and traffic patterns. Tower personnel sometimes will even have recorded data on aspects of airport activity that are not included among the compiled data available on the FAA or state website.

Flight Instructors and Other Pilots – Pilots, and particularly flight instructors, who regularly fly at the airport often have the best sense of where traffic patterns are located, the types of aircraft that use the airport, the distribution of activity among runways, and other operational characteristics of the airport.

Passenger Airline and Air Cargo Operators – If the airport manager does not have data on passenger and cargo activity, direct contact with these users may be necessary at airports where this use is present.

Specialized Users – Where special functions such as aerial firefighting, search and rescue, disaster management, aeromedical transport, or crop dusting take place at the airport, contact with the users will provide information on their activities and possibly additional insight into airport operations as a whole. Talking to military personnel also may be warranted if military activity is a significant component of the airport use.



Tim Brooks, Kenmore Air's Vice President of Flight Operations, explains the operational characteristics of Kenmore Air Harbor's established airspace corridor to city staff and onlookers.



Airport staff can be an asset in evaluating the current operational characteristics of an airport.

Documents and Databases

These printed documents and online databases contain extensive amounts of data, not all of which will be directly relevant to the compatibility planning task. Nevertheless, it is important to check out each source to glean important information about the airport in your community.

Airport Land Use

What do I need to know about land uses around the airport?

The other side of the airport land use compatibility planning coin is the land use side. To be able to identify where compatibility conflicts already exist and to develop policies to avoid new problems, you need to gather information about existing and planned land uses in the airport influence area. If you are working through the compatibility planning process in this guidebook as part of a comprehensive plan update, you presumably have the necessary information readily at hand. With the copious amounts of land use documents, policies, databases, maps, and other information available for most communities, the challenge is to focus on the information that is most pertinent to airport land use compatibility issues. Here are some of the items you should assemble. The information will be used when you get to [Step 4](#).

Most of the land use map data you will need should have been collected during your comprehensive plan updates or rezone activities. This information may also be available in your local or regional geographic information system

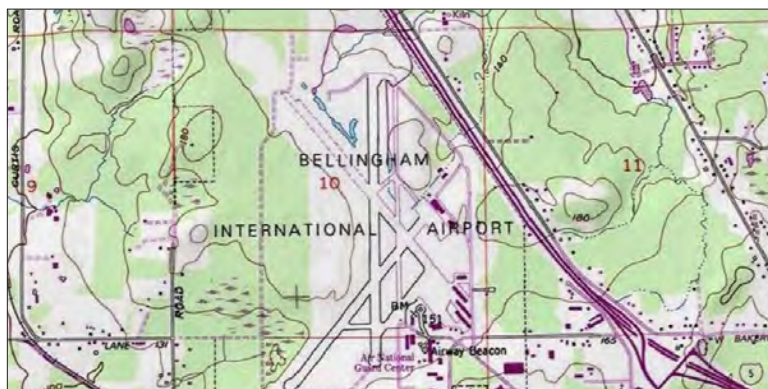
An Individual parcels map demonstrates the jurisdiction’s the current parcel configuration. In many cases, large parcels have greater development potential. Smaller parcels are often limited to types of development they can accommodate due to their physical constraints. Parcel maps are available through your local jurisdiction and in many cases available online.



Parcels

Bellingham International Airport

A Topographic map is a map that shows and names prominent natural and cultural features. These maps primarily provide the user with an understanding of the areas geographic configuration and elevation of the terrain’s topography. They may be used to identify features that shape development, increase exposure to aviation impacts, constraint airport operations, or represent an area with potential for conflict. They may be obtained from your local jurisdiction, USGS, or free online through open source software such as ArcGIS Explorer®



Topographic Map

Did you know that topographic maps come in a variety of scales? Planners and land use stakeholders will find maps at 1:24 and 1:250,000 to be most useful in compatibility planning.

| Scale of Map | Distance on Map and Distance on the Ground |
|--------------|--|
| 1:24 | 1 inch = 2,000 feet |
| 1:250,000 | 1 inch = about 4 miles |
| 1:500,000 | 1 inch = about 8 miles |
| 1:1,000,000 | 1 inch = about 16 miles |

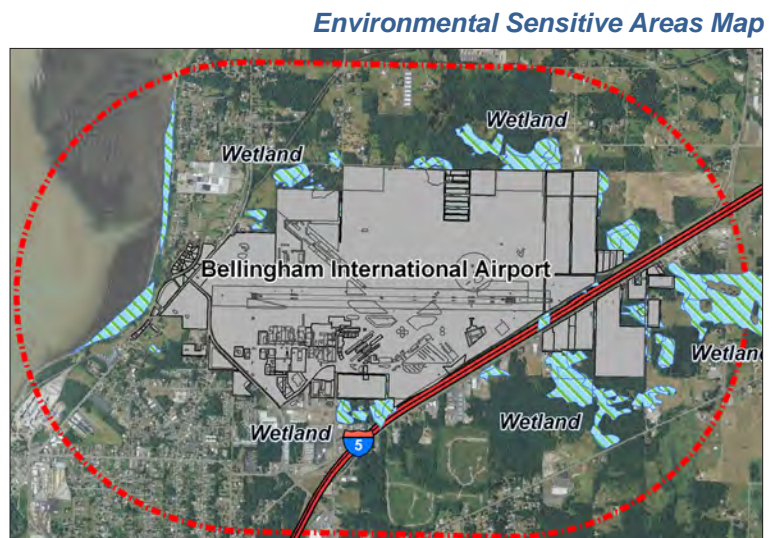
An Existing Land Use map

demonstrates the current utilization of an area. For example, an area may be zoned for a use, such as residential, but only 20 percent of the area may be actively developed for it. These map may also identify important features such as hospitals, school K-12, day cares, sporting arenas, adult care facilities, above ground storage of hazardous or flammable materials, and libraries. Existing land use maps are available through your local jurisdiction.



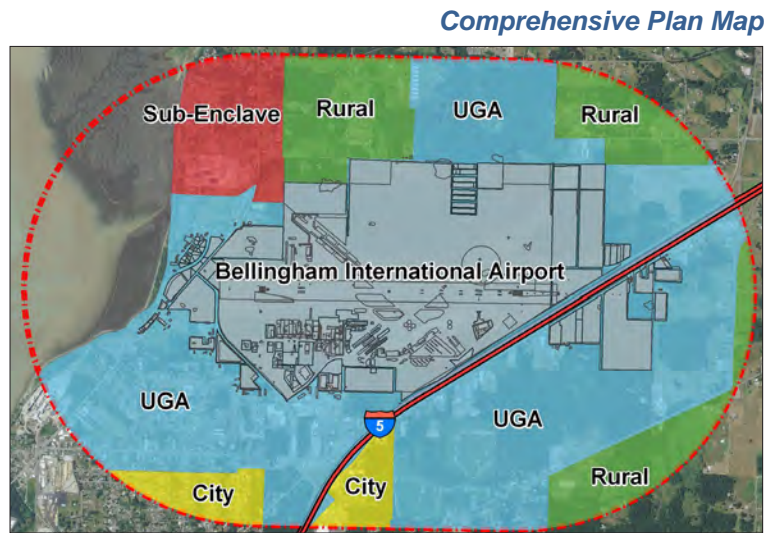
An Environmental Sensitive Areas map

is a graphic representation of our natural surroundings. Maps may depict natural features, geological hazard, shorelines, flood plains, wetlands, flora, soil types, aquifers, and fish and wildlife habitat. The GMA contains a provision requiring cities and counties to designate and take measures to protect natural areas of critical ecological value.



A Comprehensive Plan Map

is a graphic representation of a community's current and future vision for itself. These maps designate areas appropriate for different uses. These uses may include residential, commercial, industrial, agricultural, mixed use, forest resources lands, and historic districts.



The Municipal Research Center is a private, non-profit organization that has comprehensive plans and zoning ordinances available at: www.mrsc.org/codes.aspx#city

What is the ambient noise level? It is the background noise level absent identifiable individual sounds. Knowing this level is important because noise is usually experienced differently in a quiet, rural setting than in a bustling commercial center or noisy industrial area.

Comprehensive plans guide regulations and development decisions within the airport’s influence area, so be sure to inventory applicable goals and policies that affect development adjacent to the airport. Applicable goals and policies are often found in the comprehensive plans’ land use, transportation, and capital facilities elements. Be sure to check with your local planner regarding any applicable sub area plans.

**WHATCOM COUNTY
COMPREHENSIVE PLAN**

January 2010

Whatcom County Executive
Pete Kremen

Whatcom County Council

| | |
|-----------------|----------------|
| Barbara Brenner | Kathy Kershner |
| Bill Knutzen | Ward Nelson |
| Sam Crawford | Carl Weimer |
| Ken Mann | |

Whatcom County Planning Commission

| | |
|---------------|--------------|
| John Belisle | Jean Melious |
| Rabel Burdge | Jeff Rainey |
| Michelle Luke | Rod Erickson |
| John Lesow | Gary Honcoop |

Whatcom County Planning and Development Services Department
David Stalheim, Director

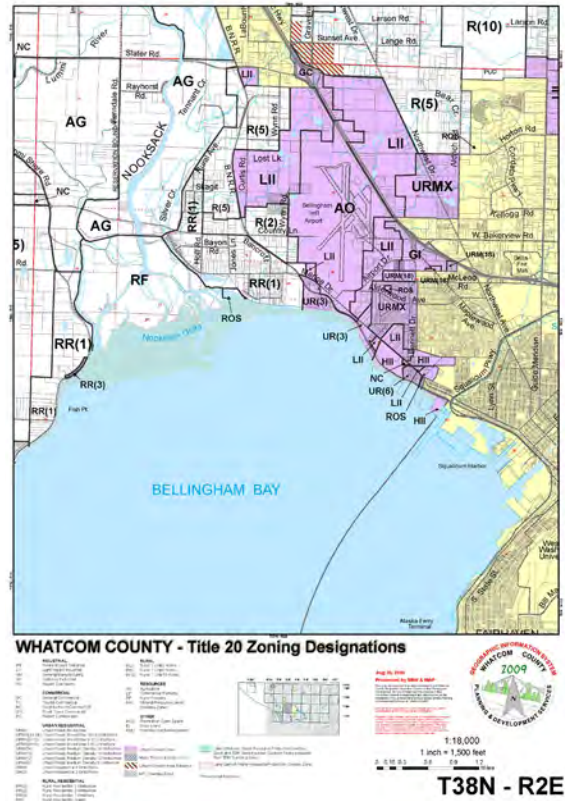
Planning Division

| | |
|----------------------------|----------------------------|
| Wain Harrison, Supervisor | Samya Lutz, Planner I |
| Matt Aamot, Senior Planner | Alex Clearthous, Planner I |
| Gary Davis, Senior Planner | Michelle Stiles, Planner I |
| Erin Osborn, Planner II | Becky Boxx, Coordinator |
| Kate Koch, Planner II | |

Whatcom County Planning and Development Services Department
Planning Division
Northwest Annex
5260 Northwest Road
Bellingham, Washington 98226-9094
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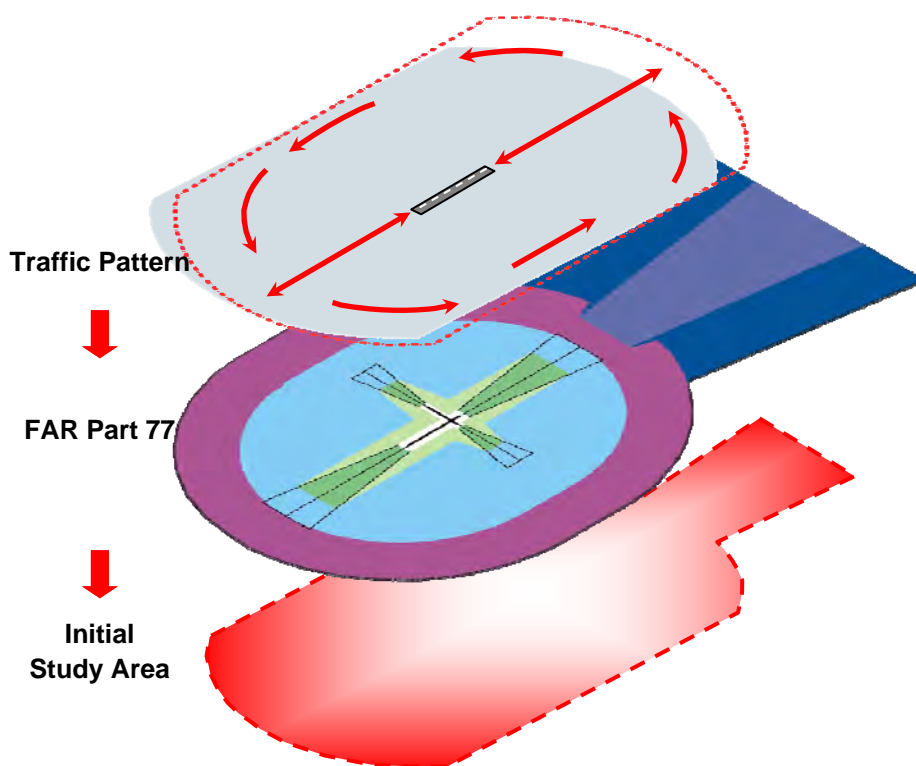
Applicable zoning ordinances and zoning maps, including airport overlay, should be assembled. Zoning ordinances define the categories, uses, and standards of development permitted within a particular land use designation. The zoning map demonstrates the spatial distribution of the zoning classifications. These ordinances typically categorize land uses into several different classifications. Usually included are residential, commercial, industrial, institutional/governmental, parks/open space, and agricultural.

Zoning Map



Initial Study Area

To determine the area necessary for your initial land use compatibility planning study, use the airport's traffic pattern and FAR Part 77 *Imaginary Airspace Surfaces*. In most cases, these aeronautical factors will identify areas where normal aircraft operations occur and where conflict could potentially arise. The initial study area will be used in the following step to identify the airport influence area and access impacts associated with normal airport operations.



Step 1: Products

- Creation of a compatibility planning working group.
- Findings that outline your airport land use compatibility planning responsibilities under state law.
- Understanding of the airport's context within the community, state, and nation.
- Inventory of airport facilities, activities, and services for use in subsequent land use compatibility planning steps and in the transportation element of the comprehensive plan as well as the capital facilities element, when applicable.
- Summary of data regarding compatible and incompatible land uses around the airport.
- The initial study area for land use compatibility planning.

Step 2: Delineate the Airport Influence Area

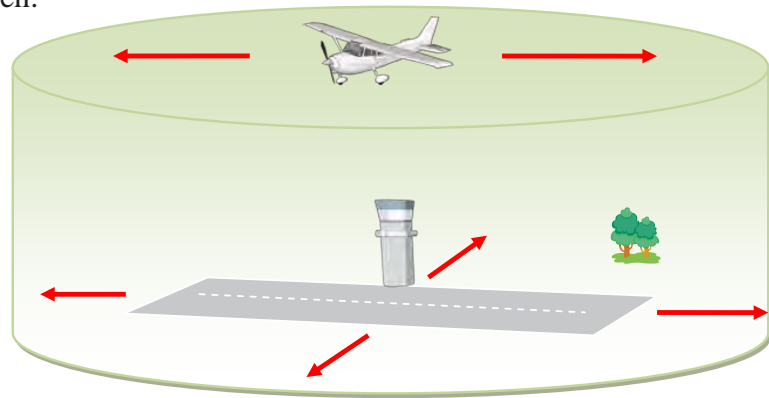
Now that you have learned about the airport and its setting and have created a framework for your planning process, the next step is to define the area you need to consider for addressing land use compatibility. This is the airport influence area. How do you determine the size of the influence area? The boundaries differ for each airport based on its unique characteristics. The key is to think about all areas where existing or future aircraft operations at the airport may interfere with the development and use of the land, as well as where land uses can impair the development and use of the airport. The most significant effects are direct physical impacts such as those brought about by noise or tall structures.



For tips on how to identify and assess the airport influence area, see [Appendix C](#).

You will know you have been successful when:

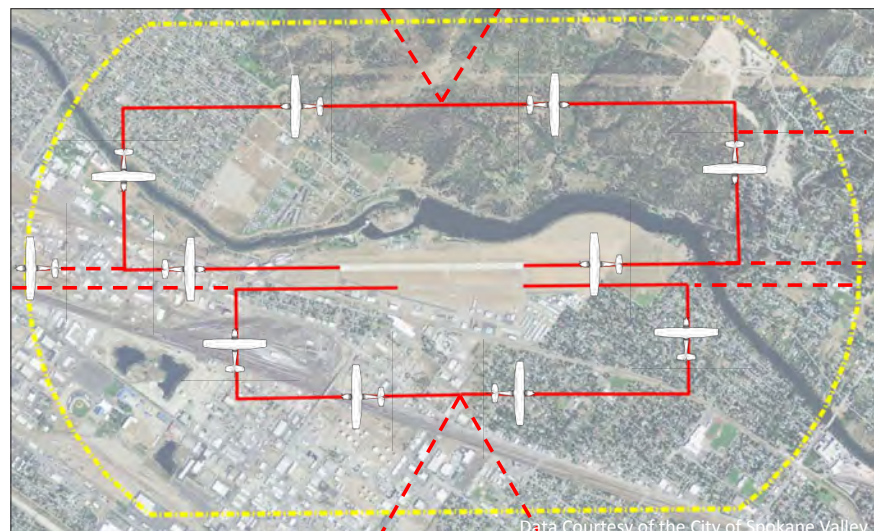
- You can define the airport influence area, traffic pattern, airspace protection, and safety impacts of the airport and know what areas in the airport environs are affected.
- You have designated an airport influence area.



What is the airport influence area?

An airport’s influence area is the area within which the airport’s impacts may adversely affect the use of land or the land uses may adversely affect development and use of the airport. To avoid airport land use compatibility conflicts, certain types of land uses should be encouraged, while other should be avoided. Some land uses may also require various degrees of restriction to encourage and promote compatible land use development within the airport influence area. If an airport expands or changes its functions so that new impacts on surrounding land uses are created, then the community and airport should work cooperatively to mitigate these impacts.

Felts Field’s Traffic Pattern

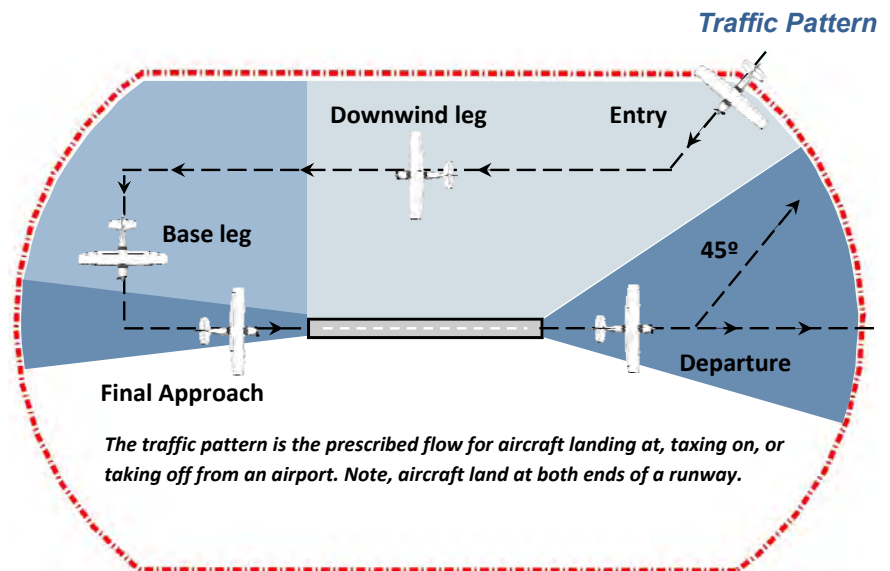


For tips on how to identify and assess the airport's traffic pattern and fleet mix, see [Appendix C](#).

Although airports and surrounding land uses each have effects on the other, the delineation of an airport influence area is driven primarily by aeronautical factors. To a lesser degree, topography may also be a factor. The airport influence area should not be drawn to deliberately include or exclude a particular land use. It should be drawn based on where the airport's impacts occur. Start with the initial study area identified in [Step 1](#), and delineate the airport influence area by assessing the following:

- Aircraft operations.
- Topography.
- Impacts of noise, light, vibration, and low-flying aircraft.
- Historic accident data.
- Interviews with aviation stakeholders.
- Flight tracks or radar tracks (if available).

For tips on how to identify and assess the airport influence area, see [Appendix C](#).



Phases of flight within the traffic pattern generally consist of the entry, downwind leg, base leg, final approach, and departure. The width of typical general aviation airport's traffic pattern is generally 5,000 feet. Individual aircraft flight tracks within the traffic pattern will vary according to aircraft performance, wind, weather, piloting technique, topography, and aircraft weight. It is critical to understand that aircraft operate in a dynamic environment. They all do not fly along the same euclidian path. Planners should contact airport managers, staff, pilots, and FBO to gather additional information on the operational characteristics of their community airport

As indicated in [Chapter 1](#), four types of impacts are of concern in airport land use compatibility planning—noise, airspace protection, safety, and aviation affects within the airport influence area. To determine the size and shape of the airport influence area, the geographic extent of each of these impacts must first be determined. A typical influence area for a general aviation airport will extend approximately one mile in all directions from the airport runways, but can be larger or smaller depending on the airport traffic pattern and approach characteristics. Busy airports and ones that have instrument approach capabilities will usually have a larger airport influence area.

Seaplane Bases

What should be considered when determining the airport influence area for seaplane bases?

- Location and alignment of the area used for takeoffs and landings.
- Any areas along the standard arrival and departure routes where aircraft will be below 1,000 feet AGL.
- Estimates of how often different routes are used.
- FAR Part 77 *Imaginary Surfaces*.
- Land-based services areas.

The primary difference between sea and land airports is in defining the takeoff and landing area. It is much less clearly defined for seaplane facilities. Once defined, however, the same compatibility planning factors apply as for land airports.

What are the airport’s impacts on surrounding land uses?

Impacts Within the Airport Influence Area

Noise, vibration, light, fumes, and low-flying aircraft are the primary impacts of the airport influence area. The key to assessing these impacts is knowing where aircraft fly as they use the airport. However, because aircraft do not all fly in exactly the same places or at the same altitude, obtaining this information can prove challenging. Airport managers and pilots, particularly flight instructors, will usually be your best sources for flight track and overflight area information.

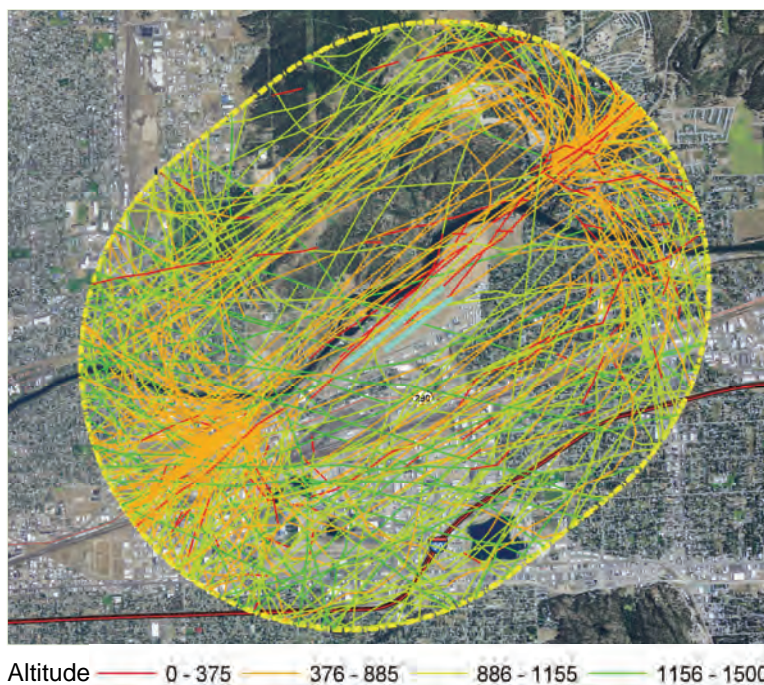
If your airport is located near a large airport that has a control tower, you might be able to get actual radar track data from its radar facility. “Near” can be 50 miles away or more, provided that no high terrain is situated between the two airports.

For more information on the aircraft operations and impacts, see [Appendix C](#).

Establish Airspace Corridor Kenmore Air SPB



Felts Field Aircraft Operations by Altitude



Noise Complaint History – Scottsdale Airport, Arizona

| Year | Annual Operations | Number of Noise Complaints |
|------|-------------------|----------------------------|
| 1967 | 10,000 | Not measured |
| 1985 | 170,000 | 834 |
| 1998 | 210,000 | 570 |
| 2003 | 190,000 | 8,719 |

This data from Scottsdale Airport, Arizona, illustrates the point that noise complaints are usually more closely related to development patterns than to the volume of aircraft operations. As residential development encroached on the airport, the number of complaint increased more than ten-fold. Meanwhile, the airport had taken major steps to limit noise impacts and make submitting complaints easier.



Once you have mapped the flight routes, your next challenge is to decide what overflights are significant. For a typical general aviation airport, the airport influence area should at a minimum include the normal traffic pattern and adjacent locations regularly overflowed by aircraft as they enter or leave the pattern. If the airport has instrument approach procedures, a more extended area may be affected by aircraft flying at altitudes below that of the normal traffic pattern. Also, faster airplanes—primarily turbo-props and business jets—tend to fly wider and longer patterns than slower, single-engine propeller planes. Helicopters fly a much lower pattern and have a higher noise footprint than most aircraft.

The noise levels produced by individual aircraft overflights also may be a useful determinant of the overflight area boundary. The difficult issue, though, will be to decide what noise level is significant. Aircraft, particularly jets, can generate peak outdoor noise levels high enough to interfere with speech communication a surprising distance from the airport—potentially many miles.

Another factor to consider when determining the extent of the airport influence area is the geographic distribution of noise complaints. Although only the busiest airports usually maintain complaint logs, most airport managers will be able to describe hot spots for noise complaints. It is interesting to note that complaints do not usually come from the most impacted areas, as people in those locations expect to be affected. Rather, the annoyance that underlies complaints usually result from unusual activity or single noise events. Concentrations of complaints from certain areas may suggest that something happening there is causing an identifiable impact. On the other hand, scattered complaints from locations beyond where aircraft normally fly are probably just random events that need not be considered in delineating the overflight impact area.

¹Cumulative noise exposure itself is a far from a perfect predictor of annoyance. A single noise event, produced by an individual aircraft at a particular point, can be perceived by some as intrusive and cause conflict between neighbors.

¹ *The Schultz Curve 25 years Later: A Research Perspective*, Sanford Fidell

Noise Impacts

When we talk about airport noise impacts, we are referring to noise levels that range from noise that cause environmental impacts to noise levels that are an irritant. Noise can disrupt the normal activities of people and sometimes animals as well. As indicated in [Chapter 1](#), for some airport land use compatibility planning purposes, we often measure these impacts in terms of DNL contours. DNL is a cumulative measure of noise that takes into account both the loudness of noise events and how often they occur. The lowest DNL at which impacts to noise-sensitive land uses, particularly residential uses, become significant depends upon airport characteristics, ambient noise levels in the surrounding community, and other factors. As a general rule, it is up to the communities to set thresholds for determining compatibility criteria by using the framework of Washington State law and both state and federal guidance.

Some significant thresholds to consider when establishing noise compatibility criteria for new development near your airport may include 50, 55, or 60 dB. For most general aviation airports, including ones with limited airline activity.

In each of these scenarios, there may be instances in which the respective noise barely reach beyond the airport boundaries. These circumstances should not be taken as a sign that the airport has no noise-related impacts. Noise and single event noise,—which are an important component of the airport influence area—will still occur and be disruptive over a wider area. Especially in quiet communities, noise impacts should be given substantial weight in land use planning around airports.

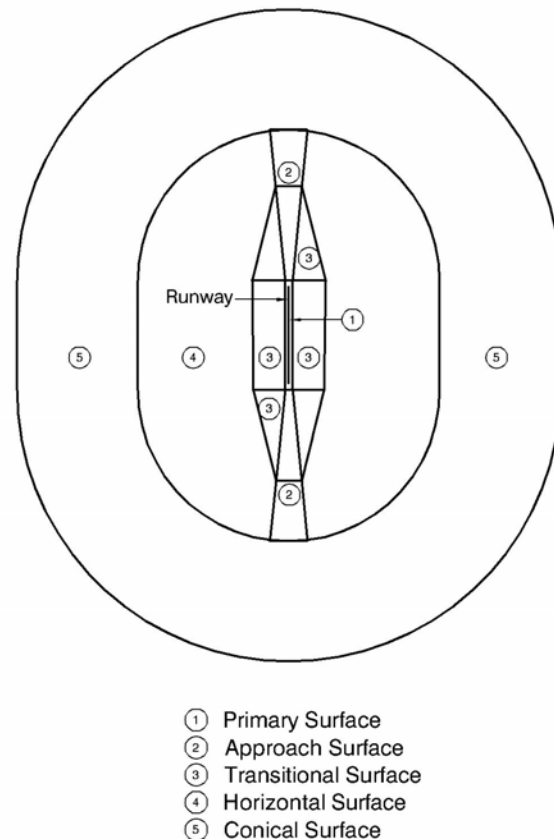
Airspace Protection Requirements

As noted in [Chapter 1](#), airspace protection requirements address land use features that can cause or contribute to aircraft accidents. Most critical among such hazards are tall objects that penetrate the navigable airspace around an airport. However, other physical, visual, and electronic land use features can also create airspace hazards. FAA standards dictate the boundary of the area required for airport airspace protection.

With respect to tall objects that may affect the airport navigable airspace, the requirements are defined in Federal Aviation Regulations (FAR) Part 77 *Objects Affecting Navigable Airspace*. A map showing the airport’s airspace “imaginary surfaces” is usually prepared as part of the airport master plan or included with the set of airport layout plan drawings. If this map is not available, then one will need to be created.

The TERPS surfaces used in the design of instrument approach procedures (see [Chapter 1](#)) also may be critical at some airports. TERPS surfaces are highly complex, however, and take special expertise to draw. Moreover, any changes to an instrument approach procedure—whether because of new technology or a new obstruction—likely will result in changes to the

FAR Part 77 Imaginary Surfaces



surfaces. Generally, you can rely on the FAR Part 77 *Surfaces* for compatibility planning, but make sure that the project applicant submits Form 7460 to the FAA as required by federal law (see [Step 6](#)) for any proposed object near the airport that meets the notification requirements, particularly if the object will be taller than its surroundings.

The FAA also has criteria defining how close landfills and other uses known to attract birds should be allowed near airports. For visual hazards such as smoke or glare and electronic hazards that can disrupt aircraft communication or navigation, the criteria are less precise. These types of conflicts can be site specific and often are only addressed after they arise.



See these FAA documents for more information:

Federal Aviation Regulations Part 77 (14 CFR Part 77), Objects Affecting Navigable Airspace
http://ecfr.gpoaccess.gov/cgi/t/text/textidx?c=ecfr&sid=cef54e5ded0ce244bbfe6ec32f6a63e8&tpl=/ecfrbrowse/title14/14cfr77_main_02.tpl

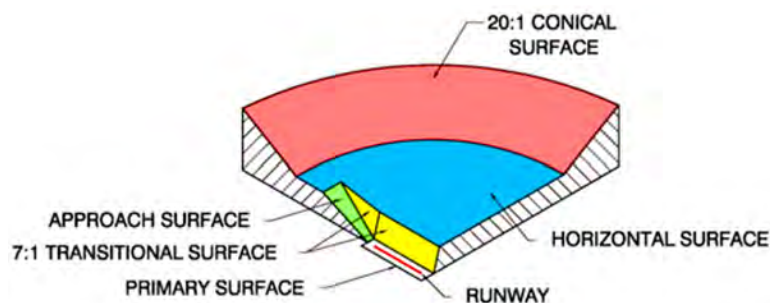
Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants On or Near Airports
www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.information/documentnumber/150_5200-33b

Historical Accident Locations

Under this heading, we are concerned with the historical pattern of aircraft accidents and the consequences that result when something causes an aircraft flight to end at a location other than on a runway. Our concern is primarily for the people and property on the ground near airports, but potential consequences for the occupants of aircraft are important as well. The consequences can range from fatal accidents to successful emergency landings where no one is hurt and little or no damage occurs—and the outcome often depends upon land use characteristics at the point where the aircraft lands.

Safety is a difficult compatibility impact to measure. Unlike noise impacts, which occur to some degree with every aircraft flight, safety deals with events that happened only occasionally and with much less predictability than noise. To get a handle on what might happen if an accident occurs, we look at what has happened in the past. In particular, we are interested in where accidents have occurred relative to the airport runway. Locations where accidents have historically been most concentrated represent the places where land use compatibility measures to reduce the potential consequences are most essential.

FAR Part 77 Imaginary Surfaces Cut Away



Davenport, Washington



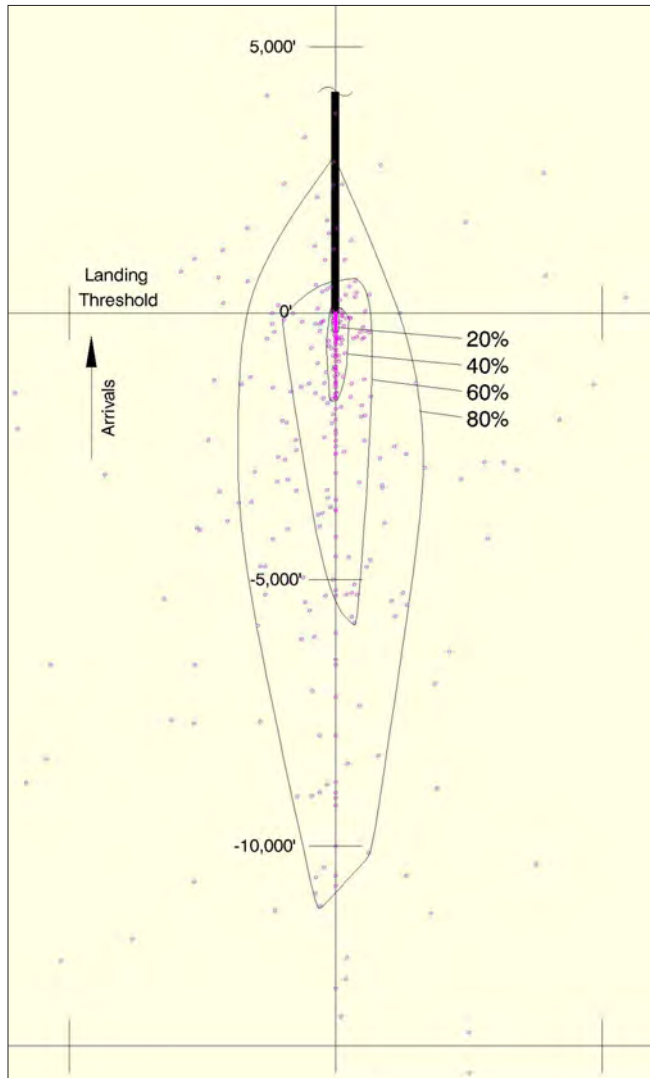
Remember WSDOT's compatibility zones address noise, safety, height hazards and land use to meet the requirements of Washington State law while California's safety zones primarily address safety.

To date, the most comprehensive examination of the topic of accident locations is contained in the 2002 edition of the *California Airport Land Use Planning Handbook* published by the California Department of Transportation Division of Aeronautics. The California handbook uses the general aviation accident scatter diagrams described in [Appendix E](#) of this guidebook to identify sets of up to six safety zones. The sizes and shapes of the safety zones reflect varying degrees of aircraft accident concentrations and also take into account the manner in which aircraft fly as they land and takeoff (where they fly and turn and the altitude at which they normally would be). Different safety zone sizes and shapes are suggested depending upon the runway length and type of aircraft presumed to use the runway.

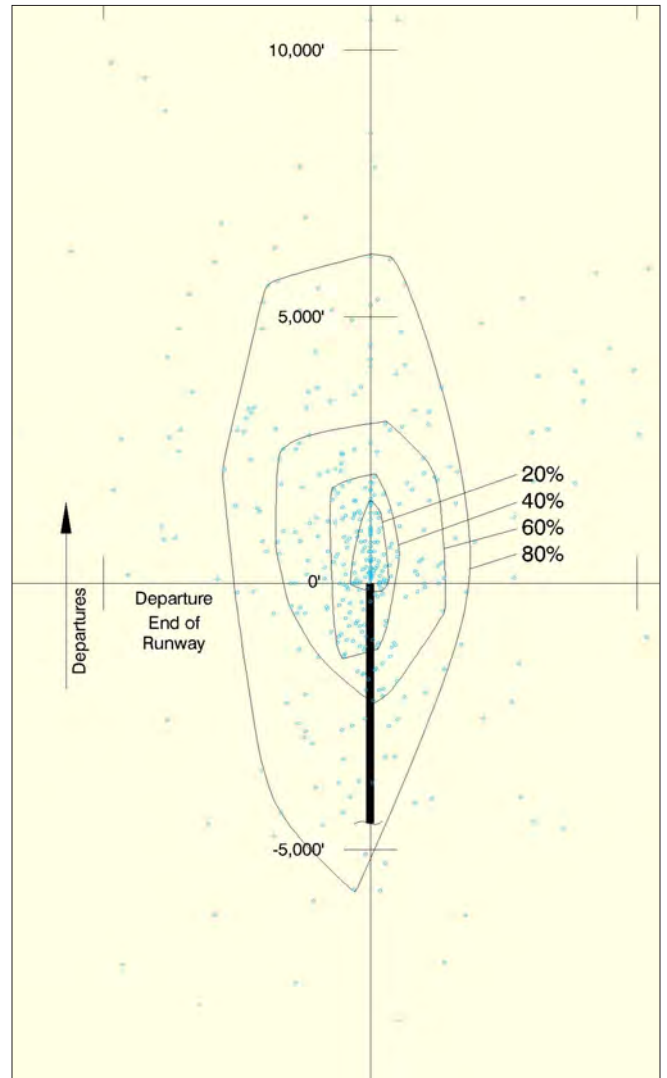
Most critical among the safety zones is Zone 1, which encompasses the runway protection zone (RPZ) and land along the edges of the runway. RPZs are where the highest concentrations of off-runway accidents take place. FAA standards define the dimensions of RPZs and the criteria for land uses within them. The function of RPZs is “to enhance the protection of people and property on the ground.” The FAA encourages airports to control the land uses in RPZs, preferably through acquisition of the property though easements or zoning may suffice. When owned by the airport, the center portion of the RPZ must be clear of all objects (except certain navigational facilities) and only very-low-intensity uses such as automobile parking are acceptable elsewhere. These standards are strongly recommended even when the RPZ is not fully on the airport.

While Safety Zone 1 contains the highest concentration of historical accident points, data from the *California Airport Land Use Planning Handbook* indicates that only about 20 percent of off-runway, near-airport accidents occur in this area. Significant accident potential thus exists in other parts of the airport environs—it is just more dispersed. Of the other zones, Safety Zone 2 is most important as it encompasses the second highest concentration of accident points. The concentrations in the other zones diminish from there. Land use compatibility criteria for each safety zone should be set in accordance with these relative concentrations of accidents. The greatest restrictions should apply within Safety Zone 1 and reduced limitations farther from the runway ends.

General Aviation Accident Distribution Contours



All Arrivals



All Departures

Source: California Airport Land Use Planning Handbook (2002)

| Zone | Example 1: Runway Length Less than 4,000 Feet | | | Example 2: Runway Length 4,000 to 5,999 Feet | | | Example 3: Runway Length 6,000 Feet or More | | | |
|---------------------------------------|---|-------|--------|--|-------|--------|---|-------|--------|--|
| | % of Points | Acres | %/Acre | % of Points | Acres | %/Acre | % of Points | Acres | %/Acre | |
| Arrival Accident Sites | | | | | | | | | | |
| Primary Surface | 29% | — | — | 2% | — | — | 11% | — | — | |
| Zone 1: Runway Protection Zone | 27% | 8 | 3.35 | 26% | 49 | 0.53 | 25% | 79 | 0.32 | |
| Zone 2: Inner Approach/Departure Zone | 15% | 44 | 0.34 | 9% | 101 | 0.09 | 12% | 114 | 0.11 | |
| Zone 3: Inner Turning Zone | 2% | 50 | 0.04 | 5% | 151 | 0.04 | 6% | 131 | 0.05 | |
| Zone 4: Outer Approach/Departure Zone | 3% | 35 | 0.07 | 5% | 69 | 0.08 | 8% | 92 | 0.09 | |
| Zone 5: Sideline Zone | 1% | — | — | 3% | — | — | 1% | — | — | |
| Zone 6: Traffic Pattern Zone | 10% | — | — | 11% | — | — | 21% | — | — | |
| Total: Zones 1-6 + Primary Surface | 87% | — | — | 79% | — | — | 85% | — | — | |
| Departure Accident Sites | | | | | | | | | | |
| Primary Surface | 9% | — | — | 9% | — | — | 16% | — | — | |
| Zone 1: Runway Protection Zone | 17% | 8 | 2.09 | 14% | 49 | 0.28 | 13% | 79 | 0.17 | |
| Zone 2: Inner Approach/Departure Zone | 28% | 44 | 0.63 | 11% | 101 | 0.11 | 3% | 114 | 0.02 | |
| Zone 3: Inner Turning Zone | 5% | 50 | 0.10 | 9% | 151 | 0.06 | 8% | 131 | 0.06 | |
| Zone 4: Outer Approach/Departure Zone | 2% | 35 | 0.06 | 4% | 69 | 0.06 | 3% | 92 | 0.03 | |
| Zone 5: Sideline Zone | 8% | — | — | 8% | — | — | 5% | — | — | |
| Zone 6: Traffic Pattern Zone | 24% | — | — | 37% | — | — | 39% | — | — | |
| Total: Zones 1-6 + Primary Surface | 94% | — | — | 91% | — | — | 86% | — | — | |
| All Accident Sites | | | | | | | | | | |
| Primary Surface | 18% | — | — | 15% | — | — | 13% | — | — | |
| Zone 1: Runway Protection Zone | 21 % | 8 | 2.65 | 21% | 49 | 0.40 | 20% | 79 | 0.26 | |
| Zone 2: Inner Approach/Departure Zone | 22% | 44 | 0.50 | 10% | 101 | 0.10 | 8% | 114 | 0.07 | |
| Zone 3: Inner Turning Zone | 4% | 50 | 0.08 | 7% | 151 | 0.05 | 7% | 131 | 0.05 | |
| Zone 4: Outer Approach/Departure Zone | 2% | 35 | 0.07 | 5% | 69 | 0.07 | 6% | 92 | 0.07 | |
| Zone 5: Sideline Zone | 5% | — | — | 5% | — | — | 3% | — | — | |
| Zone 6: Traffic Pattern Zone | 18% | — | — | 23% | — | — | 29% | — | — | |
| Total: Zones 1-6 + Primary Surface | 91% | — | — | 85% | — | — | 85% | — | — | |

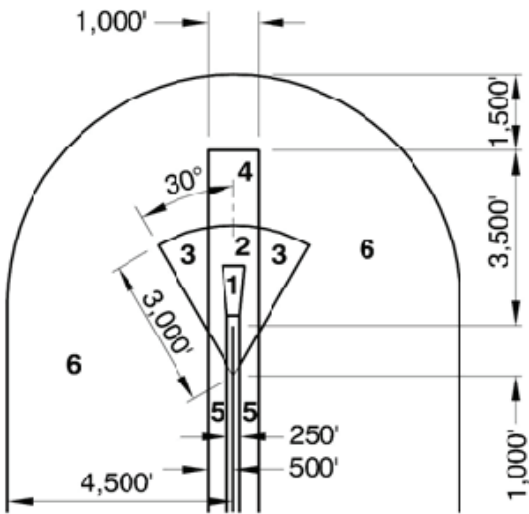
Notes:

- Totals may not equal the sum of the numbers above because of mathematical rounding.
- Accident site locations as indicated in expanded general aviation aircraft accident database.

Source California Airprot land Use Planning Handbook (2002)

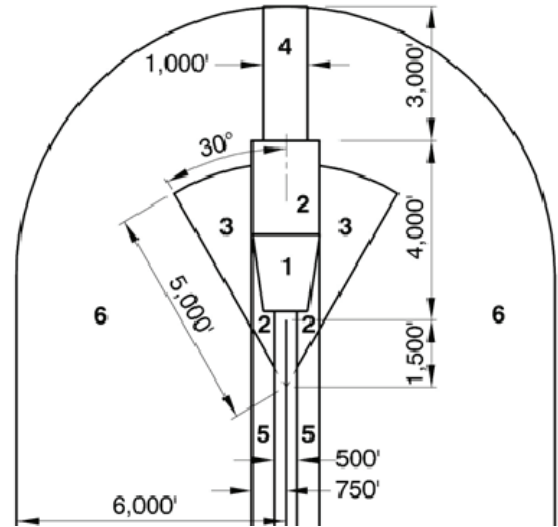
Example 1:

Runway Length Less than 4,000 Feet

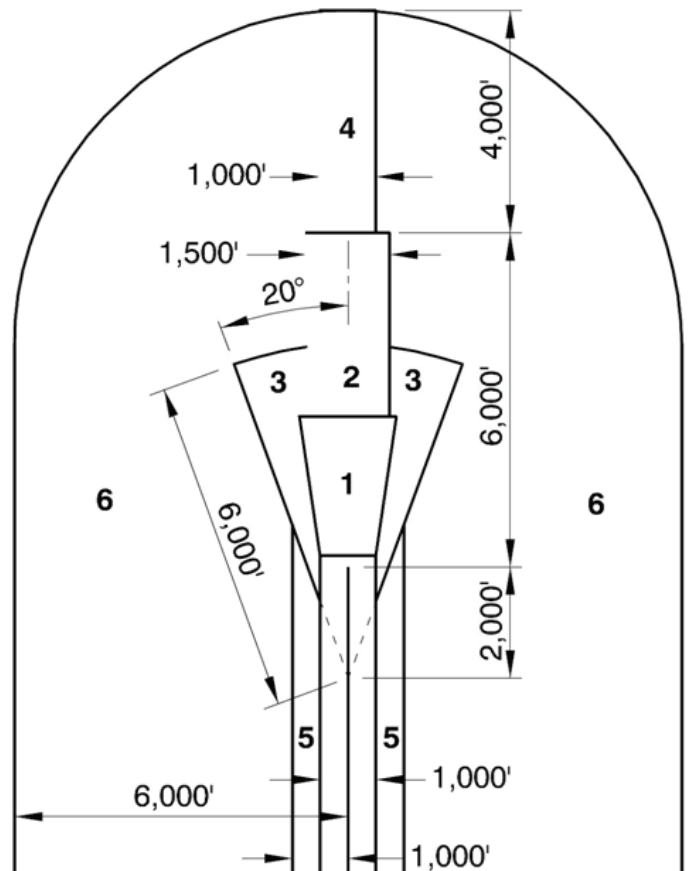


Example 2:

Runway Length 4,000 Feet to 5,999 Feet



*Accident data and zone geometries are based upon the California's Airport Land Use Planning Handbook for public use airports.



Source California Airport Land Use Planning Handbook (2002)

📖 FAA Advisory Circular 150/5300-13 is available online at: www.faa.gov/airports/resources/advisory_circulars/

📖 National Transportation Safety Board website at: www.nts.gov/ntsb

Step 2: Products

- Map the airport traffic pattern and airport approach/departure areas for the different types of aircraft using the airport.
- Map of aircraft flight impact area and in applicable cases noise contours.
- Use data identifying potential historic accident locations.
- Airport airspace map showing FAR Part 77 *Imaginary Surfaces and Elevations*.
- Delineate the airport influence area.

Step 3: Identify Compatibility Concerns

You have set a foundation that described key information about your airport and community. You have also identified the airport influence area that is relevant. Now it is time to examine the level of compatibility in your community. This step will help you understand the various issues involved in determining compatibility.

You will know you have been successful when:

- You have determined the compatibility status of existing land uses in the airport influence area.
- You have identified potential compatibility conflicts that could arise from future development.
- You have identified the particular compatibility concerns that will require further review in the next step.



What is the land use character of the airport influence area?

Once you have identified the influence area, the next step is to understand the land use conditions within that area. What are current land uses? What types of development are allowed under existing development regulations? The following factors should be taken into account when assessing existing conditions in the airport influence area:

Dorothy Scott Municipal Airport



New residential development adjacent to Dorothy Scott Municipal Airport

“Density” vs. “Intensity”

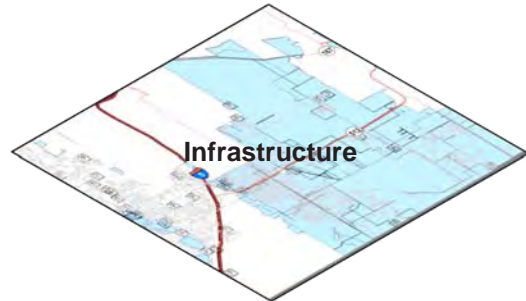
As used for airport land use compatibility purposes, “density” refers to residential development and is measured in dwelling units per acre. “Intensity” applies to nonresidential uses and is measured in people per acre.

Create a series of maps to support your inventory of the influence area. Pay special attention to vacant or agricultural lands planned for development. Also identify areas where redevelopment could result in greater residential densities or nonresidential intensities.

- **Existing Land Uses** – Describe the function, condition, and height of existing structures within the airport influence area. Note typical types of uses and age of uses where possible. Also describe the residential density and nonresidential development intensity. Identify and describe vested development proposals where possible.



- **Infrastructure** – Review existing and planned infrastructure in the airport area—particularly water, sewer, major roadways—to assess what type of future development it will support.



- **Allowed Land Uses** – Describe what land uses might be allowed under a maximum build-out scenario based on current comprehensive plan policies and development regulations. Also take note of where there are large parcels that can be subdivided under current policies and regulations. Note potential density and intensity where possible.



- **Topography/Geography** – Provide a general description of land features within the airport influence area. Of particular interest are features that constrain future development: steep terrain, lakes, flood zones, environmentally sensitive habitats, etc.



What is the current compatibility status?

Although the focus of this compatibility planning process is on preventing new incompatible land uses from being created, knowing the airport's compatibility status relative to existing land uses can be helpful. Sometimes it is essential to make sure that existing problems do not become worse. In other instances, infill development similar in character to the existing uses may be reasonable. Also, knowing the current compatibility status will help you to look for opportunities where incompatible uses could be converted to more compatible ones through local policies.

[Table 2-2](#) provides a general guide to the compatibility of various uses that may be found around the airport. You will be able to make a more detailed assessment of the land use compatibility status once you have drafted specific compatibility criteria in [Step 4](#).

Now inventory the uses that exist within the airport influence area. Are these uses clearly compatible or incompatible with the airport? Flag the uses that could potentially be incompatible or that you are uncertain about.

Use [Worksheet 3A](#) to summarize your information.

To the extent that land uses are compatible with the airport, you will want to ensure that policies are in place to continue that status. This is especially true in locations on the edge of urban areas where pressures are greatest for conversion of agricultural lands to urban uses. Airport compatibility must be considered when drawing or modifying urban growth area boundaries. As for existing incompatibilities, there may not be a lot that can be done to remedy them, but some actions may be possible. For example:

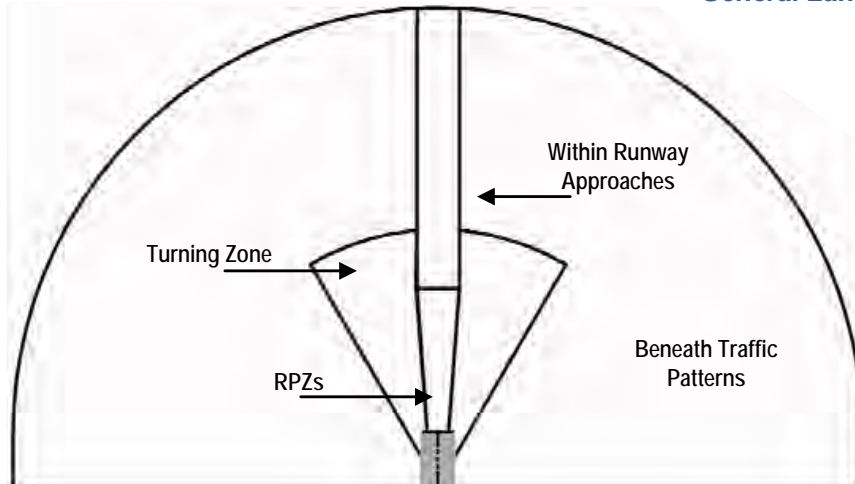
- Are there areas that may be transitioning to other uses or exhibit mixed-use character near the airport where industrial or other compatible uses can be encouraged and incompatible uses phased out?
- Are there prospects that the airport could obtain federal or state funds to influence or buy the most highly impacted lands close to the runway ends and convert the areas to compatible uses?
- Can the airport obtain funds to install sound attenuation in noise-impacted residences and schools in locations where conversion to other uses is impractical? This option would be available only to the busiest airports with considerable jet traffic.



Mixed-use development may be appropriate depending where it is located and what type of uses are involved. A good mixed-use development might include offices, retail, and multi-family residential.



Table 2-2
General Land Use Acceptability



| | Airport Proximity: | RPZ | Within Runway Approaches | Turning zone | Beneath Traffic Patterns |
|-------------------------------|--|---|---|---|---|
| | In General... | Only low heights and few or no people. | Limited building height and number of people; no noise-sensitive uses. | Limited building height and number of people; no noise-sensitive uses. | No noise sensitive uses. |
| | Agricultural | Compatible if not wildlife attractant or produces airspace obstructions. | Compatible if not wildlife attractant. | Compatible if not wildlife attractant. | Compatible if not wildlife attractant. |
| | Power Plants/ Transmission Lines/Roads | Generally incompatible. | Compatible if does not produce airspace or visual obstructions. | Compatible if does not produce airspace or visual obstructions. | Compatible. |
| | Parks/Recreation | Incompatible. | Compatible if low intensity. | Compatible if low intensity. | Compatible. |
| | Stadiums | Incompatible. | Incompatible. | Incompatible. | Generally incompatible. |
| Typical Land Use Types | Industrial | Compatible if low-activity, warehousing, mini-storage, etc., provided the use does not produce airspace obstructions. | Compatible if does not produce airspace obstructions or have bulk amounts of hazardous materials. | Compatible if does not produce airspace obstructions or have bulk amounts of hazardous materials. | Compatible if does not produce airspace obstructions. |
| | Retail/Service Uses/Mixed Use | Incompatible. | Compatible only if low intensity. | Compatible. | Compatible. |
| | Dining/ Entertainment | Incompatible. | High-intensity and outdoor areas incompatible. | Outdoor areas generally incompatible. | Outdoor areas generally incompatible. |
| | Offices/Industrial Parks | Incompatible. | Compatible if low intensity. | Compatible. | Compatible. |
| | Places of Worship | Incompatible. | Incompatible. | Generally Incompatible. | Compatible if low intensity. |
| | Residential | Incompatible. | Incompatible. | Incompatible. | Generally incompatible. |
| | Schools K-12/Day Care Centers | Incompatible. | Incompatible. | Incompatible. | Incompatible. |
| | Hospitals/Nursing Homes | Incompatible. | Incompatible. | Incompatible. | Incompatible. |

What potential compatibility conflicts are on the horizon?

Here is where your efforts stand to reap the greatest benefits in terms of enhancing airport land use compatibility. Questions you should ask include:

- Where could uses allowed by current plans and zoning be developed, yet potentially be incompatible with the airport?
- Are there plans to extend utilities, roads, and other infrastructure into an area to support development that would be incompatible with the airport?
- Are there locations within the airport influence area where redevelopment is planned? Will the redevelopment result in uses that would be incompatible because of density/intensity, noise, height, or other factors? Can the redevelopment be directed toward uses that are compatible with the airport?
- Are there vacant or underdeveloped sites that have infill development potential within these areas? Would such development be too incompatible with the airport to consider or could it be acceptable given the character of the surrounding land uses?
- To what extent can reuse of existing buildings result in more intense occupancy? Can a vacant building shell be used in a manner that might be incompatible with the airport? For example, can an office or religious institution go into a building originally planned as industrial or warehouse space?
- What controls do you have over the heights of cell towers, antennas, and other buildings or structures that could be airspace obstructions?

Use [Worksheet 3B](#) to understand how the jurisdiction's plan for future development in the airport influence area will affect compatibility concerns: increase, decrease, or remain the same? Identify issues that have the potential to become conflicts in the future.



What compatibility concerns need to be addressed?

Now, list in [Worksheet 3C](#) the specific issues that must be addressed to ensure that development of incompatible land uses is avoided in the airport influence area. You will use this list in [Step 4](#).



Step 3: Products

- List of current community policies affecting land use development in the airport influence area.
- Evaluation of current compatibility status.
- Identification of potential future compatibility conflicts.
- List of specific compatibility issues to be addressed by new policies.

Remember to take into account future expansion plans for the airport as identified in an airport master plan or airport layout plan.

Be sure to look forward at least 20 years when evaluating the implications of airport impacts. To what extent will the community grow over this time period? Are there compatibility concerns that may arise in the long range that may not be evident from a short-term perspective? These issues may be particularly significant for airports whose influence area includes lands near urban growth boundaries.

Step 4: Develop the Comprehensive Plan

Steps 1 through 3 led you through the research and analysis needed to describe and assess the interactions between airports and surrounding land uses. You now know what constitutes compatible land uses around your airport and have identified key challenges to prevention of more incompatible uses. What are your options for addressing those challenges? This step will help you think through the various compatibility strategies available, then evaluate and incorporate the best strategies into the draft your comprehensive plan.

You will know you have been successful when:

- You have weighed the comparative advantages and disadvantages of available planning strategies.
- You have identified preferred planning strategies.
- You have decided upon specific compatibility criteria.
- You have conducted an assessment of the airport and included information on the airport in the transportation circulation element of the comprehensive plan.
- You have fully considered airport land use compatibility measures in your comprehensive planning process and incorporated plan policies to address land use compatibility and encroachment into the draft comprehensive plan where appropriate.
- You have reviewed comprehensive plan map and circulation element and have designated land uses within the airport influence areas that are compatible with the airport and addressed land use encroachment of incompatible development.
- You are ready to circulate the proposed comprehensive plan for review and adoption.



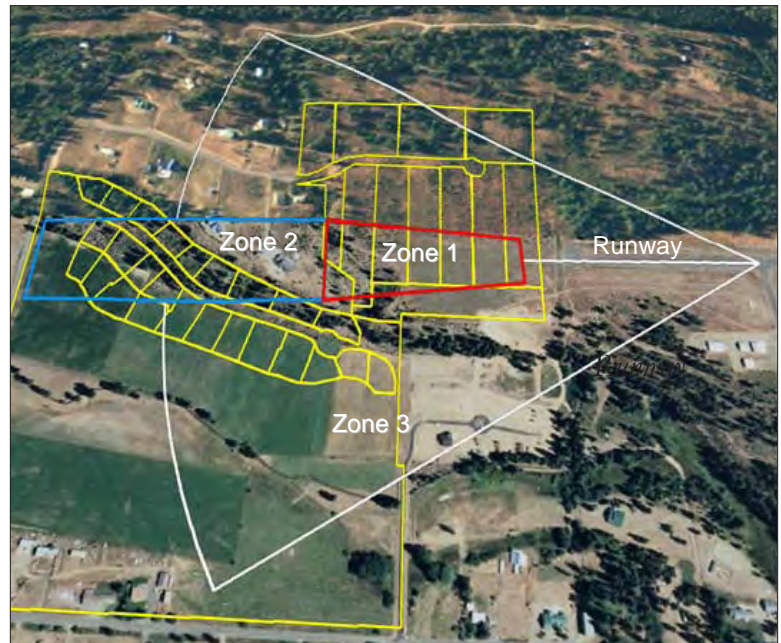
What does it mean to discourage development of incompatible land uses?

State law requires towns, cities, and counties to “adopt comprehensive plans and development regulations to discourage development of incompatible land uses adjacent to public use airports.” What does that mean to you? It means that your jurisdiction must take actions necessary to preserve investment in transportation infrastructure and protect the airport as an essential public facility.

Communities can address airport land use compatibility in a variety of ways based on the characteristics of the individual airport facility as well as numerous other factors that are unique to each location. The following two principles—developed based on WSDOT’s experience and expertise with airport land use compatibility—guide our technical assistance program:

- To discourage encroachment, communities must take proactive steps to prevent the proliferation of incompatible land uses adjacent to public-use airports. Existing conditions should be maintained or improved to prevent future incompatible development.
- To adopt effective goals, policies, and regulations, communities must conduct an assessment of airport operations, identify unique community characteristics, review best management practices, and analyze data and available research to make informed decisions that can be supported by the record.

As you begin drafting compatibility policy and map for the airport and melding those policies into the comprehensive plan for your community, you must look first at the impacts generated by the airport as identified in [Step 2](#). Your task does not stop there, however. Compatibility planning seldom takes place in a vacuum where existing land uses and future development expectations around the airport can be ignored. Policies that may be appropriate for a rural airport surrounded by farmlands are likely to be unacceptable in an urban environment. The analyses you have done in [Step 3](#) thus will significantly affect how you proceed with [Step 4](#).



What compatibility policies are already in place?

If the airport you are addressing is owned by your jurisdiction or physically located within its boundaries, chances are that your current comprehensive plan acknowledges it in some manner. If only portions of the airport influence area overlap your community's territory, then the comprehensive plan may make little or no mention of the airport's impacts. The absence of explicit compatibility policies may implicitly be a policy that allows or even promotes incompatible development.

Review the land use planning documents gathered during [Step 1](#). In [Worksheet 4A](#), list the existing comprehensive plan text, goals, policies, and development regulations affecting the airport influence area. Also note any implicit policies or land use map designations that may affect future land use compatibility.

Next, assess the effectiveness of the comprehensive plan.

- Does the plan address air transportation and provide a summary of the airport and airport operations?
- Do the current policies help prevent incompatible land use development in the airport influence area or do they tend to promote this development?
- To what extent have policies intended to prevent incompatible development been inadequate to the task? Why? Are there loopholes in the policies that allow compatibility goals to be circumvented?

Case Study: After completing a two million dollar runway and taxiway reconstruction project at a public-use airport in Washington State, the local jurisdiction approved two single family residential developments within the airport's approach.

A jurisdiction's comprehensive plan drives a community's development pattern. Good comprehensive plan policies can also promote compatible development, while poor policies can promote the proliferation of incompatible uses that inevitably limit the potential and utility of the transportation asset.

Remember the guiding philosophy of "Do no more harm." The number one goal of airport land use compatibility planning is to support continuation of existing compatible land uses around airports and prevent encroachment by new incompatible uses. Beyond that, any feasible actions that can be taken to reduce or eliminate existing conflicts are desirable as well.



- Are the policies clearly defined or are they open to a wide degree of interpretation?
- Do the current policies provide a good starting point for more detailed and thorough policies or do you need to start from nothing?
- Is comprehensive plan land use map consistent with the current policies and does it discourage incompatible land uses within the airport influence area. Are there other types of land uses that would be more appropriate and compatible with the airport?
- Does the circulation map identify the airport and airport access?

In [Worksheet 4B](#), write statements of fact that document your findings. These statements provide evidence of your work on airport land use compatibility and may be used to support adoption of policies and regulations, and may also be referenced in any proceedings of the Growth Management Hearings Board.



What strategies can be used to respond to compatibility planning challenges?

Every community faces certain challenges in planning for airport land use compatibility. In almost every case, communities must decide how to balance a range of competing interests in order to protect the airport, preserve quality of life, and meet the requirements of state law.

Avoid, minimize, and mitigate is a principle used in planning to address adverse impacts of development. This principle is a hierarchical approach—the idea is to first avoid negative impacts when possible. When it is not possible to avoid adverse effects, the second part of the strategy is to minimize the effects to the greatest degree possible. The third step, used in cases where the adverse impacts are truly unavoidable, is to mitigate the negative effects by offsetting the impacts in some way. This approach can be used in airport land use compatibility planning as well. This guidebook provides tools to empower local jurisdictions to prevent development of incompatible land uses adjacent to airports. However, where it is not possible to prevent such development, the tools may also be used to minimize and mitigate the effects.



[Table 2-4](#) lists a series of challenges you may encounter as you prepare compatibility policies and incorporate them into your comprehensive plan. For each of these challenges, the table identifies one or more basic

strategies that can be used to address these challenges. Most jurisdictions will utilize a combination of techniques to implement their compatibility programs. Note that some strategies may be appropriate for your community, while others will not be. Also, different strategies are applicable to different circumstances. Specifically, some strategies are preventative, meaning that they are designed to avoid new incompatible development. Other strategies are mitigation techniques, meaning that they are used to minimize the negative effects of incompatible development when such development already exists or is unavoidable.

These strategies are not intended to represent specific policies or criteria. Think of them more as tools. Most are discussed in [Chapter 3](#).

Which approach is right for you?

There is no single right way to approach these issues—although there are some wrong ones—and WSDOT does not endorse a particular approach for every community. Rather, what is most critical is that every community evaluate the options that are available and make informed decisions about the right course of action that will meet its stated goals and policies and uphold the requirements of the Growth Management Act ([RCW 36.70A](#)) and [RCW 36.70.547](#).

As you consider the various options for addressing compatibility challenges, think about the advantages and disadvantages for your airport and your community. How would use of each technique influence the efficacy of your airport land use compatibility program? How would the approach work in your community?

Table 2-3 rates the level of compatibility in the airport influence area. This will help you set expectations for the kinds of amendments that may be needed to achieve airport land use compatibility in your community.

Table 2-3
Compatibility Status

| | Green | Yellow | Red |
|--|--|--|--|
| Airport Influence Area Land Use Characteristics | Few opportunities for incompatible development given existing policies and regulations. | Some incompatible development already exists; some opportunity for new incompatible development based on existing policy and regulations. | Significant amount of existing and potential future incompatible development. |
| Strategy | Keep a good thing going. | Proceed with caution. | Change direction. |
| Action | Perform a review of existing land use map, policies, and regulations for key elements of compatibility. Amend comprehensive plan and development regulations as necessary for continued success. | Consider course corrections to prevent new incompatible development. Consider down-zoning or rezoning to a more compatible use to achieve airport land use compatibility objectives. | Planning as usual will not discourage incompatible land use. A new direction is needed to protect the airport. |

The next worksheet takes you through the process of evaluating various strategies available and settling on the best approaches. It is important as you evaluate each approach to remember the principles that guide airport land use compatibility planning: How does each approach serve (or detract) from these planning principles? What should the specific compatibility criteria be?



**Table 2-4
Compatibility Challenges and Strategies**

| Challenge Strategy | Strategy | | | | | | | | | | | | | | | |
|---|-----------------------------------|------------------|---------------------------|---|----------------------------------|----------------------------|----------------------------------|--|--------------------------------------|-----------------------------------|--------------------------------|--------------------------------------|---------------------------------------|--------------------------------------|--|----------------------------------|
| | Encourage Airport to Buy Property | Prohibit the Use | Limit Residential Density | Limit Usage Intensity (people per acre) | Avoid Highly-Risk Sensitive Uses | Avoid Noise-Sensitive Uses | Encourage Development Clustering | Encourage Transfer of Development Rights | Consider limited criteria exceptions | Require Preservation of Open Land | Restrict Heights of Structures | Prohibit Bird & Wildlife Attractants | Require Avigation Easement Dedication | Require Recorded Deed or Plat Notice | Recommend Disclosure During Real Estate Transactions | Establish Coordination Mechanism |
| Expansion of UGA to encompass all or part of the airport influence area is proposed | | | | | | | X | X | | X | X | | | X | X | X |
| The airport influence area encompasses all of a town or city | | | | | X | | | | X | | X | X | | | | X |
| The airport influence area encompasses multiple jurisdictions | | | | | | | | X | | | | | | | | X |
| The airport area is in a GMA and extensive new development is unavoidable | | | X | X | X | X | X | X | | | | | | X | X | |
| Airport influence area is almost completely developed and there is a demand for infill | | | X | X | X | X | X | X | | | | | X | X | X | |
| Redevelopment is planned for part of airport influence area | | | | | X | X | | | | | X | | | | | |
| Land near the airport is needed for residential development | | X | X | | | | X | X | | X | | | X | X | X | |
| There are existing residential areas near the airport and a new school is needed | | X | | X | | | | | | | | | | | | |
| The community's commercial core area is within runway approach zone | | | | X | X | | | | | | X | | X | | | |
| Some of runway protection zone is private property | X | | | X | | | | | X | X | X | X | X | | | |
| Planned new high-intensity development near runway approaches would put people at risk | | | X | X | | | | | | | | | | | | |
| Little open land remains near the airport | | | | | | | X | | | X | | | | | | |
| High terrain exceeding FAR Part 77 standards exists near the airport | | | | | | | | | X | X | X | | X | | | |
| Property is so close to runway that FAR Part 77 height criteria doesn't allow buildings | X | X | | | | | X | | X | | | | X | | | |
| Tall buildings could be located near the airport | | X | | | | | | X | | | X | | X | | | |
| Cell towers and antennas are not restricted in the airport environs | | X | | | | | | | | | X | | X | | | |
| Existing uses in the airport area attract birds or other wildlife | | | | | | | | | | | | X | | | | X |
| Airport compatibility conflicts with siting requirements for other essential public facilities located nearby | | | | | X | | | | | | | | | | | X |

What should the compatibility policies be?

Things to Consider

You have decided upon the compatibility strategies that will work best for your community. Next you will need to prepare specific compatibility policies. How detailed you choose to make the policies will depend upon the issues you are facing. In outlying areas where little development is expected, providing general development parameters (such as height limits or maximum number of people per acre) may be sufficient. Where much development will be occurring, a detailed list of acceptable and unacceptable land uses and conditions to be met if the use is marginal may be necessary.

Another major decision to be made at this point is how restrictive your compatibility criteria should be. Again, the choice may depend upon the existing character of the airport environs. For example, it may be a simple decision to have policies precluding high-intensity development in outlying rural areas because such development is unlikely to occur anyway. In developed or developing locations, the point at which the line is drawn for acceptability with regard to airport impacts can be controversial. Questions you should consider in making this choice include:

- Is the development not likely to occur for reasons other than airport compatibility restrictions?
- What is the community's current image of the airport? Is it seen as a good neighbor?
- Are existing uses that might seem to be incompatible felt to be acceptable in your community given the community characteristics, relationship with the airport, and other factors?
- What are the community's expectations for and acceptance of growth in airport activity and the additional impacts that might result?
- What assurances can be given to protect the viability of the airport if relatively relaxed compatibility criteria are established?
- What realistic and economically viable uses of the land would remain with the compatibility restrictions in place?

Rural Environment



Urban Environment



- Could highly restrictive criteria cause some private property to be unusable and thus raise concerns that the policies could be deemed a taking?
- Would restrictive criteria render large areas of existing development as nonconforming to the compatibility criteria? What implications would this have?
- Should infill areas be treated differently than larger sites and ones on the edges of urbanized areas?
- Are different parts of the airport environs sufficiently different in land use character that different compatibility criteria should be applied?

To avoid takings issues, you usually will want to allow a single-family dwelling to be built on a legal residential lot of record.



For more about takings, review this advisory Washington

Department of Commerce publication:

qa.cted.wa.gov/_cted/documents/id_1068_publications.pdf

Basic Criteria

Table 2-5 is intended as a starting point for your preparation of specific compatibility criteria. It provides basic, qualitative criteria for different types of airport environs from outlying to developed. Your criteria will most likely need to be more detailed and quantitative.

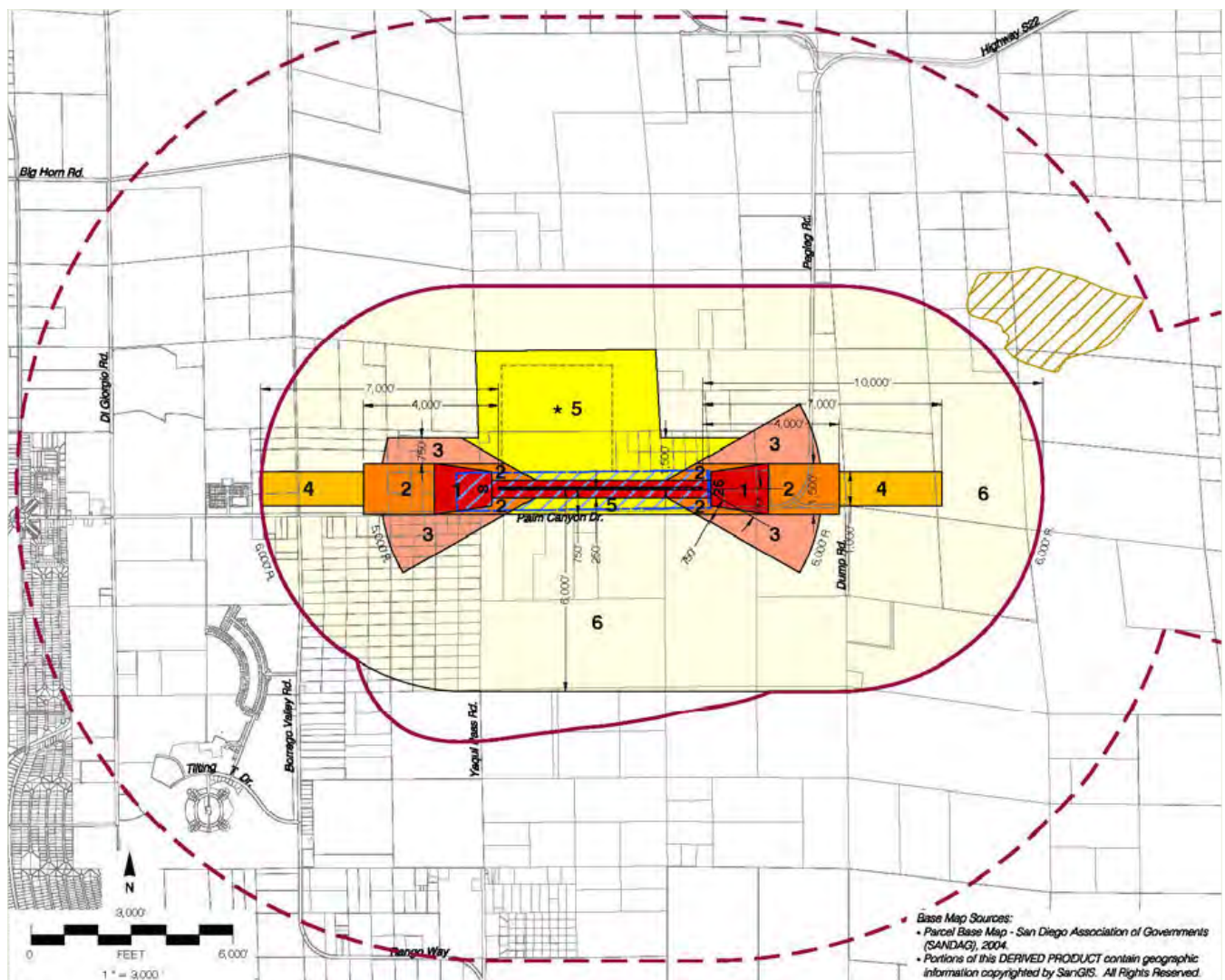
With regard to the four primary compatibility factors, some key points to remember are:

- **Noise** – No new noise-sensitive uses should be permitted within the high impact areas defined by the airport traffic pattern. This especially includes residential uses, but other uses with outdoor activities are also incompatible. Remember that noise impacts extend beyond the runway approach and departure areas into the airport influence area. Avoid noise-sensitive uses such as low residential, K-12 schools, hospitals, and adult care facilities. Where residential uses are to be accommodated, multi-family residential or mixed use is preferable to single-family because of the typically greater background noise, fewer outside walls through which outside noise can intrude, and less amount of outdoor living space. Consider establishing some form of buyer awareness program to alert prospective new residents to the occurrence of noise.
- **Affects Within the Airport Influence Area** – Vibration, fumes, noise, and an element of fear from low-flying aircraft all contribute to annoyance and other impacts associated with the airport influence area.
- **Airspace Protection** – You can generally use FAR Part 77 standards as the guide for determining allowable heights for new structures, but be sure to take into account any plans for runway extensions or new types of instrument approach procedures. Work with the airport and the FAA to determine acceptable heights in places where the ground itself exceeds the standards. Also be sure to address other hazards to flight. Uses that attract birds into the airport airspace or wildlife onto the runways are a particular concern. Other hazards include land uses that generate steam or smoke, produce glare, or otherwise interfere with the view of pilots and ones that could generate electrical interference with aircraft navigation or communication signals.
- **Safety** – Uses that attract concentrations of people into small areas near airports are not wise planning, especially in locations close to the ends of runways. New K-12 schools, hospitals, and other uses in which the occupants are young or infirm should not be allowed. Uses involving quantities of hazardous or explosive materials also do not belong near airports.

Seek to cluster development in a manner that leaves some flat, open land where small aircraft could make an emergency landing if necessary.

Can the airport influence area size be adjusted?

Most of the time, the airport influence area will consist of a combination of the areas affected by each of the four preceding factors. In some instances though, there are reasons for making adjustments. This should be done by going back to the four individual factors and reconsidering the underlying assumptions. Simply expanding the influence area boundary when no impacts occur and no compatibility criteria would apply within part of the area would serve little purpose. Oppositely, to omit locations where identified impacts warrant some form of compatibility policies would be contrary to the purpose of compatibility planning.



Source: Borrego Valley Airport, Land Use Compatibility Plan, December 2006



Table 2-5
Characteristics of Existing Influence Area Environs

| Characteristics of Existing Influence Area Environs | Rural <i>Existing land use is agricultural or rural; few buildings; new development not anticipated.</i> | Limited Development <i>Existing development is scattered or low-intensity with little new development anticipated.</i> | Developing <i>Extensive vacant or underutilized land with urban development potential.</i> | Developed <i>Fully or mostly developed; potential redevelopment.</i> |
|--|---|--|--|---|
| Runway Protection Zone | <ul style="list-style-type: none"> • Airport should control land consistent with design standards. • Height restrictions. • Avoid new buildings. • Avoid new roads. | <ul style="list-style-type: none"> • Airport should control land consistent with design standards. • Height restrictions. • Avoid new buildings. • Avoid new roads. | <ul style="list-style-type: none"> • Airport should control land consistent with design standards. • Height restrictions. • Avoid new buildings. • Avoid new roads. | <ul style="list-style-type: none"> • Airport should control land consistent with design standards. • Height restrictions. • Infill uses if low intensity. • Avoid new roads. |
| Parallel to Runway | <ul style="list-style-type: none"> • Aviation-related development preferred. • No new residential tracts. • Non-residential uses acceptable, industry preferred. • No new schools, hospitals, nursing homes, etc. • Tall structures restricted to protect airspace. • Caution regarding land uses that attract birds or other wildlife. • Encourage keeping land agricultural, undeveloped, or in airport-related uses. | <ul style="list-style-type: none"> • Aviation-related development preferred. • No new residential tracts. • Low intensity non-residential uses acceptable. • No new schools, hospitals, nursing homes, etc. • Tall structures restricted to protect airspace. • Caution regarding land uses that attract birds or other wildlife. • Encourage keeping land agricultural, undeveloped, or in airport-related uses. | <ul style="list-style-type: none"> • 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 or wildlife. • Encourage light industrial and other low-intensity uses or airport-related uses. | <ul style="list-style-type: none"> • 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 or wildlife. • Encourage light industrial, commercial, and other low-intensity non-residential uses. |
| Approaches/ Extended Runway Centerline | <ul style="list-style-type: none"> • Aviation-related development preferred. • Low-intensity industry or other non-residential uses acceptable. • 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 or wildlife. • Encourage continuation of agricultural and related uses. | <ul style="list-style-type: none"> • Low-intensity industrial or other non-residential uses acceptable. • 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 or wildlife. • Encourage continuation of agricultural and related uses. | <ul style="list-style-type: none"> • Low/moderate-intensity industrial or other non-residential uses acceptable. • 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 or wildlife. • Encourage light industrial, office, and other low-intensity uses. | <ul style="list-style-type: none"> • Low/moderate-intensity industrial or other non-residential uses acceptable. • 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, places of public assembly*. • Tall structures restricted to protect airspace. • Caution regarding land uses that attract birds or wildlife. • Encourage light industrial, office, and other low-intensity uses. |
| Traffic Pattern | <ul style="list-style-type: none"> • Maintain existing minimal development conditions to maximum extent practical. • No new schools, day care centers, nursing homes, hospitals, etc. • Encourage continued agricultural uses, and industrial uses. | <ul style="list-style-type: none"> • No new residential subdivisions. • No new schools, day care centers, nursing homes, hospitals, etc. • Encourage continued agricultural and agriculture-related commercial or industrial or other low-intensity commercial uses. | <ul style="list-style-type: none"> • No new residential subdivisions. • Encourage nonresidential uses except for ones with very high intensities (such as sports arenas). • Favor moderate to high-density or mixed use development if residential is necessary. • Caution regarding land uses that attract birds or wildlife. | <ul style="list-style-type: none"> • No new residential subdivisions. • Encourage nonresidential uses except for ones with very high intensities (such as sports arenas). • Favor high-density residential or as infill or mixed use redevelopment. • Caution regarding land uses that attract birds or wildlife. |

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

What should be added or changed in the comprehensive plan?

The comprehensive plan establishes the policy foundation that guides the physical development of a community. Towns, cities, and counties in the state each should adopt a comprehensive plan and following the state's enabling legislation or growth management legislation as appropriate. Policies directed toward ensuring airport land use compatibility in the community must be an integral part of these plans. These policies should be evident in:

- The goals that the community seeks to achieve with regard to future development and the manner in which the airport and provisions for land use compatibility around it fit into these goals.
- Description of the types of airport land use compatibility standards that future development will need to meet.
- Comprehensive plan map designation of lands near the airport for types of development that will be compatible with the airport.
- Identification of the specific tools that will be used to ensure implementation of the compatibility standards.

Goals

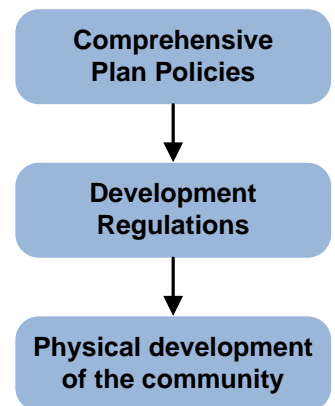
It is critically important that a community's goals for air transportation facilities and adjacent land uses be expressed in the comprehensive plan. Values and strategies included in the comprehensive plan filter down through all other planning decisions, from zoning to issuing building permits. The land use, transportation, capital facilities, and economic sections are all appropriate places to discuss airports and land use compatibility.

The goals should cover a range of issues that express the value of the airport to the community, as well as the community's commitment to preserving the airport consistent with its value.

At a minimum, the goals should:

- Recognize the multiple roles of the airport in the community, its contribution to the community's economy, and the services it provides to the community's businesses, residents, and visitors.
- Recognize the airport as an essential public facility.
- Recognize the airport as part of the multi-modal transportation system.
- Signal the community's intent to discourage development of incompatible land uses adjacent to the airport.
- Signal the community's intent to protect the airport's airspace.

How Comprehensive Plans Drive Development



Compatibility Policy Identification

The basic objectives of the compatibility criteria for each of the four compatibility concerns should be identified in the comprehensive plan. Indicate which of the strategies you selected earlier in [Step 4](#). Also, the airport influence area boundary that you have defined should be presented in the comprehensive plan together with a discussion of the factors on which it is based.

At least a basic level of compatibility policies should be included in the comprehensive plan to ensure that they are not overlooked during reviews of individual development proposals. Highly detailed criteria may be better suited to inclusion in a separate policy document or within development regulations or within an airport compatibility overlay component to the zoning ordinance. If the complete strategies and policies will appear in the comprehensive plan rather than in other policy documents, then maps of the impact areas for the four individual compatibility factors would need to be included as well.

The following example goals/policies are offered to assist local communities in the development or amendment of comprehensive plans. We recommend that local jurisdictions insert policy language into several sections of their comprehensive plan including sections for general land use, capital facilities, economic development, essential public facilities, and the transportation element.

- Recognize (name of airport) as an essential public facility and discourage land uses that may promote incompatible development adjacent to the (name) airport.
- Protect the viability of the airport as a significant economic resource to the community by encouraging compatible land uses, densities, and reducing hazards that may endanger the lives and property of the public and aviation users.
- Encourage the protection of the (Name) Airport from adjacent incompatible land uses and/or activities that could impact the present and/or future use of the airport as an Essential Public Facility (EPF), endanger the lives of people on the ground and/or promote inadvertent growth of incompatible land uses. Incompatible land uses may include residential, multi-family, height hazards, uses that attract large concentrations of people, wildlife hazards, and special uses such as schools, hospitals, and nursing homes, and explosive/hazardous materials.
- Encourage the adoption of development regulations that protect the airport from height hazards by developing a Height Overlay District that will prohibit buildings or structures from penetrating FAR Part 77 *Imaginary Surfaces*.
- Encourage open space/clear areas and utilize zoning criteria within key safety areas adjacent to the airport to facilitate protection of the airport as an essential public facility, and reduce safety risk exposure to people on the ground and in the air. Applicable criteria may include promoting cluster development to promote open space/clear areas, locating structures away from the extended centerline of the runway, discouraging public assembly, transfer of development rights, and other applicable strategies. When possible promote contiguous open space parcels, especially in areas with smaller parcel size configurations.

Land Use Map Designations

Designating land uses that will be compatible with the airport impacts in a particular location is key to the success of the whole compatibility planning process.

- **Agricultural Uses and Related Uses** – How much of these types of undeveloped or minimally developed uses can be continued? Especially outside of urban growth boundaries, this should be a high-priority choice.
- **Residential Uses** – Residential land uses are a particular concern. Is new low-density residential development, especially any new subdivisions, proposed for locations where it would be incompatible with the airport? If so, are other more compatible uses possible such as high-density multifamily or mixed use?
- **Noise- and Risk-Sensitive Uses** – Where are schools, hospitals, and other sensitive uses planned to be located? If these uses already exist, can expansion be limited? Are there any critical community infrastructure uses—such as power plants and communication facilities—planned in the airport influence area that could be built elsewhere instead?
- **Other Nonresidential Uses** – Take a close look at industry, commercial, and other nonresidential uses that potentially have high concentrations of people. Are any such uses proposed within the compatibility zones close to the runway? If so, what can be done to limit the intensity? Also make certain the building heights allowed for these uses would not result in airspace obstructions.

Step 4: Products

- Revisit [Worksheet 3C](#) and review the list of current policies affecting airport land use compatibility in your community and conduct an assessment of the adequacy of the current policies to improve compatibility ([Worksheet 4A](#)).
- Evaluation of alternative compatibility strategies ([Worksheet 4B](#)).
- Draft of specific compatibility criteria ([Worksheet 4C](#)).
- Adjustment of airport influence area boundary if necessary ([Worksheet 4D](#)).
- Draft comprehensive plan policies.
- Draft comprehensive plan land use map.

Land Use Map Designations,
Chelan Municipal Airport



Agricultural Uses,
Arlington Municipal Airport



Noise Sensitive Use With
Potential for Expansion, Spokane, WA



Step 5: Adopt the Comprehensive Plan

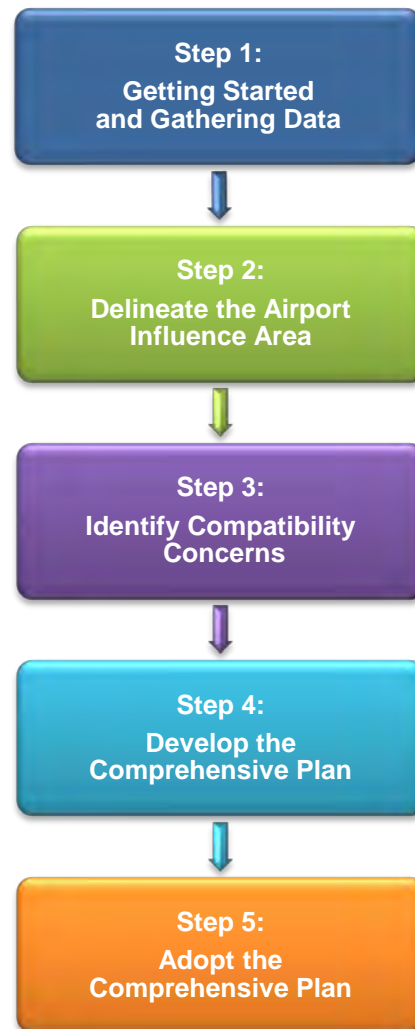
This short step takes the comprehensive plan you prepared in [Step 4](#) through the adoption process. Particular emphasis is given to gaining support for the airport land use compatibility measures you have incorporated into the draft plan.

At this point, you should have completed the following tasks:

- Identified the airport and airport operations within the transportation element.
- Finalized the delineation of the airport influence area boundary.
- Identified policies necessary to address compatibility and the airport.
- Defined strategies and identified appropriate land use measures on the comprehensive plan map to address compatible land uses adjacent to the airport.

You will know you have been successful when:

- Airport stakeholders feel that their concerns regarding compatibility matters have been understood and appropriately considered in the comprehensive plan.
- You have gained public acceptance of the importance of airport land use compatibility planning.
- WSDOT Aviation provides comments supporting the compatibility measures you propose to take in your comprehensive plan.
- Your community’s decision makers have adopted a comprehensive plan that contains appropriate measures to protect the airport from encroachment by incompatible land uses.



Does WSDOT Aviation need to review the draft comprehensive plan?

Under [RCW 36.70.547](#), “all proposed and adopted plans and regulations shall be filed with the aviation division of the department of transportation within a reasonable time after release for public consideration and comment.” Beyond this requirement, as you begin work on preparing your draft comprehensive plan, it is important that you coordinate with WSDOT Aviation. We can provide technical assistance and help you identify measures that may be appropriate in your community to address airport land use compatibility issues you will need to consider during your comprehensive plan process.

Information collected for the transportation inventory can be expanded as public outreach materials to educate community members about the airport. For example, a brief fact sheet or flyer describing activities supported by the airport and future activity anticipated at the airport can be a great resource for raising awareness about the role of the airport in the local, regional, and state transportation system.

What public participation is needed for policy adoption?

By the time you reach this step, you should have thoroughly examined airport land use compatibility issues and incorporated appropriate measures into the draft comprehensive plan. Airport land use compatibility planning now becomes one of many issues that the public and decision makers will evaluate during the process leading to the adoption of the amended comprehensive plan. Thus, the formal public participation process for compatibility planning should be the same as for the comprehensive plan and implementing regulations.

Airport land use compatibility planning has its own unique group of stakeholders, and these stakeholders may not always be active participants in the comprehensive planning process. [Chapter 1](#) described the stakeholders most likely associated with airports and the importance of involving them in the process.

How can you gain public and decision-maker support for airport land use compatibility measures?

For people closely involved with aviation, the importance of airport land use compatibility planning is probably obvious. To other people, it may not be as evident or they may view it as less of a priority than other community planning objectives. In order for the airport land use compatibility measures you have developed to be successfully implemented, the people who have the authority to make decisions or the ability to sway those decisions must be convinced.

One way of doing this is to demonstrate why compatibility is important not just to the airport, but also to the community's residents and businesses. This topic was covered in [Chapter 1](#). Simply put, development that unnecessarily puts people where they will be exposed to significant airport impacts, experience reduced quality of life or incur increased risk is poor planning.

Another approach is to focus on the economic importance of the airport to the community. This topic has already been touched upon several times in this guidebook. From a statewide perspective, some additional points to consider are:

- Airports, aviation, and industries related to aviation in Washington have an impact on the economic well-being of communities throughout the state. Airports and aviation-related industries create thousands of jobs and provide millions of dollars in income and sales each year.

Planning Staff



City of Spokane planning staff working with Spokane International Operations Manager on a new airport Overlay

Planning Commission




- According to a WSDOT study conducted in 2001, airport operations, aviation-related businesses, air travel, visitor spending, and special aviation events in Washington generate an estimated \$19.6 billion annually in total economic activity, support over 176,900 full- and part-time employees statewide, and produce \$14 billion each year in employee wages and benefits for state residents.
- Capital spending by local airports also contributes to the economic well-being of local and regional economies. While not generally an annual expenditure, spending on capital improvements in the year 2000 generated an additional \$137.9 million in output, supported over 1,400 jobs and produced \$42 million in employee wages and benefits for state residents.

To bring these points home at a local level, preparation of an airport economic analysis focusing on your airport may be worth considering. Such studies can document several types of economic benefits:

- They measure the new economic benefits that the region accrues because of the airport.
- They provide a metric for comparison to other public projects in terms of rate of return on investment.
- They show the net benefit of dollars flowing into the local economy from outside of the community because of the airport.

 For more on the WSDOT Aviation economic impact study, see: www.wsdot.wa.gov/aviation/econimpacts

 For more information on comprehensive plans and adoption process, see: www.commerce.wa.gov/site/303/default.aspx

Step 5: Products

- Public Outreach Plan with a strategy to provide opportunities for the public and decision maker to become engaged in the comprehensive plan and process.
- Information materials describing the importance of the airport and airport land use compatibility.
- An adopted comprehensive plan incorporating airport land use compatibility strategies, policies, land use map, and supporting documentation.

Step 6: Implement the ALUC Policies

Congratulations! You have shepherded airport land use compatibility matters through the research and comprehensive plan adoption process. You have successfully reflected the concerns in your comprehensive plan, which has now been adopted by your community's decision makers. But, you can't stop there. The one final step involves preparing implementing regulations, getting them adopted, and then using them on a day-to-day basis to ensure that encroachment of incompatible land use concerns for the airport will continue to be addressed and avoided.

You will know you have been successful when:

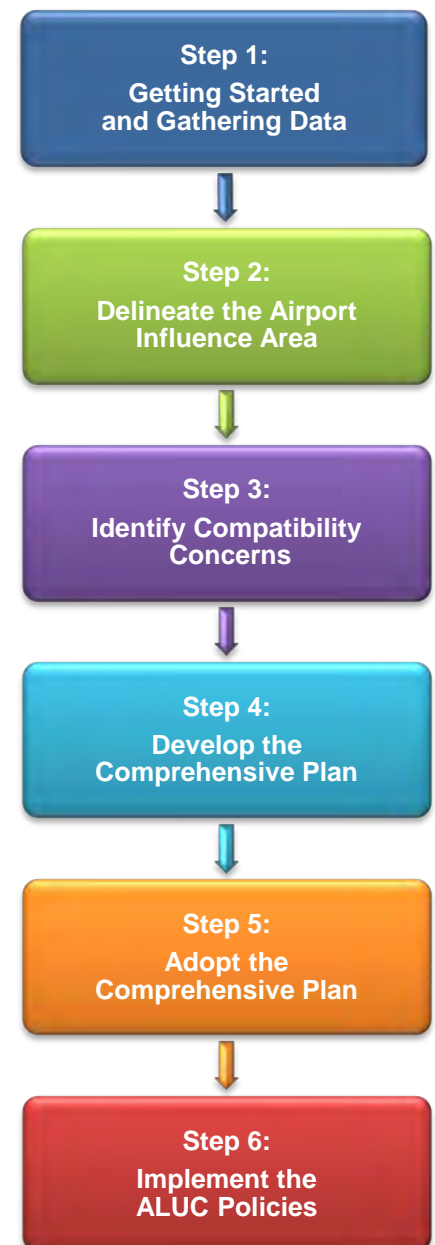
- You have evaluated the development regulations and revised them to implement the comprehensive plan, policies, and land use map.

What implementing regulations are needed?

Once your comprehensive plan has been amended, it is time to determine what types of regulatory tools you will need to implement the plan. Most likely, unless the compatibility issues you face are simple, your existing development regulations will not contain all the tools necessary to ensure consistency with the amended comprehensive plan. These details will need to be included in an amendment to your community's development regulations. Primary among these is your zoning ordinance, but subdivision and environmental impact regulations, and other implementing regulations also may need to be reviewed and revised to reflect the comprehensive plan policies on airport land use compatibility.

The purposes of development regulations are to establish land use controls on land covered by the comprehensive plan. In addition to defining specific types of land use, the development regulations establishes the density and intensity of land uses, building and structure height, setbacks, subdivision control, permitting processes, and other aspects of property use. Development regulations are required to be on file with the local jurisdiction and available to the public.

Other than where direct conflicts need to be eliminated from the comprehensive plan text and maps, implementation of compatibility policies could be accomplished almost entirely through conventional zoning, airport overlay ordinance, and a height hazard overlay ordinance. Use [Worksheet 6A](#) to confirm that you have addressed all the compatibility criteria in your implementing regulations.



Development regulations put policy into action. It is important that the regulations implement the policy, not start a new direction. Make sure to provide adequate detail in the regulations to help the development community understand what is required.



Traditional Zoning Ordinance

Zoning ordinances are the most common regulatory tool used by local government throughout the country to manage land use and development. Traditional zoning ordinances typically involve two components: text and a map. The text defines the categories, uses, and standards of development permitted within a particular land use designation. The map demonstrates the spatial distribution of the zoning classifications.

Historically, zoning has been used as a land use control technique to segregate incompatible land uses and establish standards for the type and intensity of use. Zoning ordinances typically categorize land uses into several different classifications. Usually included are: residential, commercial, industrial, institutional/governmental, parks/open space, and agricultural. The exact classifications will vary from jurisdiction to jurisdiction. Zoning is also used to regulate the density and intensity of uses, and the manner in which structures can be placed on the site—setback distances, lot coverage, and allowable height. Parking and landscaping requirements for each land use classification are typically specified in the zoning ordinance as well.

 Click here to review your jurisdiction's development regulations: www.mrsc.org/codes.aspx

How can zoning be used to promote airport land use compatibility?

To discourage the encroachment of incompatible land uses within the airport influence area, jurisdictions can develop regulatory tools that limits or discourages uses such as residential development and promotes compatible commercial, agricultural, light industrial, and mixed-use development. Parcels within the airport influence area should, at a minimum, be maintained at their current level of compatibility or rezoned for a more compatible use. Parcels should not be rezoned to allow a more incompatible use. Remember, jurisdictions are required to discourage incompatible development, not encourage its proliferation through passive zoning regulations.

Overlay Zoning Ordinance

Overlay zoning is a regulatory tool that identifies special zoning standards that provides additional standards and/or modifies standards in the base zoning district map and text. The overlay district can share common boundaries with the base or underlying zone or cut across the underlying zone boundaries. Additionally, overlay zones are usually created to be applied within smaller geographic areas to protect a specific resource or guide development within a special area.

Overlay zoning is a highly useful and efficient tool for addressing land use compatibility within an airport influence area. Common requirements may include building heights, bulk and density standards, lot sizes, provide incentives to attract uses or prohibit uses or activities that may impact the airport. By creating an airport overlay zone, the underlying zoning criteria for property within the airport influence area can be modified to ensure compatibility with the airport. This method also allows communities to keep their existing base zoning in place adjacent to the airport rather than creating new base zoning districts. In this way, the need to create zoning district to specifically address industrial commercial, or other such classifications specific to the airport influence area can be avoided. Several types of overlay districts have been successfully used to address land use compatibility. The two most commonly used in Washington State have included an overlay district to address height hazards using FAR Part 77 *Imaginary Surfaces* and a separate overlay to implement the land use compatibility zones addressed in [Appendix F](#).

Critical Concept

To be successful in implementing both an airport overlay and traditional zoning, the two strategies must have and maintain a give-and-take relationship. This means you cannot change the underlying zoning without due process or cause, such as a change in circumstance or operations. Jurisdictions should establish a clear record of their methodology and goals regarding efforts to achieve a more compatible environment through the use of both tools.

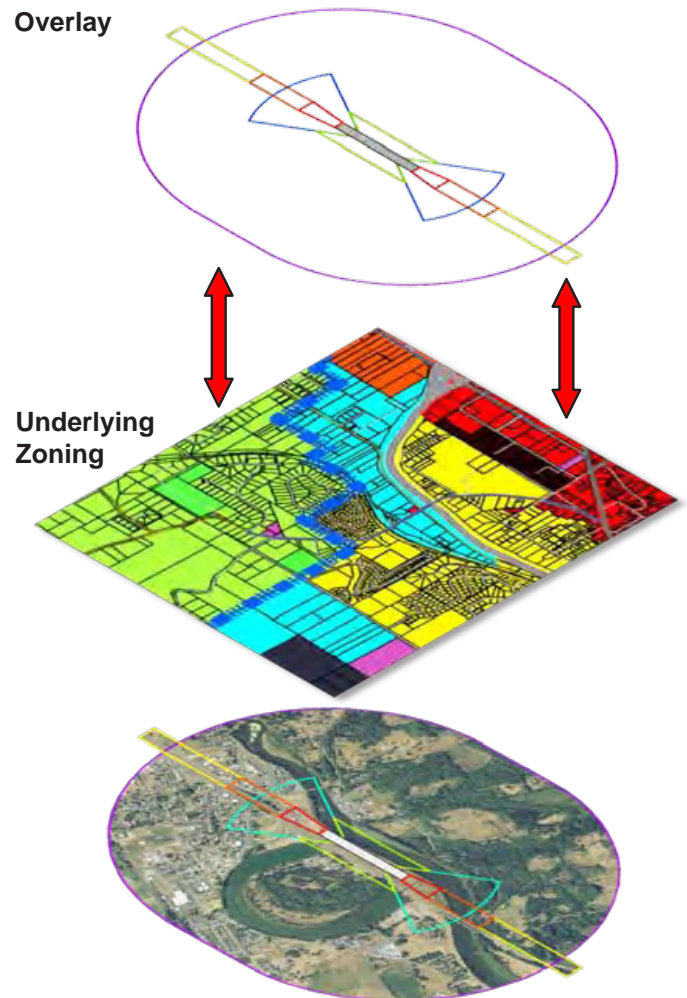
Land Use Protection/Airport Compatibility Overlay

An airport overlay can be used to protect the viability of the airport as an essential public facility by discouraging incompatible development and encouraging compatible land uses. As the name implies, the overlay district is laid over the existing zoning districts and modifies the density and land use requirements of the underlying zoning districts. An overlay should also address:

- Wildlife attractants.
- Light, smoke, and glare.
- Electromagnetic interference.
- Storage of hazardous materials.
- High intensity and special function uses.

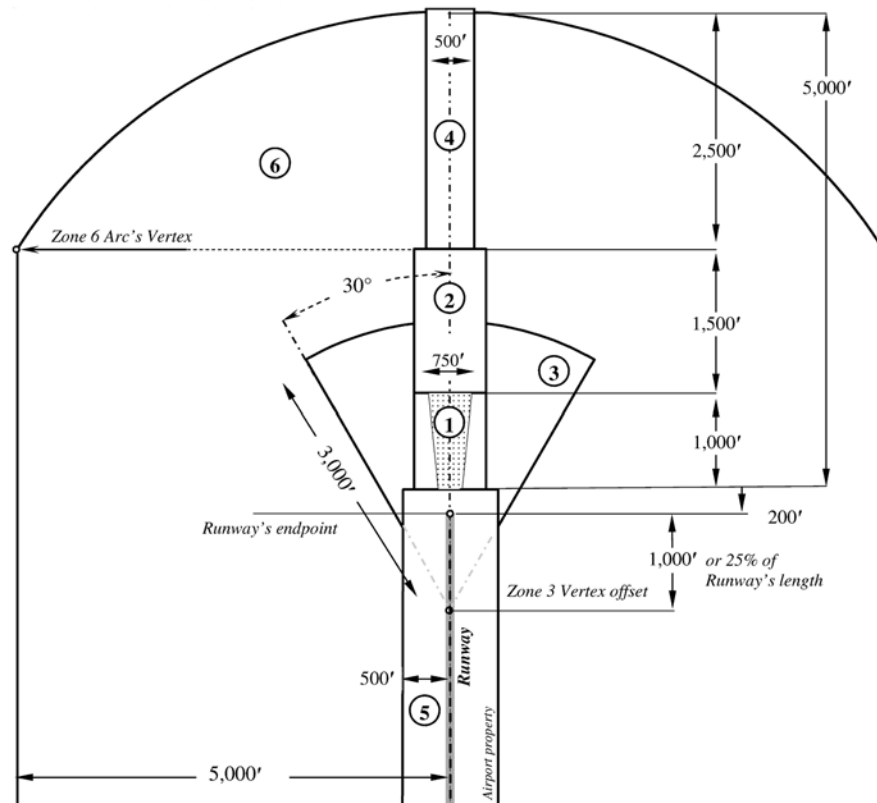
Typically, airport overlays address the issues of noise, light, vibration, safety, and low-flying aircraft through a series of compatibility zones. WSDOT recommends variations of the compatibility zones to take into account different runway lengths, types of approach procedures, traffic pattern location, and other factors.

As shown in [Appendix F](#), the suggested zones are larger for longer runways that accommodate larger, faster aircraft than for short runways used only by light aircraft. The six zones can be characterized as follows:

Symbiotic Relationship

Airport Compatibility Overlay


WSDOT Compatibility Zones

- Compatibility Zone 1** – This zone encompasses the runway protection zone (RPZ) at each end of the runway and should use the RPZ dimensions established in accordance with FAA standards. Also included in the zone are the strips of land immediately adjacent to the runway where FAA standards preclude structures.



- Compatibility Zone 2** – This zone wraps around and extends beyond Zone 1 along the runway centerline. Next to the RPZ, it represents the area where the risk of aircraft accidents is the greatest. On departure, aircraft are typically at full power in the initial phase of climb. On approach, they are at low altitude as they prepare for landing.

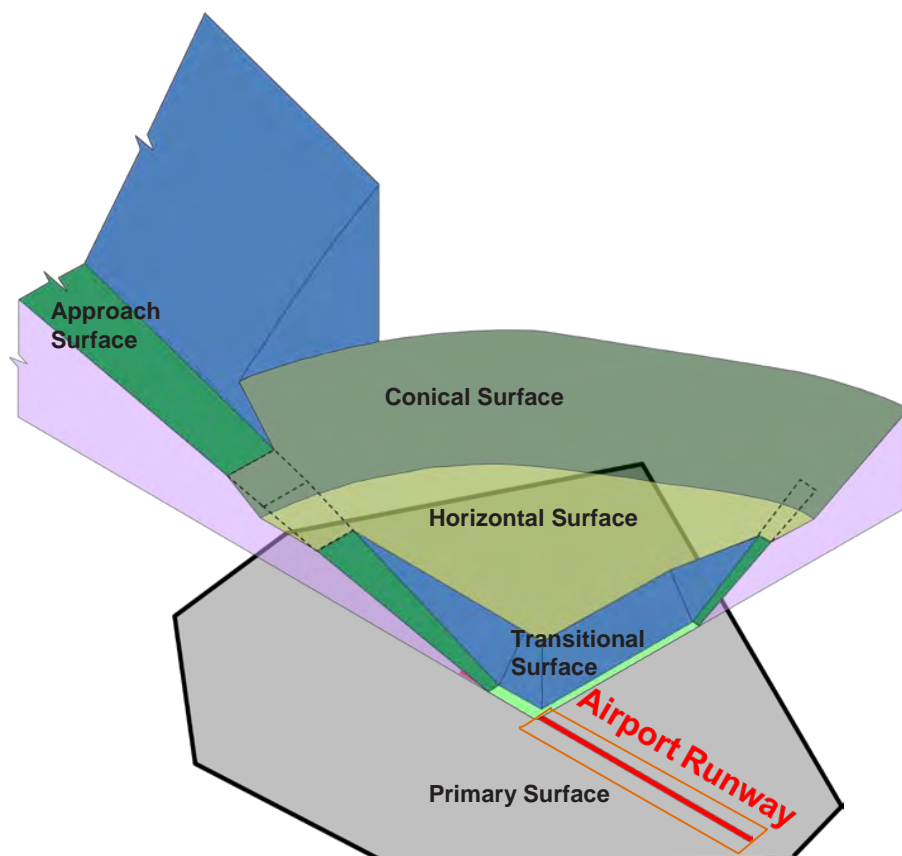
- Compatibility Zone 3** – This zone is a wedge-shaped area lying along the sides of Zone 2. When operating visually, departing aircraft may begin turning over this area to fly toward their destination or to remain in the traffic pattern. Arriving aircraft often overfly this area as well, especially if they are flying a tight pattern.
- Compatibility Zone 4** – This area lies beyond Zone 3 along the extended runway centerline. Aircraft flying straight out or in overfly this area at low altitude. The zone is particularly significant on runways where much of the operations are on instrument procedures and at busy airports where elongated traffic patterns are common.
- Compatibility Zone 5** – Lying in narrow bands along each side of the runway, aircraft do not normally fly over the sideline zone. The principal risk is from aircraft that lose directional control while landing or just after takeoff.
- Compatibility Zone 6** – The final zone contains the remainder of the airport environment where aircraft fly as they approach and depart the airport or are engaged in flight training. In area, Zone 6 is typically larger than the other zones combined.

Each airport is unique. Thus, it is essential to adjust compatibility zones to fit the airfield configuration, usage characteristics, fleet mix, topography, and other factors associated with a specific airport.

Airspace Protection/Height Limit Overlay

FAR Part 77, *Objects Affecting Navigable Airspace*, establishes standards for determining obstructions to the airspace necessary for safe aircraft operations. To do this, the regulations define a set of airspace protection surfaces referred to as “imaginary surfaces.” The sizes and shapes of the surfaces are determined by the airport’s runway configuration, the weight of the aircraft each runway can accommodate, and the type of approach procedure (visual, non-precision, or precision) at each runway end. There are five types of surfaces that should be considered:

- **Primary Surface** – It is longitudinally centered on a runway and, if the runway is paved, extends 200 feet beyond the runway ends.
- **Approach Surfaces** – These surfaces begin at the end of the primary surface and extend from 5,000 feet to as much as 50,000 feet if the runway has a precision approach. The surface slopes upward at a horizontal-to-vertical ratio of 20:1, 34:1, or 50:1.
- **Transitional Surfaces** – These surfaces are situated along the edges of the primary and approach surfaces. They have a slope of 7:1 running at right angles to the runway centerline.
- **Horizontal Surface** – As the name suggests, this surface is a horizontal plane. Its elevation is 150 feet above the highest point on the airport runway(s) and it extends either 5,000 or 10,000 feet from the runway.
- **Conical Surface** – Extending outward and upward from the periphery of the horizontal surface, the conical surface has a slope of 20:1 for a horizontal distance of 4,000 feet.




Development regulations put policy into action. It is important that the regulations implement the policy, not start a new direction. Make sure to provide adequate detail in the regulations to help the development community understand what is required.

Objects that are too tall may constitute airspace hazards. By holding objects to heights that remain below the FAR Part 77, land use jurisdictions can ensure that constraints are not placed on the length of the runway usable for aircraft takeoffs and landings or on the runway’s instrument approach procedures.

How can an airspace protection/height limit overlay be used to promote airport land use compatibility?

Use the airspace definitions provided in federal law to identify FAR Part 77 Surfaces for your airport, and include in the development regulations language that prohibits penetration of these surfaces. Provide a map and instructions to assist community members, airport managers, and planning staff with implementing the regulations.

 The airspace assessment worksheet is located on page D-7.

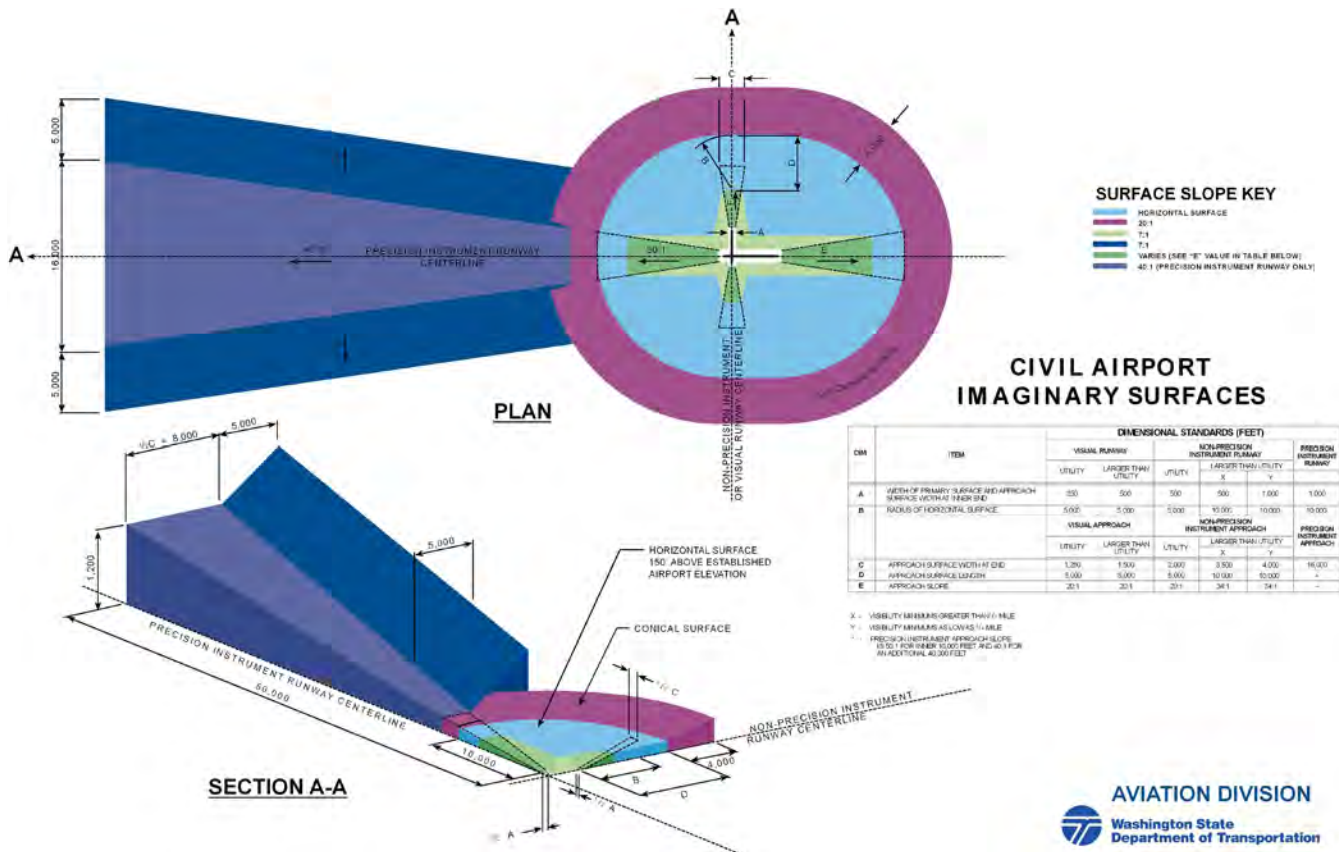
The FAA relies on local jurisdictions with land use authority to keep critical airspace clear of obstructions. [RCW 14.12](#) Airport Zoning gives local jurisdictions the authority to develop and adopt airspace regulations.

Harvey Field, Snohomish County



Airspace obstructions, as seen above, can severely limit the utility of an airport by displacing the runway's threshold and limiting the ability of aircraft to develop supplanting instrument approach procedures necessary for most business aircraft.

FAR Part 77 Imaginary Surfaces



See [Appendix D](#) for a diagram of FAR Part 77 Imaginary Surfaces and a chart of the surfaces' dimensions.

How can the zoning ordinance be used to promote airport land use compatibility?

Tools to promote compatibility can include conventional zoning, overlay zoning, or a combination of both. Use of the airport overlay relies on the base zoning district or underlying zoning district and standards identified in the overlay zoning to prohibit or restrict land use features and activities within the airport influence area. Use the overlay to address issues such as:

- Tall structures and development that would penetrate critical airspace surfaces identified in FAR Part 77.
- Stormwater or other facilities (such as stormwater or agricultural operations) that may attract hazardous wildlife. The overlay may direct staff to use a specific standard such as the *Washington Aviation Stormwater Manual* to address stormwater issues on or off airport property.
- Interference with air navigation (i.e., smoke, electromagnetic interference).
- Special function uses such as K-12 schools, hospitals, nursing homes, and other similar uses.
- Large gathering of people or areas of public assembly such as sporting arenas, fair grounds, and stadiums.
- Above-ground bulk storage of fuel, explosive, or hazardous chemicals within the airport approach or other sensitive areas.
- Noise-sensitive uses.
- Reflective building materials. The overlay may suggest reducing light and glare by limiting the type of materials or requiring special conditions such as downward shaded lighting equipment.

Other Types of Zoning Tools

Form-Based Codes

Form-based zoning codes differ from traditional zoning in that they focus on the size and shape of buildings rather than on the way the land is used. The codes often include drawings illustrating how buildings should relate to the public spaces around them. While not highly widespread in application, form-based codes are becoming more common particularly for the more highly developed, core areas of cities and where redevelopment to more intensive uses is desired.

The best approach to promoting compatibility is using a combination regulatory tools. For example, the use of zoning overlay's rely on and have a symbiotic relationship to the underlying zoning districts and regulations. Additionally, there are two types of zoning overlays that are designed to achieve different purposes. One that is designed and shaped to address critical air space surfaces depicted in federal regulations FAR Part 77 *Imaginary Surfaces* and the other that addresses compatibility zones or the general operating environment of the airport.

Consider establishing the following regulations to address land use compatibility in the airport influence area.

- Traditional or performance based zoning regulations.
 - Compatible land use overlay.
 - Height hazard overlay.
-



How can form-based codes be used to promote airport land use compatibility?

Form-based codes have pluses and minuses in terms of their relationship to the objectives of airport land use compatibility planning. They might be beneficial in setting height limits, defining building types that offer better protection in the event of an aircraft accident, and in setting criteria for open land areas where an emergency landing could be made. On the other hand, they typically do not address occupancy types that are at the heart of conventional zoning and compatibility planning. Nevertheless, by incorporating provisions addressing usage intensities and noise sensitivity, form-based codes could be an ideal mechanism for promoting airport land use compatibility in urban communities.

Conditional Use Permit

Conditional use permits are typically used by local jurisdictions to allow a use or activity that may need additional scrutiny to ensure that the activity is compatible with neighboring land uses. Use may be tailored to meet the limitations of the site or mitigate impacts. Conditional uses are decided by the governing body, hearing examiner, board of adjustment, or similar body.

Conditional use permits and variances to the code should be reviewed and allowed only if they will not pose a safety hazard or are found to be compatible with the airport.

Variances

Variances are also decided by the a hearing examiner, board of adjustment, or similar body. A variance authorizes the landowner to vary a condition or standard in the development code. There are often used to vary a setback, height limitation, or dimensional standard. The local governing body determines whether to grant a variance request based on criteria outline in state statues and local regulations. The Planning Enabling Act details several prerequisites that must be met before a variance may be granted. These include:

- Special circumstance of the subject property (including size and shape or surroundings). Strict application of the zoning ordinance would deprive the property owner of rights or privileges enjoyed by other owners of properties in the vicinity and under identical zone classifications.
- The granting of the variance will not be materially detrimental to the public welfare or injurious to the property or improvements in the vicinity and zone in which the subject property is located.

Nonconforming Uses

A nonconforming use is a use that existed lawfully prior to the adoption or amendment of a zoning ordinance, but does not comply with present zoning provisions. Many local jurisdictions generally protect existing legal nonconforming uses of buildings, structures, premises, or fixtures if they continue unchanged. However, communities may use a variety of methods to prohibit or limit the expansion of nonconforming uses.

Docketing Process

How to recommend changes to your jurisdiction's comprehensive plan and development regulations.

Docketing is a process by which parties recommend changes to comprehensive plans and development regulations. Jurisdictions compile and maintain a list of suggested changes and consider them on an annual basis. The docket process allows parties to note deficiencies and recommend changes. These suggested changes are reviewed by the jurisdictions and made available for review by the public. There is no fee for submitting the docket form in some jurisdictions. This process allows for public input on policy affecting land use compatibility.

What actions are necessary to ensure continued implementation of the policies?

To conclude this six-step process, a final point to remember is that your work does not end with adoption of a comprehensive plan and implementing regulations that incorporate airport land use compatibility planning measures. The criteria must continue to be applied on an ongoing basis.

Among the continuing actions are:

- Make sure that compatibility criteria are not buried in the planning policies and implementing regulations so that planners do not overlook them. Flagging parcels affected by airport compatibility criteria with an airport overlay zoning designation is a way of helping to ensure that the criteria are noticed. Consider incorporating the compatibility criteria into a geographic information system (GIS) to make the criteria quickly evident.
- Pay attention not just to the finished height of structures, but also to any add-on features such as antennas that would increase the overall height. Also consider construction cranes or other temporary objects that could be airspace obstruction if near the airport. The height of trees could be another concern. Be certain that project proponents submit proper notification (Form 7460) to the FAA for an aeronautical study in accordance with FAR Part 77 requirements.
- Do not overlook proposed changes of use of existing buildings. A proposal to change a low-intensity or vacant building to one with many occupants, or to a use that is noise sensitive, or would allow the occupancy of adult or child care facility could encourage incompatible uses or activities and conflict with the comprehensive plan.

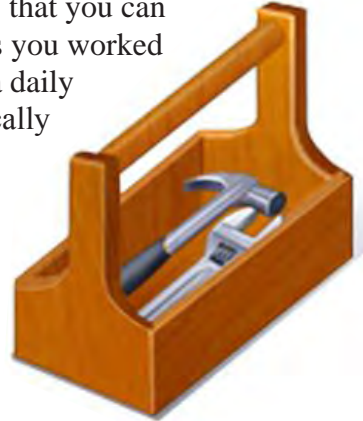
Local jurisdictions are strongly encouraged to conduct a preliminary analysis to determine if the project meets local height regulations and FAR Part 77 *Standards*. This preliminary analysis should be done prior to when the project applicant submits Form 7460 to the FAA. If the project would penetrate a FAR Part 77 *Surfaces* and thus be an airspace obstruction, jurisdictions should require the applicant to propose alterations to the proposal.

Step 6: Products

- Draft and adopt implementing regulations such as an airport overlay zoning ordinance that contain the specific compatibility criteria to be met.
- Identify continuing actions and specific points in the development review process where airport land use compatibility concerns will be addressed.

Introduction

This chapter describes a collection of additional land use strategies and tools that you can use to implement the airport land use compatibility measures you selected as you worked through the steps outlined in [Chapter 2](#). Some of these are tools you use on a daily basis: comprehensive plans and zoning ordinances. But, how do you specifically use the strategies you have learned together with tools for addressing airport land use compatibility issues? The first two sections of this chapter will provide you some guidance. Then in the latter part of the chapter, you will find various tools that can be applied to more individualized compatibility problems or during the approval process of specific projects. A final section at the end of this chapter outlines several planning scenarios that put the various tools to use. Also take a look at the guidebook appendices for additional information on airports and aircraft operations.



In this chapter, you will learn about:

- **Comprehensive Plan** – Where compatibility issues can or should be addressed. What land uses should be planned for near airport and what ones should be avoided.
- **Zoning Ordinances** – Aspects of airport land use compatibility planning that should be addressed in a traditional zoning ordinance. Airport overlay zones and other types of zoning that can be employed to address compatibility concerns.
- **Tools for Addressing Specific Compatibility Factors** – Guidance on specific criteria to use with regard to noise, overflight, safety, and airspace protection.
- **Other Tools** – These include some special tools that planners and airport managers can employ to promote compatibility.
- **Scenarios** – Some examples of how tools might be applied in particular situations.

Addressing Particular Land Use Types

A central component of all comprehensive plans is the land use map. The land use map identifies proposed land uses and future geographic pattern in the community. For most communities, the majority of the land will show designations that simply represent what already exists on the ground indicating that no changes or infill development are contemplated. Where this is the case, there is little that the airport land use compatibility program efforts will change other than to encourage sustainable development practices or redeveloped to attract more compatible uses.

The greatest opportunities for promoting airport land use compatibility are within the portions of the airport influence area. These areas provide more flexibility on the type and location of new or redevelopment issues. A brief assessments of the positive and or negative factors associated with various land use type has been provided below as well as identified in [Table 2-4](#) in [Chapter 2](#). The degree to which land uses may be impacted by airport operations are based on a number of factors including sensitivity to noise, safety, airspace intrusion, and land uses characteristics.

Agricultural Uses

Most agricultural uses are compatible with airports. However, some activities can attract wildlife which may pose a significant safety hazard.

Aviation Compatible Agricultural Use



Arlington Municipal Airport leases its RPZ for landscaping business, production of sod.

- Slaughter yards, rendering plants, feed lots, and other similar activities are a significant wildlife attractant and should be strongly discouraged
- Caution should be taken with some fruit and vegetable bearing crops. They may be incompatible near runway approaches because of the height of trees and food source for wildlife. Seed crops may attract waterfowl or flocks of birds.
- Agricultural septic lagoons and similar by-products used to enhance crop yields should be reviewed.

Residential Uses

Residential land uses are generally considered incompatible when located within the airport influence area. However, some high-density residential development can co-exist and compliment the airport depending on their location, density, and intensity of other uses around them.

Substantial Residential Encroachment



Substantial residential encroachment around Hoskins Field, Olympia, Washington.

- No new residential development should be allowed inside any runway protection zone or runway approach.
- Outside the urban growth boundary, scattered, large-lot, agricultural-related residences are acceptable. Generally they are lot sizes of five acres or greater. However, dwelling units should be strongly discouraged within the runway protection zone or runway approach.
- Inside the urban growth boundary:
 - New low to medium residential development should be discouraged within the airport influence area, especially under the airport traffic pattern(s).
 - New high-density multifamily development may compliment the airport if located in areas that do not have a high safety risk such as at the end of the runway or within the runway approach/departure area.
 - Mixed-use development or redevelopment of an area to accommodate a mix of land uses can be compatible when located in areas that that do not have a high safety risk such as at the end of the runway or within the runway approach/departure area.

Special Function Uses

Special function uses generally include children, elderly, the infirmed, or others regarded as having comparatively little control over their own lives. Land uses may include K-12 schools, hospitals, nursing homes, convalescent centers, and other similar uses.

- Proposed new uses should be located outside of the airport influence area and more specifically should not be permitted at the end of the airport runway, approach/departure areas, or within the airport traffic pattern (Compatibility Zones 1-6).
- Care should be taken to preclude uses such as hospitals where patients remain overnight. Should not be situated in approach compatibility zones.
- Substantial expansions or remodels of existing special function uses should include the addition of zoned sprinkler systems, additional exist doors, and enhance safety coordination plans with emergency providers.



K-12 schools represent a highly vulnerable use and should be prohibited near airports.

Special Function Use

Parks and Recreational Facilities

Most passive and active parks and recreation facilities are compatible when located within the airport influence area. Care should be taken not to locate facilities within the runway approach or sideline areas of the airport. Additionally, it is strongly recommended that active recreation facilities such as ball parks, football or soccer fields, and other similar uses that attract large groups of people should be discouraged from locating in the runway protection zone, runway approach to the airport, and sideline areas of the airport (Compatibility Zones 1, 2, and 5).

Commercial, Retail, and Business Office Uses

Most commercial, retail, and business office uses are compatible with airport operations. Compatibility is dependent on the concentration of people per square foot and the intensity of the use. For more information on the types of activities and restriction, see [Appendix F](#), Table F-2.

- Business office-type uses, particularly those having only one or two floors, are generally acceptable throughout the airport influence area except in and near the runway protection zone (Compatibility Zones 1 and 2) Taller buildings may present airspace obstruction issues as well as be too intense (too many people) for good safety.
- Retail commercial spaces are generally acceptable in most areas adjacent to the airport depending on the intensity of uses and concentration of people.
- Major retail shopping centers and big-box stores should not be located in Compatibility Zones 1, 2, and 5.
- Lodging facilities are generally compatible with airports and often located near airports providing accommodations for the traveling public. These uses should be prohibited in Compatibility Zone 1 and depending on the airport Compatibility Zone 2.

Industrial Uses

Most industrial uses are compatible with airport operations. Compatibility is dependent on the concentration of people per square foot and the intensity of the use. For more information on the types of activities and restriction, see [Appendix F](#), Table F-2.

The compatibility of heavy industry depends on the facility. Tall smokestacks or structures, steam, smoke, thermal plumes, glare, electromagnetic interference, and storage or use of large amounts of hazardous materials are incompatible when located in areas that may disrupt flight operations to and from the airport. Warehouse and storage facilities are excellent uses within Compatibility Zones 1 and 2 due to their low concentration of people.

Sport Stadiums and Other Large Assembly Facilities

Uses that allow high concentrations of people should be avoided within the airport influence area. These uses generally include sports stadiums, multiplex theaters, large places of worship, shopping centers, town centers, and other areas that promote the assembly of large concentrations or groups of people.



- Uses should be avoided in Compatibility Zones 1-5 and allowed with caution in Compatibility Zone 6.
- Outdoor arenas and amphitheaters can be particularly incompatible because no structure provides protection from a light aircraft accident; noise intrusion can also be an issue.

Utilities, Communications, and Emergency Response Facilities

Critical facilities that could be made inoperable if struck by an aircraft should not be situated in the approach (Compatibility Zones 1 and 2).

Other Hazards to Flight

Wildlife Attractants

Among other physical hazards to flight, wildlife strikes represent the most widespread concern. Measures based upon Federal Aviation Administration FAA guidance should be established to prevent creation of known types of conflicts and to enable mitigation of unanticipated problems. Particular attention should be paid to any proposed use that could create an increased attraction for birds and other wildlife. These uses include landfills, stormwater detention facilities, refuge containers, and certain agricultural uses that may attract birds or other wildlife that may pose hazards to aircraft in flight and people on the ground.

Tacoma Narrows Airport



Waterfowl, gulls, and raptors represent 77 percent of reported bird strikes causing damage to aircraft in the US. Over 70 percent of all strikes occur within 500 vertical feet within the airport traffic pattern. (Photo courtesy of the Tacoma News Tribune)

The FAA recommends that uses known to attract birds—sanitary landfills and certain types of crops being primary examples—be kept at least 5,000 feet from runways used only by piston-powered aircraft. For runways used by turbine-powered aircraft, the distance increases to 10,000 feet.

 FAA rules and regulations concerning these hazards are found in FAA Order 5200.5A, Waste Disposal Sites On or Near Airports, and Advisory Circular 150/5200-33, Hazardous Wildlife Attractants On or Near Airports.

- **FAR Part 139** – FAA regulations associated with wildlife hazards are addressed in FAR Part 139 (14 CFR 139) *Certification of Airports*. Section 139.337 requires holders of Airport Operating Certificates (or air carrier airports) to “take immediate action” to address potential wildlife hazards once they are identified.

 Available at: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/title14/14tab_02.tpl

- **Grant Assurances** – While none of the standard grant assurances explicitly addresses mitigation of bird and wildlife hazards, three establish requirements that can broadly be applied to the issue. These assurances require airports to:
 1. Operate and maintain the facilities in a safe and serviceable condition (no. 19).
 2. Remove, lower, relocate, mark, light, or otherwise mitigate existing airport hazards and prevent the establishment or creation of future airport hazards (no. 20).
 3. Take appropriate action 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 (no. 21).

Beyond these two sources, federal guidance is advisory. Several FAA advisory circulars address particular aspects of the issue.

- ***Wildlife Hazard Management at Airports: A Manual for Airport Personnel (July 2005)*** – FAA’s most thorough reference document. The manual includes background information, agencies and organizations involved in wildlife hazard management at airports, and applicable legislation, regulations, and policies as well as direct and indirect controls for addressing potential hazards.

 Available at: http://wildlife.pr.erau.edu/englishmanual/2005_faa_manual_complete.pdf

- **AC 150/5200-32A, *Reporting Wildlife Aircraft Strikes (December 2004)*** – Explains the importance of reporting collisions between aircraft and wildlife and describes FAA’s Bird/Other Wildlife Strike Reporting system. Provides instructions on how to report a wildlife strike in paper or electronic format, and provides links to wildlife strike reporting mechanism.

 Available at: www.faa.gov/documentLibrary/media/advisory_circular/150-5200-32A/150_5200_32A.pdf

Additional guidance regarding mitigation of wildlife hazards is available from WSDOT Aviation. In 2009, the Aviation Division, in coordination with WSDOT Environmental Services and the FAA, developed a stormwater design manual to assist in the design, construction, and maintenance of stormwater facilities on and near airports. The manual focuses on design modifications to decrease the attractiveness of stormwater facilities to wildlife rather than active wildlife removal measures.

 Available at: www.wsdot.wa.gov/aviation/airportstormwaterguidancemanual.htm

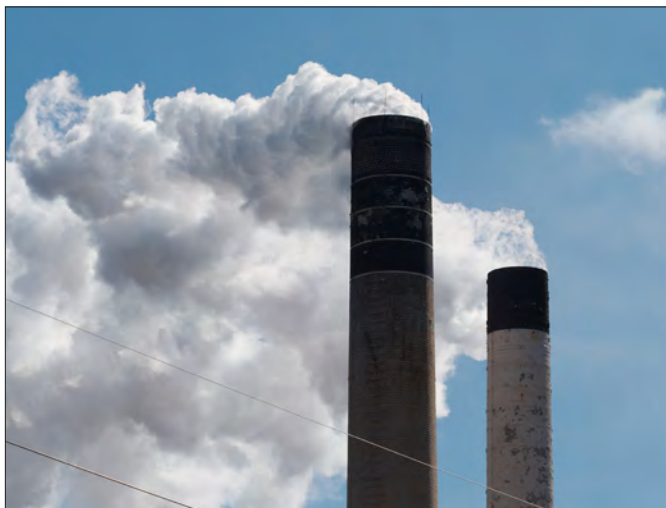
Thermal Plumes

An additional, little recognized, physical hazard to aircraft flight are thermal plumes generated by power plants. Invisible unless the heated air turns to steam, the plumes from large facilities can create unstable air at the altitude that airplanes or helicopters fly when near airports. Power plants and other facilities that generate large thermal plumes should be avoided within airport traffic pattern areas.

Visual and Electronic Interference

Criteria defining land use characteristics that can cause visual or electronic hazards to flight are more qualitative in nature—the FAA has not set any precise standards. In general, visual hazards to flight include sources of dust, steam, smoke, or glare that can impair pilot visibility, as well as distracting lights that can be confused for airport lights. Electronic hazards are ones that can cause interference with aircraft communications or navigation. While it is not always possible to prevent these types of hazards to flight from occurring, awareness of the potential can often enable reduction or mitigation of the most serious problems.

Visual Hazard



Tools That Address Specific Airport Land Use Compatibility Factors

Compatibility Strategies

Density and Intensity Limits

Establishment of criteria limiting the maximum density (number of dwellings) or people per acre is the most direct method of reducing the potential severity of an aircraft accident. In setting these criteria, consideration must be given to the two different forms of aircraft accidents—those in which the aircraft is descending, but is flying and under directional control of the pilot and those in which the aircraft is out of control as it falls (also see later discussion of clustering).

Limits on usage intensity—the number of people per acre—must take into account both types of potential aircraft accidents. To the extent that accidents and incidents are of the controlled variety, then allowing high concentrations of people in a small area would be sensible, as long as intervening areas are less populated. However, concentrated populations present a greater risk for severe consequences in the event of an uncontrolled accident at that location. Limiting the average usage intensity over a site reduces the risks associated with either type of accident. In most types of land use development though, people are not spread equally throughout the site. To minimize the risks from an uncontrolled accident, the criteria should also limit the extent to which people can be concentrated and development can be clustered in any small area.

Open Land Requirements

Creation of requirements for open land near an airport addresses the objective of enhancing safety for the occupants of small aircraft forced to make an emergency landing away from a runway. If areas are sufficiently large and clear of obstacles, open land can be valuable for light aircraft anywhere near an airport.

For large and high-performance aircraft, however, open land has little value for emergency landing purposes and is useful primarily where it is an extension of the clear areas immediately adjoining a runway.

Tools for Enhancing Compatibility

Tools for Addressing Specific Airport Land Use Compatibility Issues

The land use compatibility tools described in the first part of this chapter are ones that apply broadly throughout a community and typically are employed during the comprehensive plan amendment process. The group of tools outlined here may be enabled through the comprehensive plan or zoning ordinance, but are more narrowly focused in their application. Typically, they will come into play with regard to a specific land use development proposal.

Airport Development Review Committee

An Airport Development Review (ADR) committee is a volunteer board appointed by the airport or local jurisdiction that ensures compliance with the jurisdiction's goals, policies, and implementation regulations. Committee members volunteer their time and expertise to ensure that development within the airport influence area is compatible with the current and future airport environment.

How can an ADR committee be used to promote airport land use compatibility?

Use the ADR committee to review proposed development within the airport influence area. Draw upon local skills and expertise in regards to airport operations and planning. Be sure to include a variety of stakeholders. The goal of the committee is to assess the compatibility of proposed uses in relation to the jurisdiction's goals, policies and development regulations. Have the committee meet once a month to review applications and make recommendations to the jurisdiction's planning staff. The committee may be used to review planned unit developments, variances, and conditional-use permits.



Clustering of Development

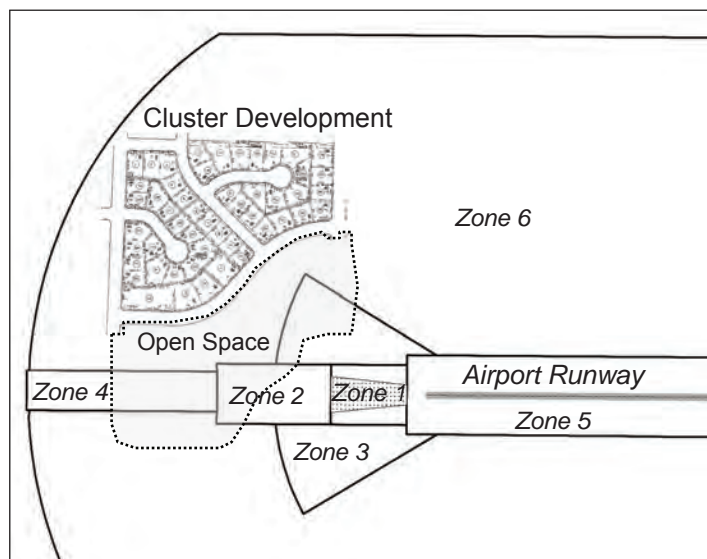
Clustering is the grouping of a particular development’s structures on a portion of available land. This reserves a significant amount of the site as protected open space. Cluster developments are appropriate for all types of development activity. They may be used in conjunction with commercial, industrial, mixed-use, and residential development. The advantage of this land use technique to the community is that it preserves open space and critical areas. The advantage to the developer is the opportunity to construct at a higher intensity or height and a lower cost of infrastructure and the ability to develop open space for passive uses.

How can cluster development be used to promote airport land use compatibility?

Clustering has several advantages for airport land use compatibility planning. It can be especially valuable with respect to safety if portions of the remaining undeveloped land are not just free of buildings, but also relatively flat and clear of other large objects such as trees and poles. If large enough—about a football field in size—these “open land” areas can potentially serve as emergency landing spots for small aircraft. For residential uses, clustering the dwellings into multifamily buildings can make them less susceptible to noise intrusion.

One caution to recognize with clustering is that its use should be limited to areas that have frequent airport operations and in areas where the potential for aircraft accidents is elevated, such as the runway approach. Providing open land areas can enhance the prospects for successful near-airport emergency landings when the aircraft is under control while descending. However, many accidents involve aircraft that are out of control and will strike whatever is in their path. Allowing a high concentration of people in the high-risk compatibility zones is not wise.

Cluster Development



Cluster developments may be used to move development away from areas that experience greater aviation impacts: noise, light, vibration, risk, fumes and low-flying aircraft.

Transfer of Development Rights

A transfer of development rights (TDR) program is a market-based mechanism that promotes the voluntary transfer of growth from places where a community would like to see less development, to places where a community would like to see more development. The owner of a site within a sending area retains property ownership, but gives up all or part of the rights to develop the property. The owner of a site within a receiving area may purchase transferable development rights from an owner of property in the sending area. This allows the sending area owners to obtain value for the property and the receiving area owner to develop the receiving property to a greater density or intensity than would have otherwise been permitted.

How can TDR be used to promote airport land use compatibility?

Use a TDR program to:

- Designate sending areas for residential development rights within the airport influence area. Target aviation environments impacted most by airport operations.
- Keep critical areas clear of all development—residential, commercial, industrial, etc.
- Designate receiving areas for residential development rights outside the airport influence area.
- Increase density and allow greater structure heights adjacent to transit hubs.
- Encourage infill development to maximize preexisting infrastructure such as power, water, and sewer.
- Promote compatible commercial and industrial development.
- Promote preservation of open space by sending incompatible activities to appropriate locations.



Infill Development

Every jurisdiction across the state has property that is either vacant or underdeveloped relative to its potential use as identified in the comprehensive plan and zoning maps. Infill is the practice of developing or redeveloping vacant or under utilized land in the midst of a community, especially land that is surrounded by existing uses similar to the ones proposed. This may mean further subdivisions of existing parcels to accommodate additional growth, redevelopment of under-utilized property to increase its density or intensity, or simply creation of new development on vacant land. Infill is often a desirable goal since it utilizes existing infrastructure and reduces development pressure on other lands within the airport influence area. In many cases, infill development results in a higher residential density or mixed-use commercial office development.

How can infill development be used to promote airport land use compatibility?

Use infill development to maintain or increase the current level of community compatibility. When appropriate, use infill development to encourage transitions within the community to a more harmonious environment. Promote the addition of mixed-use, commercial, light industrial or, when left with no viable alternative and in an appropriate environment, multifamily. Always remember, residential development should be avoided in critical aviation environments. In an urban environment, creative zoning designations may be employed that allow the addition of a mixture of land uses. For example, a commercial or business office classification may be added that allows existing land to be developed for convenience retail, art studios, office, auto sales, and many more. Use infill development to maintain preexisting commercial and industrial uses or redevelopment of areas that may be transitioning to more intense uses.

Vacant Land With Infill Potential



From a practical standpoint, it is usually impossible to prevent a small, vacant piece of property from being developed in the same manner as its neighbors. Compatibility conflicts unrelated to the airport would occur. Still, it is important not to let infill become the rationale for permitting extensive new airport-incompatible development to move forward. An acreage limit and other qualifications should be set on infill development.

Consider establishing the following conditions for infill uses:

- Limit the size to 20 acres.
 - Require the site to be two-thirds surrounded by existing uses similar to the one proposed.
 - Restrict the new development to a density and/or intensity no greater than that of the surrounding uses.
-

Redevelopment

As older, established communities grow and change over time, there often is a need to remove all or most of the existing structures so that something new can be constructed. Redevelopment can be a powerful tool for revitalizing deteriorating, under-utilized property. However, when the property proposed to be redeveloped is occupied by an existing airport-incompatible land use, every effort should be made to use this as an opportunity to enhance airport compatibility.

Basically, unless a site is small and cannot qualify as infill, redevelopment should be considered the same as new development. The proposal should be required to meet all of the applicable airport land use compatibility criteria.

Mixed-Use Development

Mixed-use development is the combination of commercial, industrial, office, residential, institutional, or other uses in a building or group of buildings. In theory, this practice promotes cost-effective transportation alternatives and a more walkable, sustainable, vibrant, and livable community.

How can mixed-use development be used to promote airport land use compatibility?

Mixed-use developments are compatible with aviation because they often have higher background noise levels that tends to mask aircraft noise and the expectations of people working and living there are different than that of lower density uses. Mixed-use developments may be either used to transition a pre-existing development area to a more aviation-compatible environment, or to promote compatibility in new developments within non-critical aviation areas, such as beneath the downwind leg of the traffic pattern. To achieve a more aviation-compatible environment, jurisdictions should carefully review mixed-use criteria implementing this technique. Mixed-use criteria should include:

- Combination of different type of uses and activities.
- Compatibility with existing and planned airport operational environments.
- Adequate infrastructure in place.
- Sufficient public facilities and public services.
- Served by adequate transportation infrastructure.

Property With Redevelopment Potential



Mixed Use Seattle, WA



Airport Stormwater Design Manual (ASDM): Discouraging Wildlife Attractants

Stormwater and other hazardous wildlife attractants near airports pose a significant safety risk. In fact, about 75 percent of all civil aviation air strikes occur near airports. Waterfowl, gulls, and raptors represent 77 percent of reported bird strikes causing damage to aircraft in the U.S. In 2009, WSDOT Aviation, in coordination with WSDOT Environmental Services and the FAA, developed a stormwater design manual to assist in the design, construction, and maintenance of stormwater facilities on and near airports. The manual focuses on design modifications to decrease the attractiveness of stormwater facilities to wildlife rather than active wildlife removal measures.

How can an Airport Stormwater Design Manual be used to promote airport land use compatibility?

Use the *Airport Stormwater Design Manual* to implement stormwater best management practices within the airport influence area. Require that any new stormwater detention facilities within the approach meet or exceed recommendations found in WSDOT’s airport stormwater manuals.



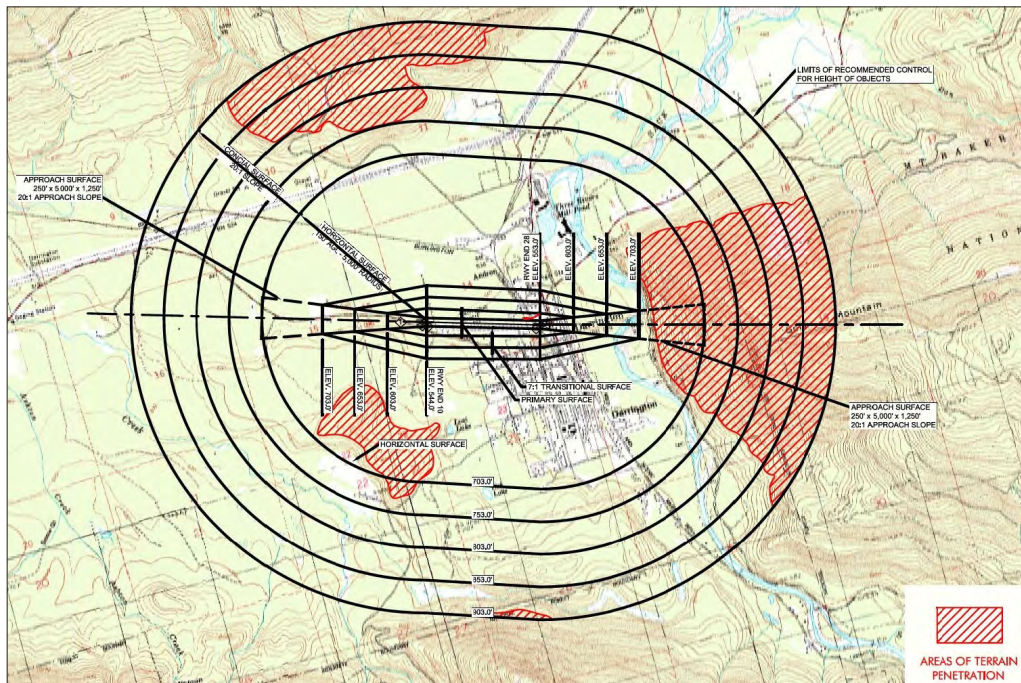
Wireless Communication Facilities Codes

Over the last decade, Washington State has seen an unprecedented growth in wireless communication facilities.

Unfortunately, most jurisdictions lack development regulations governing the siting of wireless communication facilities communication towers and other tall structures that can be hazards to aviation.

Wireless communications

antennas—because of their height and relative inconspicuousness from a fast-moving aircraft—can adversely affect airport airspace. The frequent location of these facilities on ridge lines and other high terrain can pose conflicts with aviation airspace even when situated well away from an airport. The potential for electronic interference with aircraft communications also should be examined in the siting of the antennas.



How can a wireless communications facilities ordinance be used to promote airport land use compatibility?

Jurisdictions can craft ordinances to address the siting of wireless communication facilities. Ordinances can be designed to minimize airspace obstruction by directing the design, location and construction of communication facilities adjacent to aviation facilities.

Jurisdictions should:

- Work with stakeholders to identify pre-approved areas for cell towers.
- Expedite the process for cell tower companies.

A wireless communications ordinance should include:

- A definition of wireless communication towers.
- Prohibit penetration of the FAA's FAR Part 77 *Imaginary Surfaces*.
- Require co-location of communication facilities/structures to accommodate multiple communication antennas—new towers should not be built until it is demonstrated that no existing towers or structures (such as rooftops, water towers) can accommodate the equipment.
- Designate approved and prohibited locations.
- Designate:
 - Maximum allowable height in geographic locations.
 - Setbacks.
 - Compliance with various standards such as the Uniform Building Code, National Electric Code.

Notice of Proposed Construction (FAA Form 7460)

The principal mechanism by which the FAA monitors obstructions to airports and critical airspace is through the Notice of Proposed Construction FAA Form 7460-1. The notification requirements are specified in the application and in Subpart B of the Part 77 regulations. Specifically, notification is required, with certain exceptions, for any proposed object that would have a height exceeding an imaginary surface extending outward and upward from a runway at a slope of:

- More than 50:1 for a horizontal distance of 10,000 feet at airports where no runway is longer than 3,200 feet; or
- More than 100:1 for a horizontal distance of 20,000 feet at airports having a runway longer than 3,200 feet.

Note that these notification slopes are shallower than those of Subpart B, which are used to identify obstructions. Exceptions to the notification requirements are made for objects in developed communities where the proposed object would be shielded by existing structures or terrain of equal or greater height.

Many jurisdictions have imposed modest height limitations for most of their zoning districts. If the local jurisdictions current regulations prohibit buildings or structures heights of over 35 feet, the local jurisdiction may not need to adopt a height hazard overlay district to regulate airspace hazards. The jurisdiction should review height standards within the airport influence area to determine the best means to avoid airspace obstructions.

Does your project need to file a 7460? The FAA's Notice Criteria Tool will assist you in identifying proposed projects that meet the notice criteria.
www.oaava.faa.gov/oaava/external/gistools/gisaction.jsp?action=shownotice-required-toolform

Additionally, any object taller than 200 feet requires FAA notification, regardless of the object’s proximity to any airport. Also important to understand is that federal law places the burden for FAA notification of development near airports on the proponents of such development, not on the local land use jurisdiction. The role of local jurisdictions is to alert project proponents of the notification requirements.

Avigation Easements

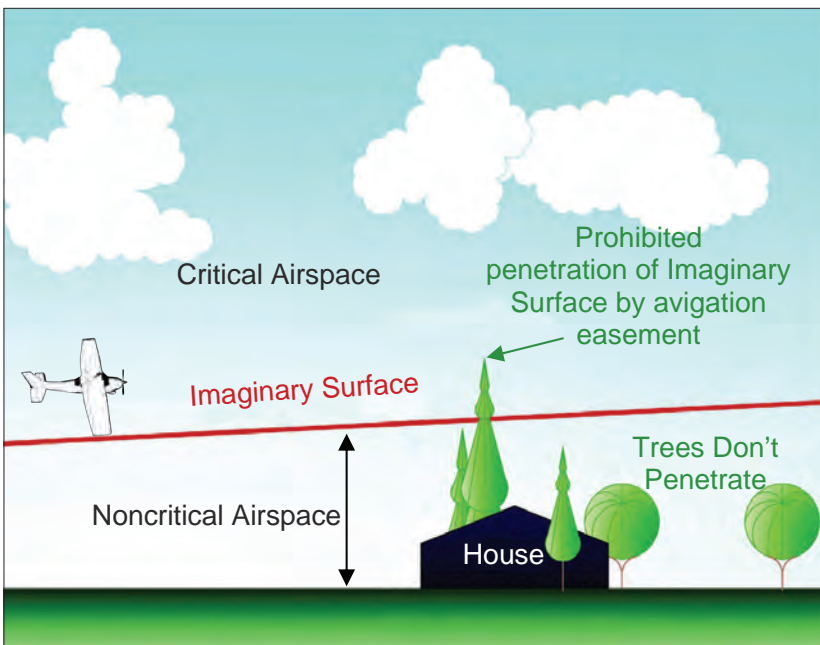
As with any type of easement, an avigation easement is a conveyance of specified property rights from the owner of the property to another party. Avigation easements are recorded with the title to the underlying properties and run with the land—that is, they remain in effect even with sale of the property.

In most cases, avigation easements are owned by the entity owning the airport. The airport may obtain the easements either through purchase or via dedication. An avigation easement typically gives the easement owner the right to fly aircraft over the property at a low altitude and to cause noise, vibrations, exhaust particle emissions, and other impacts associated with normal flight. Limits on the heights of structures, trees, and other objects are also usually established by avigation easements. To enforce these limits, an avigation easement may give the easement owner the right to enter the property to remove or reduce the height of objects that exceed the height limits.

In addition to the specific rights that avigation easements convey, another function they serve is as a form of buyer awareness that carries with it a degree of legal protection for the airport. By having an avigation easement on their property, property owners cannot easily argue politically or through litigation that the airport generates unacceptable noise levels or creates other impacts. While useful in this way, avigation easements do nothing to change the fundamental incompatibility of residential and other inappropriate land uses—they do not address the quality of life people experience.

Another important limitation of avigation easements is that they normally do not restrict the underlying use of the property. Thus, the property could still be used for other type of land use that may or may not be incompatible with airport activity in ways other than height. Where airports wish to prohibit specific land uses—or, conversely, only allow specified uses—they sometimes acquire a type of easement sometimes called an approach protection easement. In practice though, approach protection easements are only occasionally used because their cost is usually not much less than for fee title acquisition.

Avigation Easements May Be Used To Protect Critical Airspace



Source: California Airport Land Use Planning Handbook, 2002 / Mead & Hunt

How can aviation easements be used to promote airport land use compatibility?

Short of fee title property acquisition, airport ownership of an aviation easement is the most certain means of ensuring protection of the runway approaches from too tall objects. For property located close to runway approaches where common structures, trees, and other objects could penetrate the airport airspace, a common practice is to require that the property owner dedicate an aviation easement to the airport as a condition for local approval of property development.

An additional benefit to aviation easements is that they serve as a form of buyer awareness tool as described in the next section. Caution should be exercised, however, in attempting to require aviation easement dedication in locations where buyer awareness is their only purpose. Their most appropriate use is for locations where height limits are substantial or where significant constraints on the development or use of the property are necessary for noise or safety reasons.

Other Tools for Enhancing Compatibility

In addition to the tools identified elsewhere in the guidelines, fly friendly procedures, noise insulation, and property disclosure may be appropriate when used in conjunction with traditional zoning, overlays districts, TDRs or a combination of regulations and incentives. These tools are often used by jurisdictions to

Fly Friendly Procedure

A fly friendly procedure is a voluntary noise abatement program that helps airports reduce their noise footprint within the community. They are educational programs that promote recommended piloting practices and navigation techniques to help minimize impacts on surrounding land uses. Fly friendly procedures are advisory in nature and serve to help pilots be better neighbors.

They are not:

- A tool to discriminate against aircraft propulsion systems (i.e., jets).
- A way of giving preferential treatment to specific aircraft types (i.e., fixed wing, rotorcraft).
- A way to limit commercial service or interstate commerce.
- A way to supersede Federal Aviation Regulations that govern flight or the pilot in command's responsibility for safety air navigation.



Harvey Field's voluntary noise abatement procedure.

How can fly friendly procedures be used to promote airport land use compatibility?

Working toward a more aviation compatible environment is everyone's responsibility and by implementing voluntary fly friendly procedures airport sponsors and pilots can help minimize aviation impacts on surrounding land uses. Airport sponsors can work with the pilot community on ways to minimize aircraft impacts near noise sensitive uses and residential development.

Fly friendly procedures may:

- Designate a preferred runway for all traffic.
- Identify the preferred pattern for fixed wing aircraft.
- Identify the preferred pattern for rotor aircraft.
- Identify overflight areas to avoid.
- Recommend a pattern altitude.
- Recommend a reduced power setting on takeoff, as soon as safe and practical.
- Encourage use of the full runway to gain maximum altitude before overflying adjacent neighborhoods.
- Recommend a climb-out distance and turn to avoid sensitive areas, if at a safe and appropriate altitude.

Noise Insulation

Noise insulation is a mitigation measure that may be utilized in existing structures. For airports that qualify under the FAA's Part 150 program, noise insulation may be an appropriate course of action. However, it should not be used as a mitigation measure in new residential development. It is important to note that it does not provide for compatibility outside the structure and therefore does not meet the intent of [RCW 36.70.547](#). As discussed before, outside activity is a substantial aspect of single-family residential development.

Buyer Awareness Tools

As indicated in previous chapters, the guidebook describes different types of impacts found in the airport influence area. The guidebook also provides a range of actions or tools that can be used to promote compatible land uses. However, rarely do communities have the opportunity to wipe the slate clean and start over with new development or redevelopment patterns. More than likely communities are planning around existing development patterns that may have pockets of land uses that may or may not be compatible when located adjacent to airports. In these cases, options are available to enhance the public's knowledge and understanding of airport impacts through buyer awareness measures.



Jurisdictions across the state have developed different notice requirements and although variations are sometime created, measures designed specifically for the purpose of promoting buyer awareness fit mostly into two categories:

- Aviation Disclosure Notice
- Aviation Easements
- Real Estate Disclosure Statement.

Aviation easements can also serve as a means to disclosed the airport location and aviation impacts. However, this devise primarily used by the airport sponsor to protect critical flight paths. More information on avigation easement is discussed above.

Aviation Disclosure Notices

The aviation disclosure notice is a tool that is used by local land use jurisdictions to disclose the proximity of the airport and airport operations to property that may impact or be impacted by the airport and airport operations. The notice is generally recorded with the County Auditor for noise sensitive uses or uses that may be affected by low-flying aircraft, odor, vibration, and other aviation related impacts. Aviation notice requirements are generally set forth within the local jurisdictions development code, such as the subdivision regulations and or zoning regulations. The following criteria is generally used to apply the disclosure requirements.



Proposed Notice Procedures for New or Existing Lots of Record

Proposed New Lots of Record – As a condition of approval for major and short subdivisions, binding site plans, or similar documents, a note should be required on the face of the final plat map as a condition of approval of the subdivision if the proposed subdivision is located within the airport influence. Plat maps are then recorded with the County Auditor during the normal subdivision process.

Existing Lots of Record – As a condition of new development on existing lots of record, an aviation disclosure notice should be recorded with the County Auditor. The notice would be recorded for all new development/building permit activity, substantial remodels (as defined by the local jurisdiction), conditional use permits, and special use permit within the airport influence area.

Many jurisdictions require a disclosure notice for areas within the airport influence area (5,000 feet from the airport runway) that have noise sensitive uses such as residential uses. Others require notice within horizontal and approach surfaces identified within FAR Part 77 *Imaginary Surfaces*, while other may require notice within the entire airport influence area.

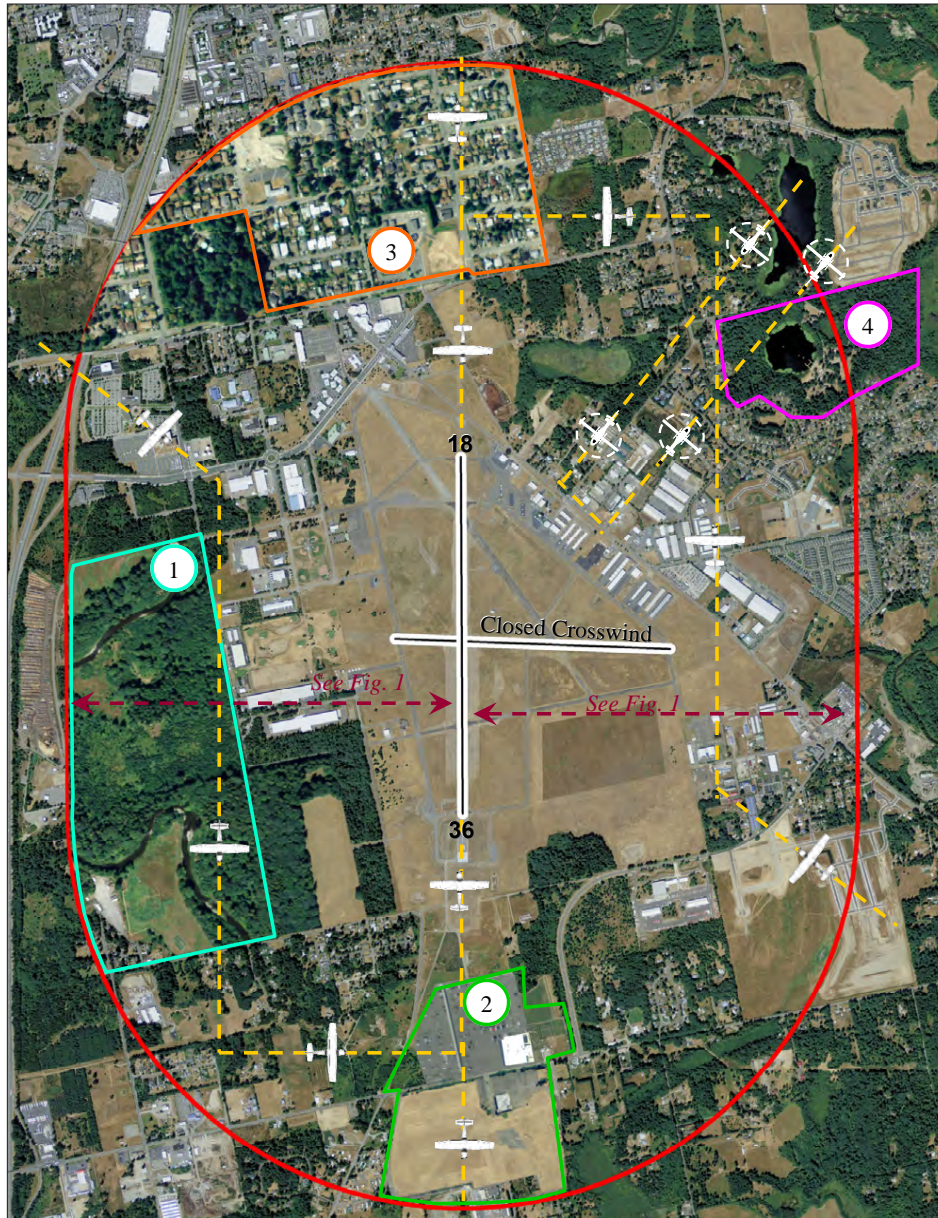
Disclosure During Real Estate Transactions

Some states have established statutory guidance with regard to disclosure of external impacts on a property such as noise, odors, natural hazards, and proximity to undesirable land uses. Airport proximity and the presence of frequent aircraft overflights may be one of the conditions to be disclosed during the sale or lease of residential property.

Disclosure is an obligation between private parties and normally not something that state or local governments can dictate. Nevertheless, WSDOT Aviation encourages counties, cities, and towns that have airports in their jurisdictions to identify the area within which airport proximity disclosure would be appropriate and to make this information known to real estate agents and others who are regularly involved in facilitating real estate transactions.

Land Use Compatibility Scenarios

The following land use scenarios and graphic have been developed to assist local jurisdictions in the decision-making process. Many scenarios, described and illustrated below, represent compatibility challenges that communities may face.

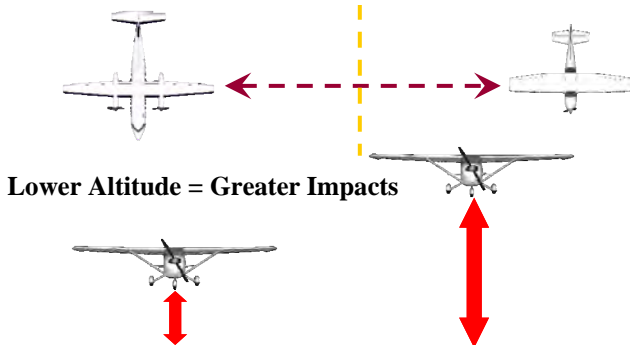


Aircraft Traffic Pattern

- Airport Elevation**
500' MSL
- Traffic Pattern Altitude**
1,000'
- Runways**
Runway 18/36
Crosswind: Closed
- Current Approach Type**
18 Visual
36 Visual
- Future Approach Type**
18 visual
36 Non Precision
- Operations**
Current: 50,000
Future (20 years): 85,000
- Commercial Service**
NA
- Air Cargo**
NA
- Military**
NA
- Fleet Mix**
Single Engine: 99
Twin Engine: 7
Jet: 4
Helicopter: 5
Ultra Light: 2

Always consider the airport's current and future characteristics: runway lengths, approach capabilities, fleet mix, etc.

Width of Traffic Pattern Varies



Lower Altitude = Greater Impacts

Remember the traffic pattern diagram describes the flow of aircraft as they enter the airport traffic pattern, parallel to the runway, turn and make their final approach to land the aircraft. This pattern also demonstrates the general departure path for aircraft. The width of the pattern depends on a number of variables, including the performance and design standards of the aircraft, wind, weather, piloting technique, topography, and aircraft weight. These will help you in assessing potential impacts and weighing alternatives. See [Appendix Section C](#) for additional information about aircraft traffic patterns.

Compatibility Scenarios

When engaging in the airport land use compatibility planning process, always practice the guiding philosophy of do no more harm. Since planners are rarely handed a clean slate to work with, jurisdictions should acknowledge current incompatibilities and move forward from that point on. Whenever possible, jurisdictions should strive to create a more harmonious environment by transitioning incompatible uses into more compatible uses.

Work through the following hypothetical land use scenarios using the aviation compatibility information you have learned so far and the aircraft traffic pattern graphic and airport attributes. (Keep in mind the requirements of [RCW 36.70.547](#) and [36.70A.510](#).)

Scenario 1

Area 1 is inside the urban growth boundary and is currently undeveloped. Preexisting, industrial uses are located to the east and undeveloped areas are located to the north, south, and west. The area has site constraints consisting of wetlands and some steep slopes. The land is currently zoned for commercial and light industrial use.

Aviation Considerations: The area falls within the downwind and baseleg portions of the traffic pattern. The airport's elevation is 500' mean sea level (MSL). The traffic pattern altitude for the airport is 1000' above ground level (AGL). The site has a significantly higher ground elevation than the airport. Aircraft would be generally traversing the area at altitudes ranging from 500' to 700' as they execute the downwind and baseleg portion of the traffic pattern. The area will be overflowed by both single engine and multi engine aircraft.

- What use should the area be zoned for and why? (Single-family residential, high-density residential, commercial/light industrial, mixed-use.)
- What type of impacts will the property experience from aircraft and airport operations?
- Given the area, what tools could a jurisdiction employ to promote a more compatible environment?

Scenario 2

Area 2 consists of both undeveloped property and existing commercial uses. It is currently zoned for commercial development, but 50 percent has remained vacant since its annexation five years ago. No topographical features or wetlands exist on the site. Sporadic low-density residential development exists to the east and the property is zoned for commercial use to the west.

Aviation Considerations: The area falls within the approach/departure portion of the traffic pattern. Runway 36 currently has a visual approach, but has a planned non-precision approach in the future. The traffic pattern altitude for the airport is 1000' above ground level (AGL). The site has the same ground elevation as the airport. Currently aircraft traversing the area are at altitudes ranging from 75' to 250' as they execute the approach and departure phases of flight. The area will be overflowed by all aircraft types.

- Should the undeveloped property be zoned? (Single-family residential, high-density residential, commercial/light industrial, mixed-use.) Why/why not?
- What type of impacts will the property experience from aircraft and airport operations?
- Given the area, what tools could a jurisdiction employ to promote a more compatible environment?

Scenario 3

Area 3 falls inside the urban growth boundary and has a historic and extensive residential development pattern with small pockets of undeveloped and redevelopable property and is zoned residential low. Industrial and commercial properties are located to the south, vacant land to the west, and residential development to the north and east. The site has no topographical or wetland constraints.

Aviation Considerations: The area falls within the approach/departure portion of the traffic pattern. Runway 18 currently has a visual approach. The airport's elevation is 500' mean sea level (MSL). The traffic pattern altitude for the airport is 1000' above ground level (AGL). The site has the same ground elevation as the airport. Currently aircraft traversing the area at altitudes ranging from 100' to 250' as they approach and depart the airport. The area will be overflowed by all aircraft types.

- Should the property be rezoned? (Single-family residential, high-density residential, commercial/light industrial, mixed-use.) Why/why not?
- What type of impacts will the property experience from aircraft and airport operations?
- Given the area, what tools could a jurisdiction employ to promote a more compatible environment?

Scenario 4

Area 4 falls outside the urban growth boundary and has yet to be developed. Residential development is located to the south and west of the site. Property to east and north are undeveloped. The site has wetlands constraints.

Aviation Considerations: The area falls within the baseleg portion of the traffic pattern for fixed wing single and multiengine aircraft. A portion of the property also falls within the established traffic pattern for helicopters. The site has a lower ground elevation than the airport. Aircraft would be generally traversing the area at altitudes ranging from 700' to 900' as they execute the traffic pattern. The area will be flown over by helicopters, single engine and multi engine aircraft. The land is currently zoned for low-density rural residential use, one dwelling unit per five acres.

- Should the undeveloped property be zoned from its current land use designation of rural residential?
- What type of impacts will the property experience from aircraft and airport operations?
- What tools could the jurisdiction use to encourage a more compatible environment?

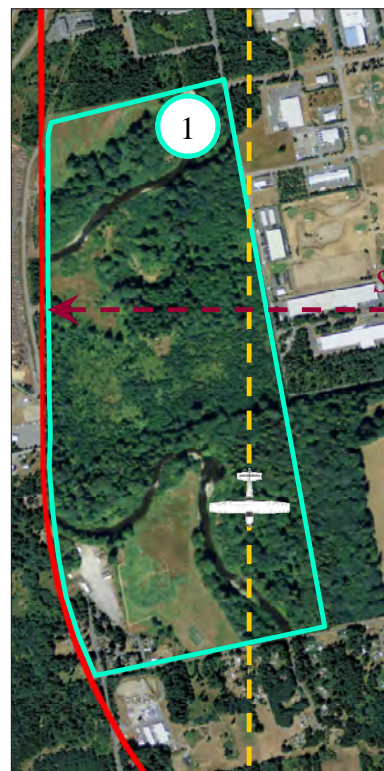
Compatibility Scenarios Discussions

Scenario 1 Discussion

WSDOT’s recommends designating the area for commercial/light industrial. Manufacturing, business office park, or mixed-use commercial/industrial would be ideal for the area. See the land use matrix in [Appendix Section F](#) for addition recommendations.

The property is currently a clean slate with no established development pattern. The only adjacent use is an industrial area to the east. The property falls directly under the downwind and baseleg portions of the airport’s traffic pattern. Due to the property’s topographical features, higher terrain elevation, single engine and multi engine aircraft would be generally traversing the area at lower altitudes. This lower altitude will exacerbate the impacts of noise, light, vibration, fumes, and the negative perception of low-flying aircraft on adjacent uses. Single-family residential and high-density residential are incompatible with the current aviation environment. Mixed-use is a less desirable alternative and should only be used when all other alternatives have failed.

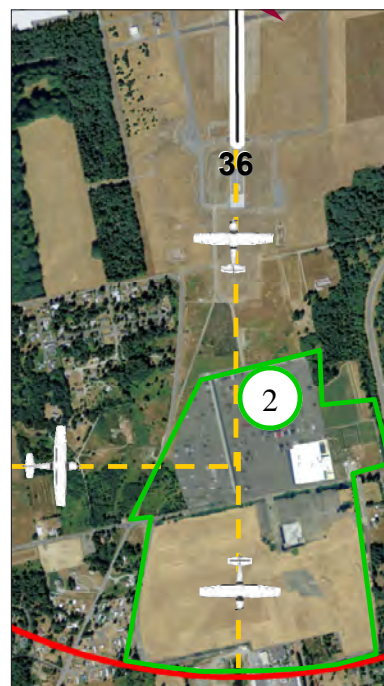
Tools: Cluster development, height hazards ordinance, discourage: high intensity uses, prohibit: reflective building materials, visual hazards, electronic interference, hazardous or flammable materials and wildlife attractants.



Scenario 2 Discussion

WSDOT recommends that all of the property within Area 2 retain its current commercial zoning designation. Out of the zoning choices presented, this is the most compatible option for the adjacent area and airport. The sporadic low density residential development to the east is not an established development pattern and may be transition to a more compatible use in the future. The adjacent property to the west has a zoning designation of commercial and has an established use. Aviation impacts and concerns include the property falls directly in the approach to runway 36. The aviation impacts of risk, noise, light, vibration, fumes, and the negative perception of low-flying aircraft will be significant. The property falls along the extended runway center line for runway 36. The majority of all aircraft accidents occur along this extended centerline. The approach to runway 36 will be changing from a visual to a non-precision. This approach change will translate into aircraft flying at even low altitudes above the property. Aviation impacts will increase over time as the number of operations grow. The airport is projected to have 85,000 operations in 20 years.

Tools: Height hazards ordinance, prohibit: high intensity uses, reflective building materials, visual hazards, electronic interference, hazardous materials, and wildlife attractants.



Scenario 3 Discussion

Given the area's well established and historic development pattern, WSDOT recommends that it retain its current zoning designation of residential. The property is directly in the approach to runway 18 and will be significantly impacted by low-flying aircraft, noise, light, vibration, and fumes. Since the area falls within the approach to runway, there is an elevated level of risk associated with it. The jurisdiction may wish to examine the area on a smaller scale and look for opportunities to promote a more compatible and harmonious environment. For example, the subject property is bordered by industrial and commercial uses to the south. Often older residential areas will evolve over time into another use. It is not uncommon to see commercial uses transitioning the periphery of these residential areas. Jurisdictions may wish to encourage this by promoting mixed-use zones. Larger parcels, away from the extended runway centerline, may be zoned for multifamily or mixed-use development. Opportunities for low impact commercial uses, along the extended runway centerline should be encouraged. Airport managers should work with planners on a recommended abatement procedure that lessen impacts on residential areas.



Tools: Redevelopment or adaptive reuse of residential areas, infill with mixed-use or multifamily, voluntary abatement procedure, height hazards ordinance, prohibit: high intensity uses, reflective building materials, visual hazards, electronic interference, hazardous or flammable materials, and wildlife attractants.

Scenario 4 Discussion

WSDOT's recommended strategy for Area 4 is to retain its current residential zoning designation. The designation promotes a compatible rural density of one dwelling unit per five acres. The property is located in the traffic pattern for fixed wing aircraft. It is also in the established traffic pattern for helicopters. The area will be impacted by low-flying aircraft, noise, light, vibration, and fumes. The ideal development for the area would be a cluster development that moves the residential development outside the airport influence area. The property, inside the influence and constrained by wetlands, could be used as open space and facilitate an increase of density in the buildable land to the east.

Tools: Cluster development, height hazards ordinance, discourage: high intensity uses, prohibit: reflective building materials, visual hazards, electronic interference, hazardous or flammable materials, and wildlife attractants.



