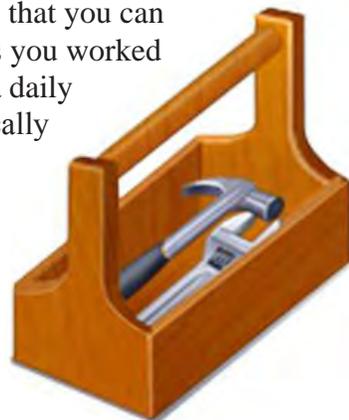


Chapter 3

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

- 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.



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

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

- 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.



Substantial residential encroachment around Hoskins Field, Olympia, Washington.

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.

Special Function Use



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

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 amphitheatres 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

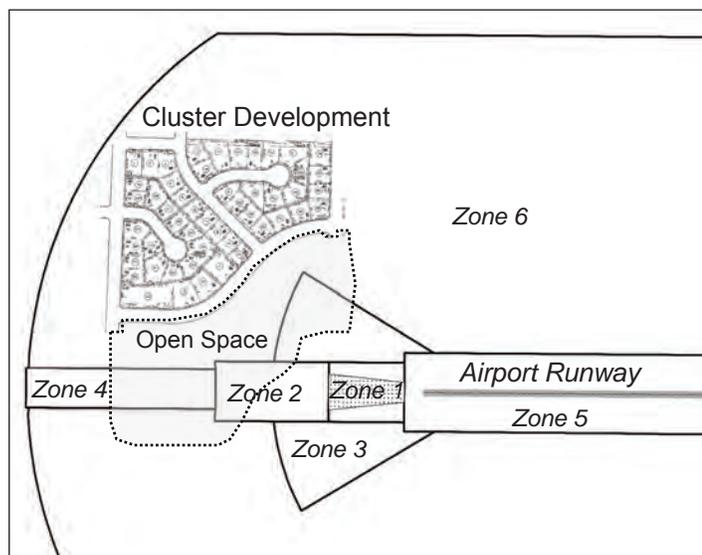
Clustering is the grouping of a particular development’s structures on a portion of available land. This reserves a significant amount of the site as protected open space. Cluster developments are appropriate for all types of development activity. They may be used in conjunction with commercial, industrial, 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.



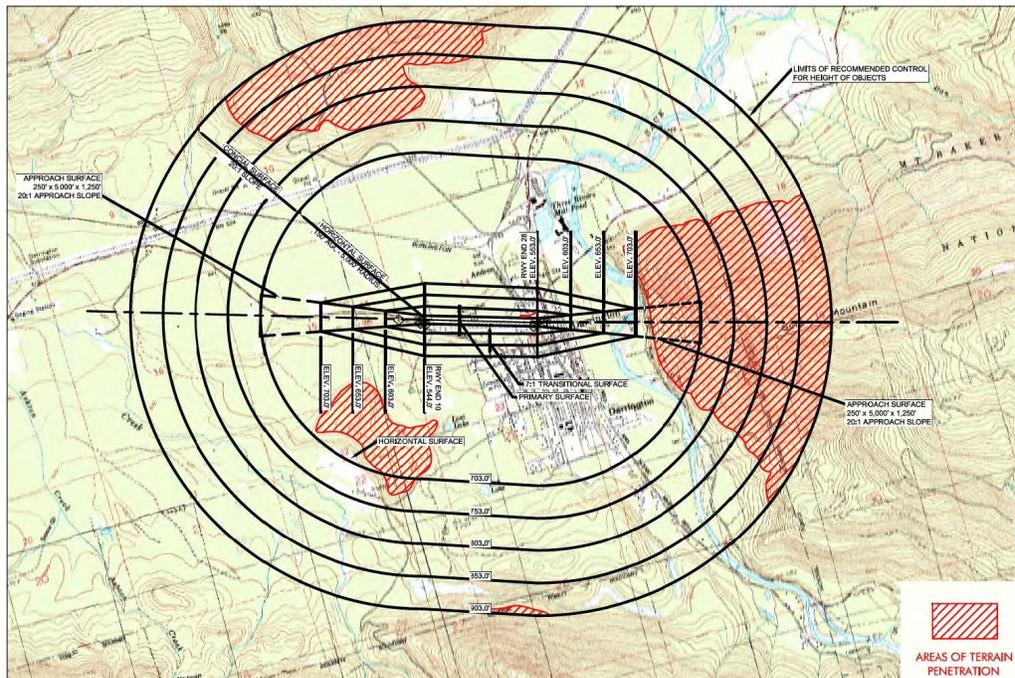
Wireless Communication Facilities Codes

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 purposed projects that meet the notice criteria.
www.oiaa.faa.gov/oiaa/external/gistools/gisaction.jsp?action=shownoticerequiredtoolform

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

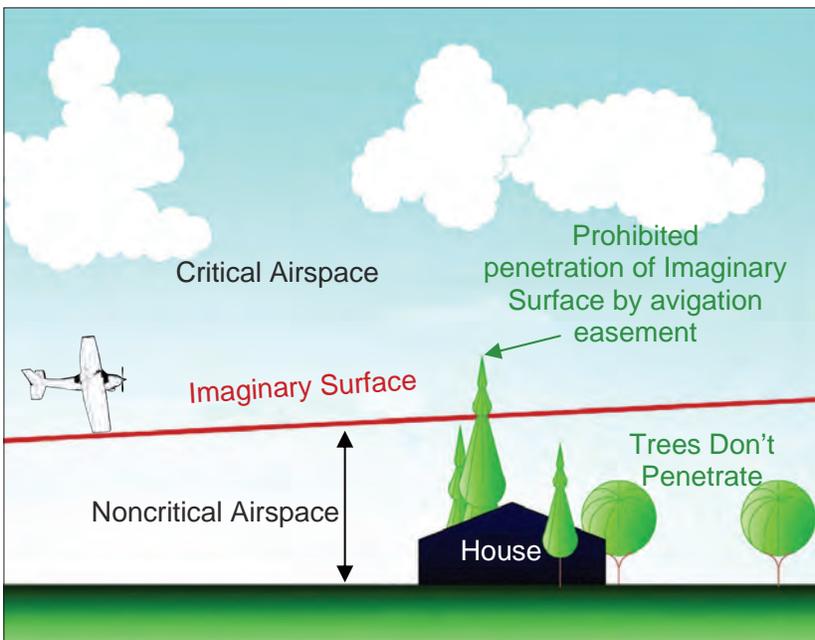
As with any type of easement, an avigation easement is a conveyance of specified property rights from the owner of the property to another party. Avigation easements are recorded with the title to the underlying properties and run with the land—that is, they remain in effect even with sale of the property.

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.

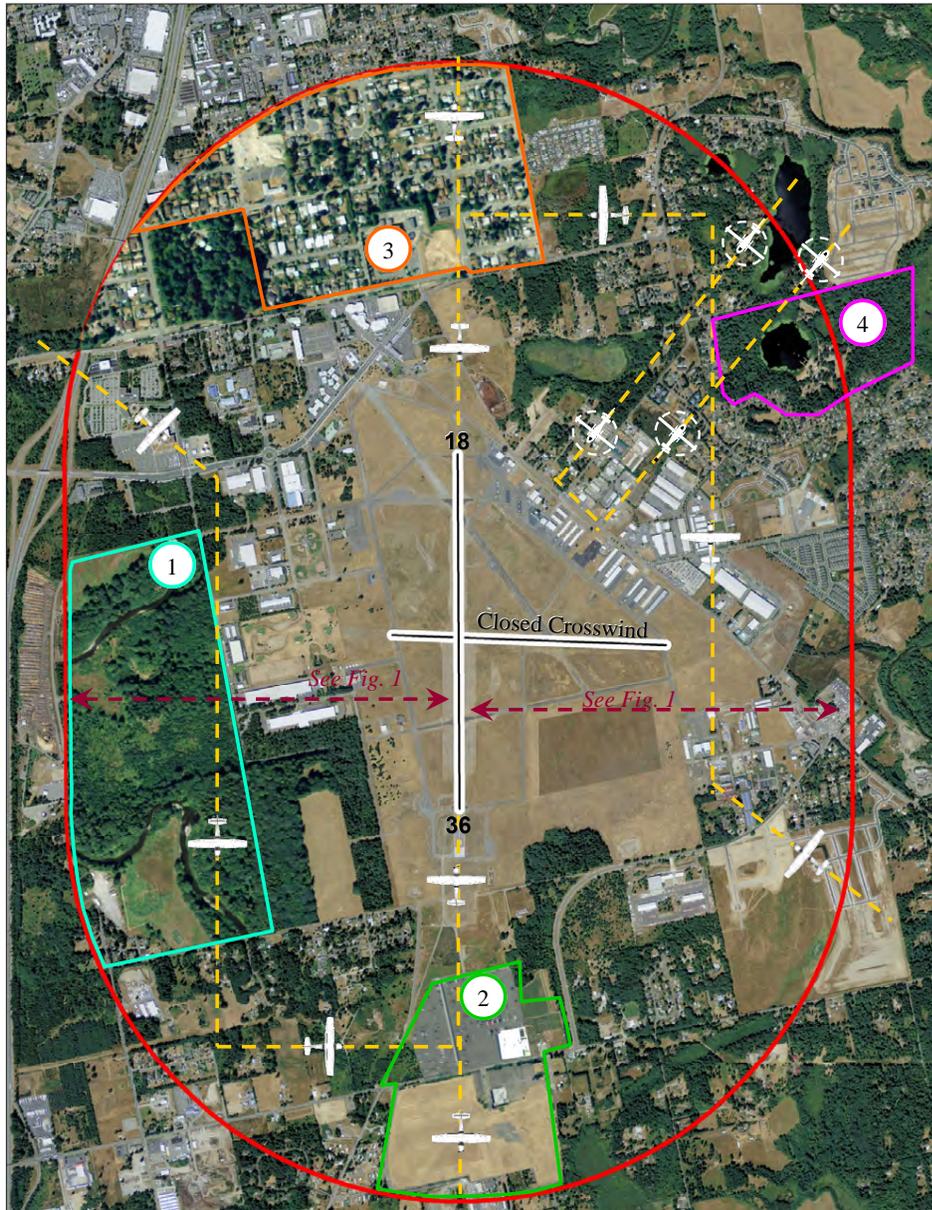
Disclosure During Real Estate Transactions

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

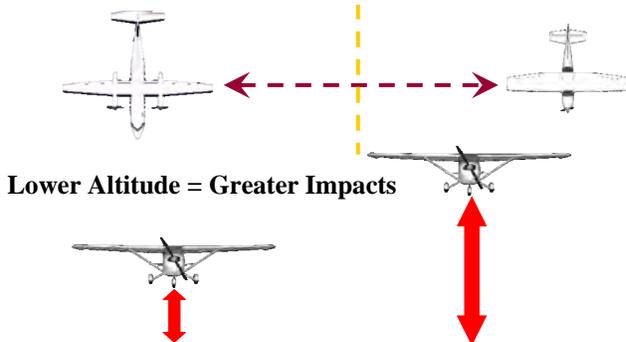
Jet: 4

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



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 overflown 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 overflown 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?

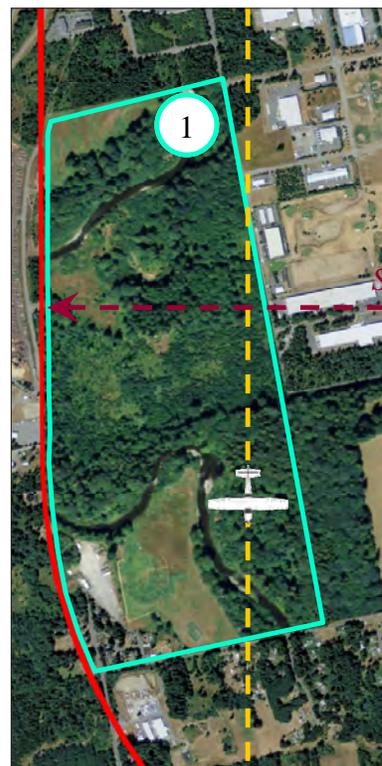
Compatibility Scenarios Discussions

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.

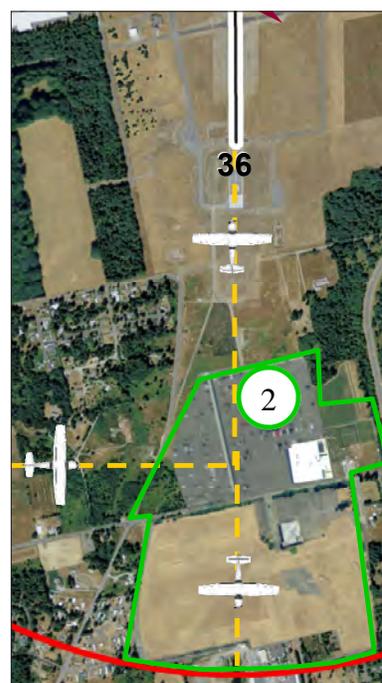
Tools: Cluster development, height hazards ordinance, discourage: high intensity uses, prohibit: reflective building materials, visual hazards, electronic interference, hazardous or flammable materials and wildlife attractants.



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.

