

2011

Wisconsin Airport Land Use Guidebook



Bureau of Aeronautics

Wisconsin Department of Transportation

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Preface

Welcome to the Wisconsin Airport Land Use Guidebook (2011 edition). This revised guidebook is designed to help communities and airports work cooperatively to plan for and establish compatible land use around airports and work towards mitigating existing incompatible conditions. Land use compatibility is a significant, yet often unrecognized, factor in aviation safety. When asked to describe an airport safety-related matter, many people refer to the perimeter fencing or the security checkpoint within an air carrier airport. Seldom does the average citizen recognize that bright lights, residential developments, wetlands, and tall towers pose hazards to airports, their users, and nearby residents. The goal of this guidebook is to protect communities and airports from incompatible land use that could negatively affect the safe operation of airports and pose hazardous consequences to the public. In this guidebook, stakeholders will find information and resources that may help them direct the future development of their communities and airports. Stakeholders who might find this guidebook useful include airport and community planners; airport owners and managers; zoning administrators; local, state, and regional agency officials; developers; legislators; and the general public.

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Chapter 1 Introduction

Wisconsin has a diverse aviation system of more than 130 public use airports. With the growth of the global market, transportation of goods and passengers is increasingly becoming a key element of Wisconsin's economy. The aviation system provides a variety of services for state residents and plays an important role in attracting business and industry to the state. Airport sponsors in Wisconsin, as well as in other states, need to maintain and develop the existing aviation infrastructure to ensure that the aviation system is preserved to meet future needs.



Figure 1-1: Outagamie County Regional Airport, Appleton, WI

One of the primary concerns facing the aviation industry today is the increasing pressure of incompatible land use near airports. Incompatible land uses are those that constrain safe and efficient operation or expose people living or working nearby to noise or other aviation hazards. In recent years, Wisconsin's airports have felt the increasing demand for developable space adjacent to airports, both in the air and on the ground. Without proper planning, incompatibilities are likely to increase as the demand for developable land and air travel grows.

Airport compatible land use planning is essential for a number of reasons. Foremost, it enhances the safety of those in the aircraft and on the ground by mitigating factors that may contribute to aircraft accidents. Secondly, compatible land use planning protects airport viability and development potential by correcting and restricting land uses that could limit the airport's growth. Compatible land use planning also increases the quality of life for airport neighbors and the surrounding communities by alleviating the negative impacts of aircraft and airport operations. For these reasons, compatible land use planning is an important component of Wisconsin's aviation industry.

Purpose of this Guidebook

The main purpose of this guidebook is to provide informational and educational guidance to airport and government officials, planners, and residents. It is intended to help airport stakeholders establish compatible land uses around their airports to improve public welfare and safety by employing and incorporating the most effective tools available. It also provides helpful resources for local officials to incorporate airport compatible land needs into their comprehensive planning process. Through this process, communities can work cooperatively with airports to reach the mutually beneficial goal of compatible land use and economic vitality.



Figure 1-2: Burnett County Airport, Siren, WI

The first chapter of this guidebook discusses the importance of the aviation industry and provides a brief snapshot of airports in Wisconsin. Chapter 2 highlights the importance of establishing compatible land uses around Wisconsin airports by outlining the impact of safety and noise hazards resulting from incompatible land use and discussing FAA safety and noise standards.

Chapter 3 discusses land use compatibility concerns in greater detail. The least compatible land uses around airports include structures with large densities of people, streetlamps and buildings that emit bright light, dust-producing smokestacks that cause visual and physical obstructions, and ponds and large wetlands that attract wildlife hazards. More compatible land uses include farmland, low density residential development, and small office buildings.

Chapter 4 presents a brief summary of state and federal land use regulations and guidance, providing a legal snapshot of the issues concerning land use compatibility surrounding airports. This section of the document includes Section 114.135-6, Wis. Stats, which grants airport owners the legal authority to protect airspace and formulate ordinances regulating the height of buildings, structures, and objects of natural growth within three miles of the airport. Additionally, this section of the document discusses

Wisconsin's comprehensive planning law, which requires all zoning, subdivisions and official maps of a community to be consistent with its adopted comprehensive plan. As one of nine required comprehensive plan elements, the "Transportation" element provides an avenue for unprecedented coordination among airports, airport managers, commissions and their host communities.

Chapter 5 discusses the roles and responsibilities of stakeholders involved in the compatible land use planning process on the federal, state, and local levels. Finally, Chapter 6 identifies techniques for establishing compatible land use within the areas of planning and zoning, natural features mitigation, land acquisition and agreements, and noise mitigation. This chapter serves as a pivotal starting point for airports and their communities, but it is important to be mindful that all airports and localities are unique and land use compatibility issues and solutions will vary.

Web links to useful resources, such as guidance documents and existing plans and programs for various preventive, corrective and mitigation practices, can be found throughout this document.

Users of this guidebook should be aware that the information contained within may not be inclusive of all of the relevant regulations, resources, problems, and solutions; rather, it is meant to be a summary of the primary issues that need to be considered. Interested parties should consult with the Bureau of Aeronautics (BOA) at WisDOT and other relevant agencies for specific guidance regarding aviation planning.

Importance of the Aviation Industry

For a better understanding of the importance of regulating incompatible land uses, it is essential to understand the value of Wisconsin's aviation system.

National Level

The United States has an extensive network of airports that move people and cargo, as well as supports national defense objectives. Aviation is an essential mode of transportation in the U.S; over 1.9 million passengers rely on U.S. airports for business and leisure travel each day.¹ Similarly, business development relies on airports for air cargo and general aviation services. The relationship between airports, aviation, and industry is interconnected and all work to sustain each other's growth and development. The nation's civil aviation industry employs more than 11 million people, with earnings of more than \$396 billion and direct, indirect, and induced outputs of more than \$1.3 trillion.² Airports are essential for job retention and economic development in communities across the nation and protecting their viability is crucial for the national economy.

State Level

Aviation is an important industry in Wisconsin which provides transportation, economic development, and recreational educational opportunities for the citizens of the state and its visitors. The Wisconsin airport system not only links businesses and residents regionally, but also to the rest of the nation and the world. Commercial air carrier airports and general aviation airports are both important resources for

¹ Airport Cooperative Research Program. Report 27: Enhancing Airport Land Use Compatibility, Vol. 1. 2010.

² Federal Aviation Administration, The Economic Impact of Civil Aviation on the U.S. Economy, December 2009, http://www.faa.gov/air_traffic/publications/media/FAA_Economic_Impact_Rpt_2009.pdf.

corporations seeking to expand or locate in the state. In addition to commercial air service and general aviation facilities, the Wisconsin aviation system also provides “quality of life” amenities such as emergency medical services, flight training, and environmental management.



Figure 1-3: Sawyer County Airport, Hayward, WI

Airports and their associated activities are themselves economic engines for communities, providing employment, purchasing goods and services from other businesses, and generating income as aviation-related spending circulates through the economy. The Wisconsin Bureau of Aeronautics measured the economic value of aviation in Wisconsin in the 2002 *Economic Significance of the Aviation Industry in Wisconsin*.

- Economic Significance of the Aviation Industry in Wisconsin can be found here: <http://www.dot.wisconsin.gov/library/publications/topic/air/economic-sum.pdf>

The study found that the total economic significance for 2002 (direct, indirect, and induced economic impact of the aviation industry) was significant, with a total output of \$2.8 billion. The economic significance in 2002 is presented in **Table 1-1**.

Table 1-1: Total 2002 Economic Significance of the Aviation Industry in Wisconsin

	Output	Personal Income	Jobs
Direct	\$1.1 Billion	\$541 Million	13,590
Indirect	\$1.2 Billion	\$443 Million	24,106
Induced	\$0.5 Billion	\$117 Million	4,042
<i>Total</i>	<i>\$2.8 Billion</i>	<i>\$1.1 Billion</i>	<i>41,738</i>

Note: results have been rounded; Source: WisDOT BOA

Wisconsin’s 90 general aviation (GA) airports in the state system and the businesses they support generated more than \$1.5 billion in output, 16,827 jobs, and \$488 million in personal income in direct, indirect, and induced economic impacts in 2002.

Airports in eight cities in Wisconsin offer regularly scheduled commercial airline service to the rest of the nation and the world. In addition to their vital air service roles, these airports are centers of economic activity that generate a large share of aviation’s total economic impact in Wisconsin. In 2002, these commercial airports generated a direct economic impact of nearly \$120 million to the Wisconsin economy, 2,832 jobs, and \$154 million in personal income to Wisconsin residents; whereas the total economic impact, including direct, indirect, and induced impacts of the commercial service airports in Wisconsin exceeded \$1 billion in output, 19,720 in jobs, and over \$480 million in personal income.

Local Level

The value of local airports to their host communities is far greater than the economic value generated by fuel sales, hangar rentals or airport-related business employee payrolls. The importance of aviation to host communities is three-pronged:

- Direct benefits from the provision of aviation services and activities, including increased transportation opportunities for passengers, cargo, aviation businesses, and flight training.
- The provision of special services such as emergency search and rescue, emergency medical service, emergency evacuation, forest fire control, and crop dusting.
- Indirect economic benefits from the improved accessibility and mobility that attracts visitors and other parties such as entrepreneurial businesses to locate themselves in the community.

All of these benefits combine to create the overall value of an airport to its community, the region, state, and the national economy. However, the vivacity of the aviation system is threatened by the encroachment of incompatible land uses on airports and the increasing demand for developable property. This is a national issue facing aviation facilities ranging from small general aviation airports in rural communities to large international airports in metropolitan areas.

Classification and Distribution of Wisconsin’s Airports

Airports, aviation and aviation-related industries play a significant role in the economic success of Wisconsin communities, in part because each airport is part of a greater aviation system. Both the state and federal governments have identified and classified airports which have particular importance within state and national aviation systems. National and state airport system plans provide a framework for the preservation and enhancement of a system of public-use airports able to meet current and future aviation needs.

National Plan of Integrated Airport Systems (NPIAS)

The Federal Aviation Administration (FAA) maintains a National Plan of Integrated Airport Systems (NPIAS) to provide the public with reasonable access to a safe and adequate system of public-use airports. In order to be eligible for federal improvement funds, an airport must be included in the NPIAS. For an airport to be included in the NPIAS, it must function as a public-use airport and meet the criteria specified in one of the categories outlined in **Table 1-2**.

Table 1-2: NPIAS Airport Functional Categories

Category	Significant function
Primary Commercial Service	Must have scheduled air carrier service and enplane 10,000 or more passengers annually.
Non-Primary Commercial Service Airports	Must have scheduled air carrier service and enplane between 2,500 and 10,000 passengers annually.
Reliever Airports	General aviation airports which are intended to reduce congestion at large commercial service airports by providing general aviation pilots with alternative landing areas. They also provide the surrounding areas with access to air transportation.
General Aviation Airports	Included in an accepted state and/or regional airport system plan; serve a community located at least 20 miles from the nearest existing or proposed airport included in the NPIAS; have 10 or more based aircraft; and have an eligible sponsor willing to own and develop the airport.

Source: Wisconsin State Airport System Plan 2020, WisDOT BOA

The FAA has identified 89 airports in Wisconsin that play a pivotal role in the U.S. aviation system and qualify for federal improvement grants. These airports are listed in **Table 1-3** on the following page.

Wisconsin State Airport System Plan (SASP)

Wisconsin's airport system plan is called the Wisconsin State Airport System Plan 2020 (SASP), and the primary purpose of the plan is to provide for the orderly and timely development of a system of airports able to meet the future aviation needs of the state over a 20-year period.

- Wisconsin State Airport System Plan 2020 can be accessed here:
<http://www.dot.wisconsin.gov/projects/state/docs/air2020-plan.pdf>
- Wisconsin State Airport System Plan Airport Classification Review and Update can be found here:
<http://www.dot.wisconsin.gov/projects/state/docs/air-classification-update.pdf>

As part of the SASP, the current and future role of each airport in the system is identified and categorized to assist in the allocation of federal and state funds and identification of development priorities. Most recently, the Wisconsin State Airport System Plan Airport Classification Review and Update revised the classifications to four categories of airports based on functional criteria developed by the Bureau of Aeronautics (BOA) (see **Figure 1-4**). Classification is based on the facility's ability to serve a particular

segment of the aviation community and the parameters of each category are illustrated in **Table 1-4**, found on the following page.

Table 1-3: Wisconsin Airports in the National Plan of Integrated Airport Systems (NPIAS)

Primary Commercial Service Airports		
Austin Straubel International Airport	Central Wisconsin Airport	Chippewa Valley Regional Airport
Dane County Regional Airport	General Mitchell International	La Crosse Municipal Airport
Outagamie County Regional Airport	Rhinelanders-Oneida County Airport	
Non-Primary Commercial Service Airports		
Lakeland Airport/Noble Lee Field	Manitowoc County Airport	Southern Wisconsin Regional Airport
Wittman Regional Airport		
Reliever Airports		
Capitol Drive Airport	Hartford Municipal Airport	John H. Batten Airport
Kenosha Regional Airport	Lawrence J. Timmerman Field	Middleton Municipal – Morey Field
Waukesha County Airport	West Bend Municipal	
General Aviation Airports		
Adams County Legion Field	Alexander Field- South Wood County	Amery Municipal Airport
Baraboo-Wisconsin Dells Airport	Barron Municipal Airport	Black River Falls Airport
Boscobel Airport	Boyceville Municipal Airport	Burlington Municipal Airport
Burnett County Airport	Cable Union Airport	Clintonville Municipal Airport
Crandon Municipal Airport	Crivitz Municipal Airport	Cumberland Municipal Airport
Dodge County Airport	Door County Cherryland Airport	Eagle River Union Airport
East Troy Municipal Airport	Ephraim-Fish Creek Airport	Fond du Lac County Airport
Fort Atkinson Municipal Airport	Grantsburg Municipal Airport	Iowa County Airport
J. Douglas Bake Memorial Airport	John F. Kennedy Memorial Airport	Joshua Sanford Field Airport
King’s Land O Lakes Airport	L.O. Simenstad Municipal Airport	Lancaster Municipal Airport
Langlade County Airport	Madeline Island Airport	Manitowish Waters Airport
Marshfield Municipal Airport	Mauston-New Lisbon Union Airport	Menomonie Municipal Airport
Merrill Municipal Airport	Monroe Municipal Airport	Neillsville Airport
New Holstein Municipal Airport	New Richmond Regional Airport	Palmyra Municipal Airport
Platteville Municipal Airport	Park Falls Municipal Airport	Portage Municipal Airport
Prairie du Chien Airport	Price County Airport	Reedsburg Municipal Airport
Rice Lake Regional Airport	Richard I. Bong Airport	Richland Airport
Rusk County Airport	Sauk Prairie Airport	Sawyer County Airport
Shawano Municipal Airport	Sheboygan County Memorial Airport	Shell Lake Municipal Airport
Solon Springs Municipal Airport	Sparta/ Fort McCoy Airport	Stevens Point Municipal Airport
Taylor County Airport	Tri-County Regional Airport	Tomahawk Regional Airport
Viroqua Municipal Airport	Washington Island Airport	Watertown Municipal Airport
Waupaca Municipal Airport	Wausau Downtown Airport	Wautoma Municipal Airport

Figure 1-4 (found on the following page) shows all public use airports in Wisconsin, based on BOA categories, as listed in the Wisconsin State Airport System Plan Airport Classification Review and Update. It illustrates that a large share of airports in the state are smaller, community-based general aviation airports. The largest categories of airports are medium general aviation (42.9 percent), followed by small general aviation (34.7 percent). Large general aviation and commercial service airports represent the smallest proportion of public airports in Wisconsin, with 14.3 percent and 8.2 percent, respectively.

Table 1-4: Wisconsin Airport Functional Categories

Category	Significant function
Commercial Service	Support regularly scheduled year-round commercial airline service and support the full range of general aviation activity to domestic and international destinations.
Large General Aviation	Support all general aviation aircraft that include daily operations of all types of business jets. These airports generally serve as domestic transportation centers and may support international business activity.
Medium General Aviation	Support most single and multi-engine general aviation aircraft, including those aircraft commonly used by businesses. These airports support regional and in-state air transportation needs.
Small General Aviation	Primarily support single-engine general aviation aircraft, but may also accommodate small twin-engine general aviation aircraft and occasionally business aircraft activity.

Source: Wisconsin State Airport System Plan 2020, WisDOT BOA

Summary

This chapter highlights the importance of the aviation industry for national, state, and local economies and the value Wisconsin airports play in maintaining the viability of the state and national systems of airports. For this reason, it is important to protect each airport in Wisconsin from incompatible land uses. The remainder of this guidebook will discuss compatible land use planning in greater detail.



Wisconsin State Airport System 2010



Figure 1-4: Wisconsin Airport System

Chapter 2 The Importance of Establishing Compatible Land Use around Airports

Establishing compatible land uses around airports reduces impacts on airport operations and persons located in close proximity to the airport. Two main categories of concern are safety and noise. This chapter discusses safety and noise concerns in greater detail and provides a justification for establishing compatible land uses near airports. Additionally, this chapter discusses FAA safety and noise standards, which play an important role in compatible land use planning.

Safety Concerns

All modes of transportation have risks and safety concerns associated with them and aviation is no different. A small number of accidents are inevitable in the area in or around an airport, but the primary goal of airport land use compatibility planning is to temper some of this risk by reducing or eliminating safety hazards surrounding airports. Not only are accidents dangerous to those in the aircraft, they are also dangerous to people on the ground. To minimize accidents, safety risks must be identified and diminished.

Basics of Aircraft Operation

In order to fully comprehend the hazards of incompatible land use, it is important to understand some basics about the operation of an airport and aircraft. During normal operations, aircraft traffic in or near the airport includes arrivals, departures and over flights of aircraft passing through the area. During these activities, pilots usually focus on scanning the surrounding airspace for other aircraft. Distracting obstructions in the airspace can impede pilots from identifying other aircraft or potential dangers.

Additionally, emergency situations can take place anytime. Aircraft emergency situations involve factors that can generally be divided into two broad categories: those under the pilot's control and those outside of the pilot's control. Factors within a pilot's control include the safe operation of an aircraft within FAA guidelines and within the operational capabilities of the aircraft, such as maintaining sufficient flying speed and maintaining proper spacing between multiple flying aircraft. Factors outside of the pilot's control include adverse wind and weather conditions, loss of power, terrain and wildlife hazards.

Airport Traffic Patterns

A typical airport traffic pattern without an operating air traffic control tower (ATCT) is a rectangular circuit around an airport that aircraft fly while waiting for clearance to land. **Figure 2-1** depicts clockwise and counter-clockwise traffic patterns; direction is usually dictated by traffic levels. A counter-clockwise pattern is standard operating procedure. Clockwise traffic patterns are not standard procedure but can be used as part of a noise mitigation program to avoid land uses that may be under the normal counter-clockwise pattern. Entry (1) begins when an aircraft enters the "downwind" leg of the traffic pattern. The aircraft then begins to turn (2) onto the "base" leg (3). After flying the base leg, the aircraft begins its "final approach" (4). If the landing has been aborted, or the aircraft has to maintain the traffic pattern to allow preceding aircraft to land, the pilot turns onto the "crosswind" leg (5, 6) and follows the downwind and base legs once more, or many times, until landing can take place. The crosswind, downwind, base and final approach legs are typically flown between 500 feet and 1,000 feet above the ground. The pattern footprint size depends on the length of the runway. All of the on-ground area included within the

footprint of a traffic pattern should be evaluated for compatible land uses since this is the predominant area affected by aircraft operations.

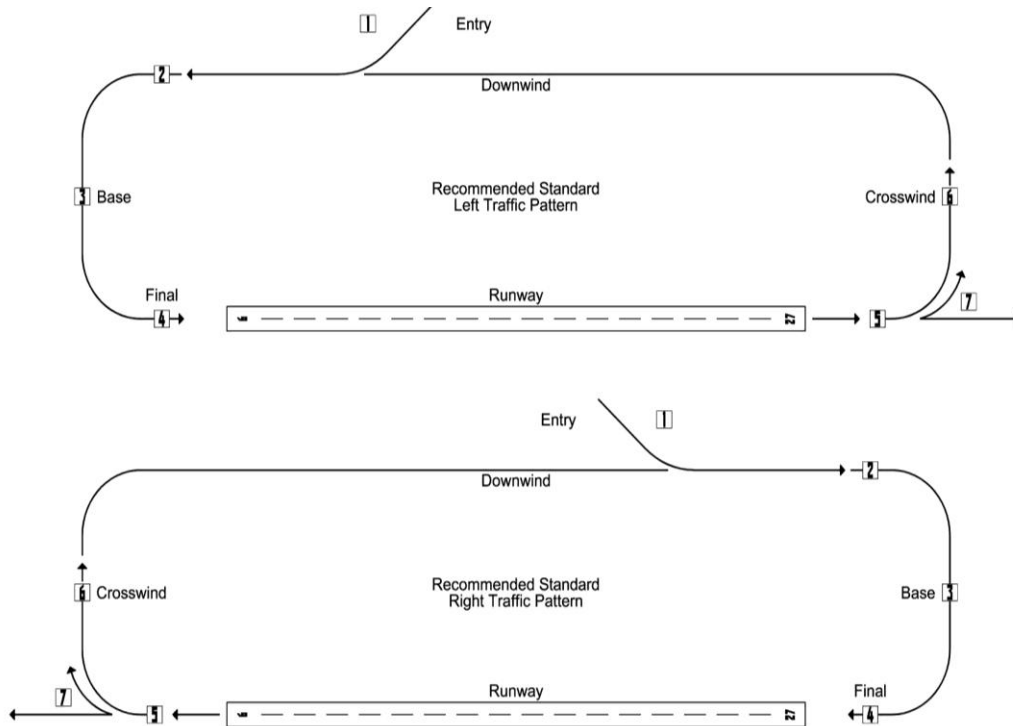


Figure 2-1: Typical Airport Traffic Pattern

Accident Statistics

Perhaps the most critical factor in determining which areas around an airport should be protected is the knowledge of where aircraft accidents occur. From a safety perspective, there are several factors that determine the areas in need of protection around an airport. These factors include the location of accidents relative to the airport, the phase of operation during which aircraft accidents most frequently occur, and the cause of the accidents.

Accidents Are More Common On and Near Airports

The National Transportation Safety Board (NTSB) maintains extensive data on commercial aircraft and general aviation accidents and their causes. Specific data regarding the location of general aviation aircraft accidents relative to existing airport locations are available from the NTSB. Data compiled by the NTSB indicate that the highest number of aircraft accidents occur on airport property. However, the vast majority of the "off-airport" accidents occur within five miles of the airport runway, most of which occur within one mile of the airport. Because lower altitude decreases the chances of successful recovery from unexpected conditions, accidents can be expected to be more common closer to the runway end than at points farther away.

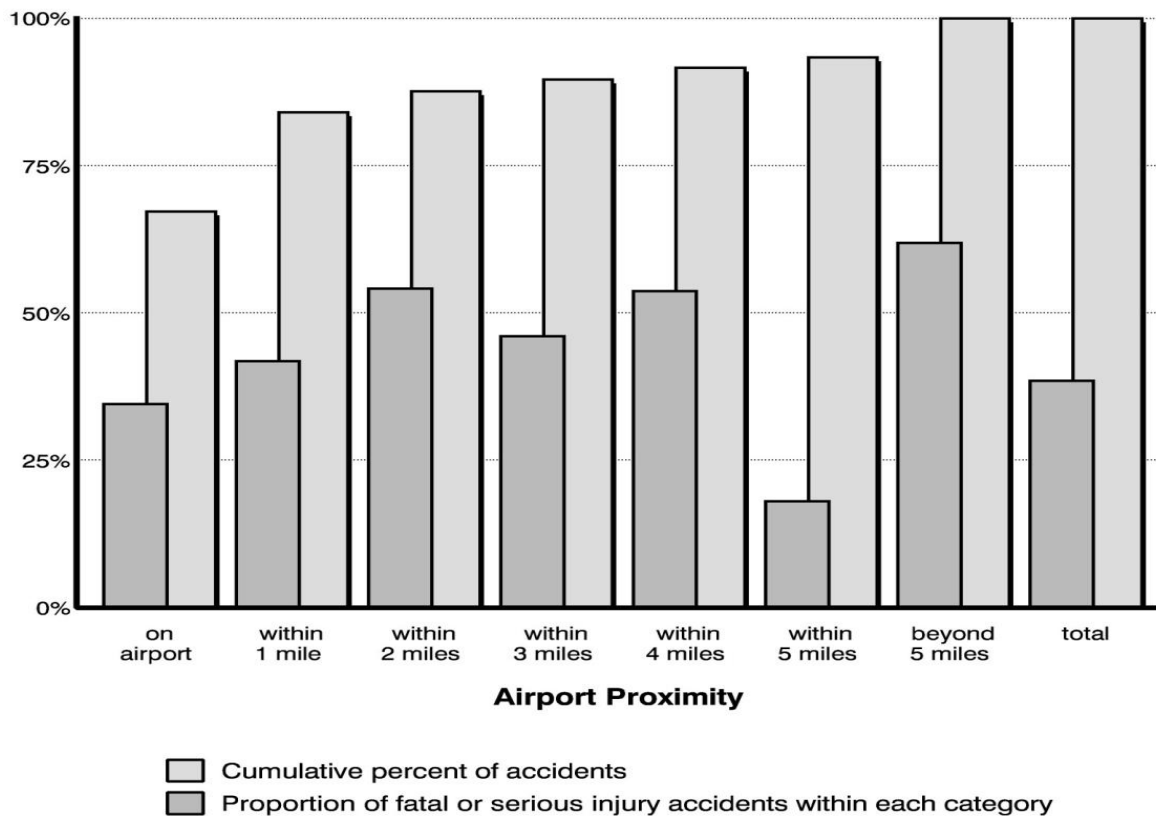
Table 2-1: General Aviation and Commercial Aircraft Accident Data

	General aviation	Commercial aviation
On the ground	4%	22%
En route	34%	25%
Take Off, Approach & Landing	62%	53%
	100%	100%

Source: NTSB Aviation Accident Database, 2003 - 2005

As shown in **Table 2-1**, the NTSB data from 2003 to 2005 reveal that only 34 percent of general aviation and 25 percent of commercial aviation are “en route” accidents (more than five miles from an airport). Conversely, over 75 percent of accidents occur either on the airport or within one mile of the airport (as demonstrated in **Figure 2-2**).

More specifically, a great majority of general aviation aircraft landing accidents take place on or immediately adjacent to a runway. Accidents on or near the runway vary between 64 percent for air carrier operations, 51 percent for commuter operations, and 58 percent for commercial air taxi operations.



Source: Data compiled from NTSB Aviation Accident Databases: General Aviation- Calendar Years 1990- 2000

Figure 2-2: Proximity of Aviation Accidents to Nearest Airport

Accidents Common at Take-Off and Touchdown Phases

When assessing accident data, it is important to identify the phase of flight in which accidents are most common. **Table 2-2** and **Table 2-3** illustrate aircraft accidents reported according to phase of operation from 1990 to 2000 for general aviation airports and commercial service airports. These figures indicate

that more than 50 percent of accidents occurred during takeoff and landing for general aviation aircraft and over 30 percent occurred during takeoff and landing for air carrier aircraft.

Table 2-2: Accidents by Phase of Operation: U.S. General Aviation Aircraft

Phase of operation	Percent of total	Proportion fatal/serious
Standing	1.1	34.6
Taxi	3.5	11.0
Takeoff	18.2	28.9
In flight		
Climb	2.8	46.3
Cruise	11.8	41.5
Descent	4.9	58.9
Maneuver	12.5	58.4
Total	32.1	46.3
Landing		
Approach	10.0	42.5
Landing	33.9	11.3
Go-round	0.3	27.3
Total	44.2	42.5
Other/unknown	0.9	83.6
All accidents	100.0	31.4

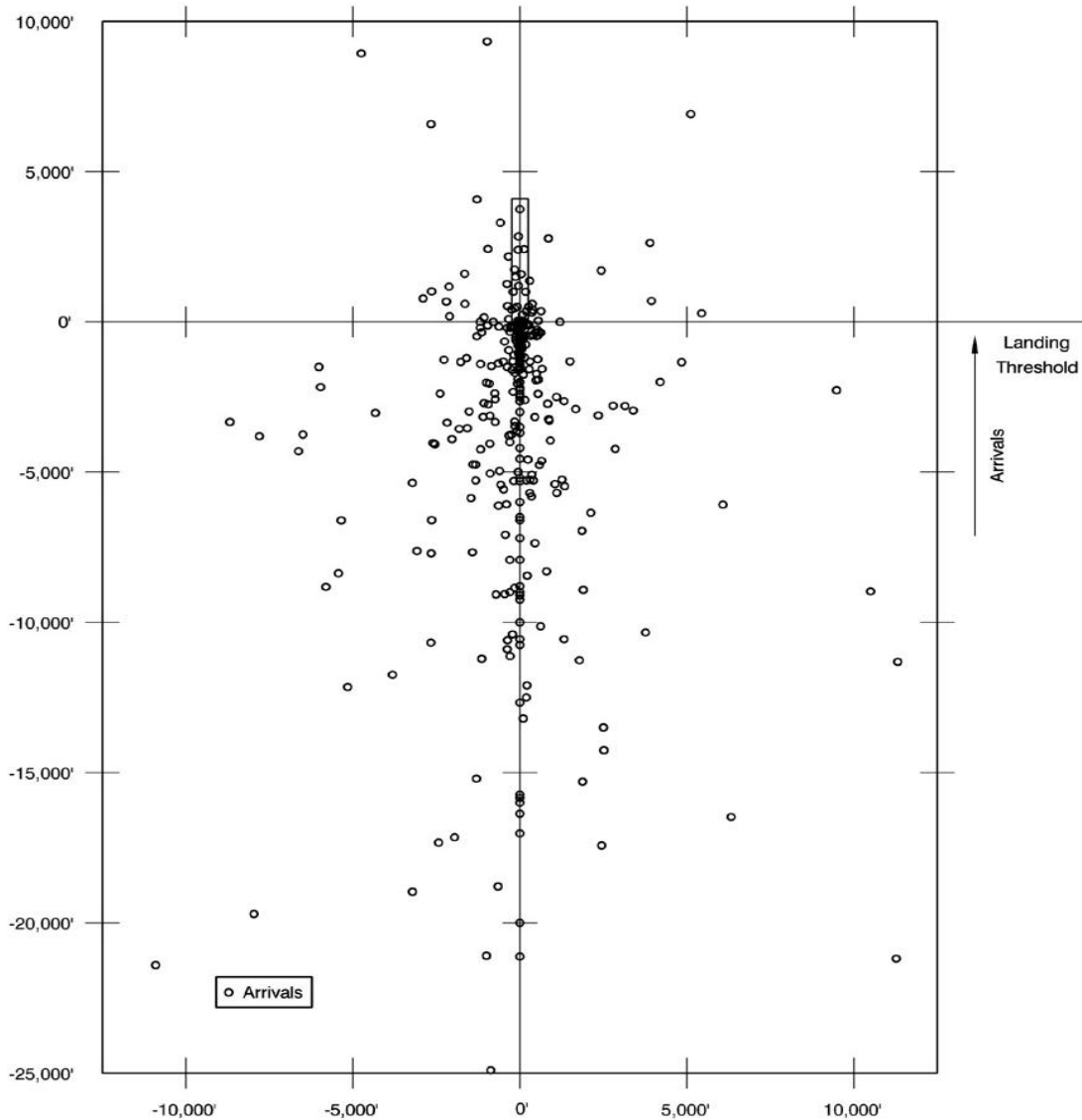
Table 2-3: Accidents by Phase of Operation: Air Carriers

Phase of Operation	Federal Aircraft Regulations Part 121 Operations (Air Carriers)		Scheduled FAR Part 135 Operations (9 or fewer passengers on regularly scheduled routes)		Nonscheduled FAR Part 135 Operations (9 or fewer passengers on personally arranged flights)	
	Percent of total	Proportion fatal/serious	Percent of total	Proportion fatal/serious	Percent of total	Proportion fatal/serious
Standing	10.3	11.4	7.0	4.3	2.3	2.3
Taxi	16.2	11.4	14.6	0.0	5.1	0.0
Takeoff	12.2	25.0	14.6	8.7	21.0	15.8
In flight						
Climb	7.4	4.5	3.8	4.3	4.7	6.8
Cruise	18.5	13.6	9.7	23.9	21.8	30.6
Descent	10.3	0.0	5.9	4.3	3.0	4.9
Maneuver	1.1	0.0	5.9	13.0	8.1	12.8
Total	37.3	18.1	25.3	45.5	37.6	55.1
Landing						
Approach	7.0	15.9	16.8	37.0	13.3	21.5
Landing	12.2	4.5	17.8	0.0	18.7	2.6
Total	19.2	20.4	34.6	37.0	32.0	24.1
Other/unknown	4.8	11.4	3.8	4.3	1.9	26
All accidents	<i>100.0</i>		<i>100.0</i>		<i>100.0</i>	

Arrival Accidents

When analyzing arrival accidents, the landing threshold, whether it is the actual runway end or a displaced threshold (a landing point that is designated farther in from the paved runway end), is the relevant point.

Figure 2-3 illustrates a typical representation of aircraft accidents attributed to a landing aircraft. The landing threshold of the runway is depicted at axis point 0 feet, 0 feet and the accident dots are relative to the location of the landing threshold. The figure demonstrates that arriving aircraft accidents are clustered at the landing threshold of the runway and become less common further away from the landing threshold.



Source: California Airport Land Use Planning Handbook (January 2002)

Figure 2-3: Arrival Accidents

The spatial distribution of arrival accidents occurring within 25,000 feet, or approximately five miles, of the runway landing threshold shows a significant concentration within 5,000 feet, or approximately one mile of the landing threshold.

Takeoff Accidents

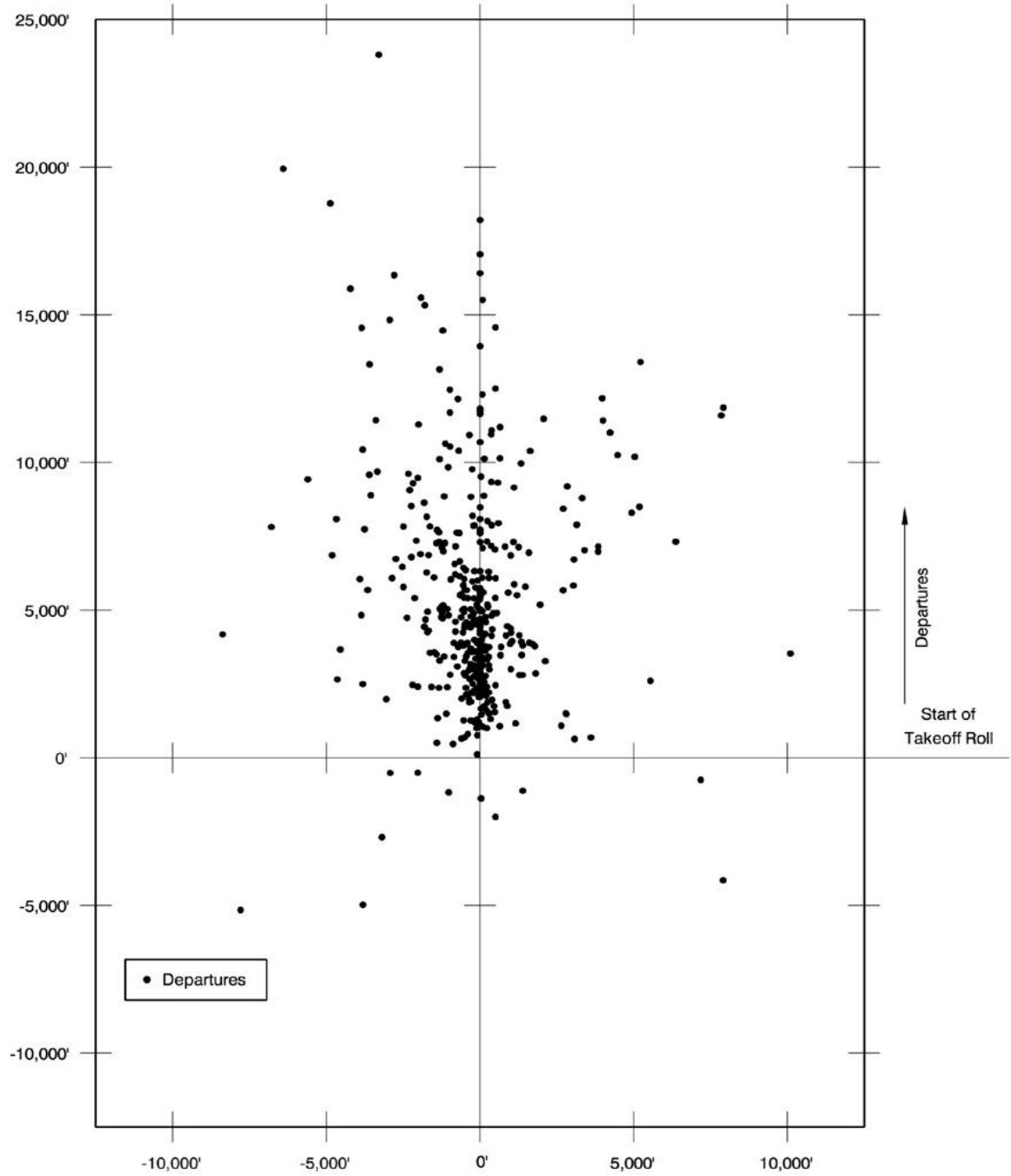
In analyzing takeoff accidents, there are two common reference points: the beginning point of the takeoff roll and the departure end of the runway. The runway length represents the difference between the two points. As shown in **Figure 2-4**, data from the period 1974 to 1989 indicate that the greatest proportion of general aviation takeoff and/or departure accidents (approximately 65 percent) took place during the initial climb phase. This finding is consistent with three factors:

- Aircraft engines are under maximum stress during the initial climb phase and are thus somewhat more susceptible to mechanical problems than at other times.
- Once an aircraft has begun to climb, it is often too late to make an emergency landing and stop on the runway without overshooting the far end.
- Low altitudes offer few options for gliding and making a successful forced landing.

Aircraft Type Is an Important Variable in Accidents

Single-engine propeller plane accidents tend to be clustered close to the runway ends and relatively near the runway centerline. For approach accidents, the median distance is 520 feet from the landing threshold, or the point at which the aircraft touches down. For takeoff accidents, the median distance is 500 feet from the departure end and 4,177 feet from the start of the takeoff roll. Also, almost 90 percent of the departure accident points lay within 9,000 feet of a takeoff roll.

Multi-engine airplanes, including jets, experience the majority of approach accidents within 500 feet of both sides of the runway centerline, but the median distance is more than 2,200 feet from the landing threshold. Departure accidents are widely scattered, although the median accident site distance is 1,100 feet from the departure end of the runway. Sites are spread evenly in the 5,000 to 10,000 foot range measured from the start of the aircraft roll for takeoff.



Source: California Airport Land Use Planning Handbook (January 2002)

Figure 2-4: Take-off Accidents

Pilot Distractions Cause Accidents

In addition to identifying the location and phase of operation during which aircraft accidents are most likely to occur, it is important to understand the most prevalent causes of accidents. **Table 2-4** identifies the various causes of accidents that occurred between 1999 and 2001 and indicates that commercial aviation aircraft accidents are most often attributed to personnel, followed closely by environment, which includes natural terrain or natural or built obstructions. For this reason, it is vital to limit pilot distractions and hazards. It is important to note that in some cases, more than one factor contributed to an accident and the assignment of accident cause can be, to some degree, subjective.

Table 2-4: Most Common Causes of Commercial Service Aviation Accidents

Causes or Factor	Part 121		Part 135		Non-Sch. Part 135		Total Accidents	
	Non-fatal Accident	Fatal Accident	Non-fatal Accident	Fatal Accident	Non-fatal Accident	Fatal Accident	Non-fatal Accident	Fatal Accident
Personnel ¹	24	2	6	1	70	20	100	23
Environment ²	16	0	3	1	50	12	69	13
Aircraft ³	11	3	4	0	34	10	49	13
Other ⁴	0	0	0	0	0	0	0	0
<i>Notes</i> ¹ Pilot, others (aboard), others (not aboard) ² Weather, light conditions, objects (trees, wires, etc.) airport, airways facilities and aids, terrain and runway conditions ³ Propulsion systems and controls, flight control systems, landing system, equipment, and instruments ⁴ All other factors Source: Tables 13, 33 and 51 of NTSB Report: PB99-156374, NTSB/ACR-99/01								

The accident data presented above illustrates the three most important areas that should be considered when addressing land uses adjacent to airports:

- Land uses located under the airport traffic pattern
- Land uses located within one-quarter mile of an airport
- Land uses located in the areas off the approaching ends of the runway, which include areas ranging from one-quarter to five miles from the end of each runway at an airport

FAA Safety Standards

The accident data presented in this chapter reveals that most aircraft accidents occur during the landing or takeoff portions of flight. For this reason, it is vital to protect the approach and departure ends of each runway. The FAA "required safety areas" and design requirements also provide critical support in the area of compatible land use by requiring areas be clear of structures, both built and natural, on and near the airport environs. This section focuses on specific land use consideration at and around airports as defined by two primary FAA criteria: Federal Aviation Regulation (FAR) Part 77 – *Objects Affecting Navigable Airspace* and FAA Advisory Circular 150/5300-13 *Airport Design Standards*. These two

primary references provide the safety foundation for delineating the environs affected by aircraft near airports.

FAR Part 77 Surfaces

FAR Part 77 surfaces were devised by the FAA to protect specific airspace areas. FAR Part 77 is codified under Subchapter C, Aircraft, of Title 14 of the Code of Federal Regulations and establishes standards for determining and defining which structures pose potential obstructions to air navigation.

- A copy of FAR Part 77 can be found here: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:2.0.1.2.9&idno=14>

The airspace areas of concern are referred to as “imaginary surfaces.” The imaginary surfaces outlined in FAR Part 77 include:

- Primary surface
- Transitional surface
- Horizontal surface
- Conical surface
- Approach surface

The dimensions of FAR Part 77 surfaces vary depending on the type of runway approach. See the box below for an explanation of the different runway approach procedures. **Table 2-5** outlines the dimensions of the Part 77 surfaces by approach type.

Types of Runway Approach Procedures

Visual approach: the pilot must visually see the airport environment and use only visual cues and internal aircraft equipment (airspeed, altitude, etc.) to maneuver and control the aircraft in order to complete the approach and landing. Visual approaches also include instances where the existing or planned instrument approach is a circling rather than a straight-in approach. A circling approach requires the pilot to have visual contact with the runway while aligning the aircraft for landing.

Non-precision instrument approach: uses air navigational facilities with only horizontal guidance for aircraft, aligning them with the runway for straight-in approaches.

Near-precision instrument approach: uses navigation information from the Global Positioning Satellite (GPS) system to provide vertical and horizontal information similar to ILS. Vertical guidance comes from the Wide-Area Augmentation System (WAAS) and the approaches are called LPV approaches (localizer performance with vertical guidance). LPV approaches provide no ground navigation equipment near the airport.

Precision instrument approach: uses an Instrument Landing System (ILS), a Precision Approach Radar (PAR), or a Microwave Landing System (MLS). These approach systems provide both vertical and horizontal alignment for aircraft to a particular runway. Airports with scheduled commercial passenger traffic and heavily-used general aviation airports usually have existing or have planned for the installation of precision instrument approaches.

Table 2-5: FAR Part 77 Dimensional Requirements

Dim	Item	Dimensional standards (feet)					
		Visual runway		Non-precision instrument runway			Precision instrument runway
		A	B	A	B		
					C	D	
A	Width of primary surface and approach surface width at inner end	250	500	500	500	1,000	1,000
B	Radius of horizontal surface	5,000	5,000	5,000	10,000	10,000	10,000
C	Approach surface width at end	1,250	1,500	2,000	3,500	4,000	16,000
D	Approach surface length	5,000	5,000	5,000	10,000	10,000	*
E	Approach slope	20:1	20:1	20:1	34:1	34:1	*

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

The primary FAR Part 77 surfaces related to land use compatibility include the following:

Primary surface – The primary surface is longitudinally centered on the runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. When the runway does not have a specially prepared hard surface, or planned hard surface, the primary surface terminates at each end of the runway. The width of a primary surface ranges from 250 to 1,000 feet depending on the existing or planned approach and runway type (i.e., visual, non-precision, or precision). The primary surface must be clear of all obstructions except those fixed by their function, such as runway edge lights, navigational aids or airport signage.

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

Conical surface – The conical surface is one that extends upward and outward from the periphery of the horizontal surface at a slope of one foot for every 20 feet (20:1) for a horizontal distance of 4,000 feet.

Approach surface – The approach surface is longitudinally centered on the extended runway centerline, the approach surface extends outward and upward from the end of the primary surface. An approach

surface is applied to the end of each runway based upon the type of approach. The approach slope of a runway is a ratio of 20:1, 34:1, or 50:1, depending on the sophistication of the approach. The length of the approach surface varies from 5,000 to 50,000 feet. The inner edge of the approach surface is the same width as the primary surface and expands uniformly to a width ranging from 1,250 feet to 16,000 feet, depending on the type of runway and approach.

Figure 2-5 and **Figure 2-6** illustrate the FAR Part 77 “imaginary surfaces” in both plan view and profile view representations and provide the dimensional requirements for each of the FAR Part 77 surfaces. A visual approach runway has relatively small imaginary surfaces, with approach and horizontal surfaces extending 5,000 feet from the primary surface, at an approach slope of 20:1. For a non-precision approach runway, both the approach and horizontal surfaces extend either 5,000 or 10,000 feet from the primary surface, depending on the design category of the runway. The imaginary surfaces for precision approach runways are similar to those for non-precision approach runways except that the approach surface extends 50,000 feet from the primary surface, and the feet from the primary surface.

Although the FAA can determine if structures are hazards to air navigation, the FAA is not authorized to regulate tall structures. FAA conducts an aeronautical study to determine whether the structure in question would be a hazard to air navigation; however, there is no specific authorization in any statute that permits the FAA to limit structure heights or determine which structures should be lighted or marked. In fact, in every aeronautical study determination, the FAA acknowledges that state or local authorities control the appropriate use of property beneath an airport’s airspace.

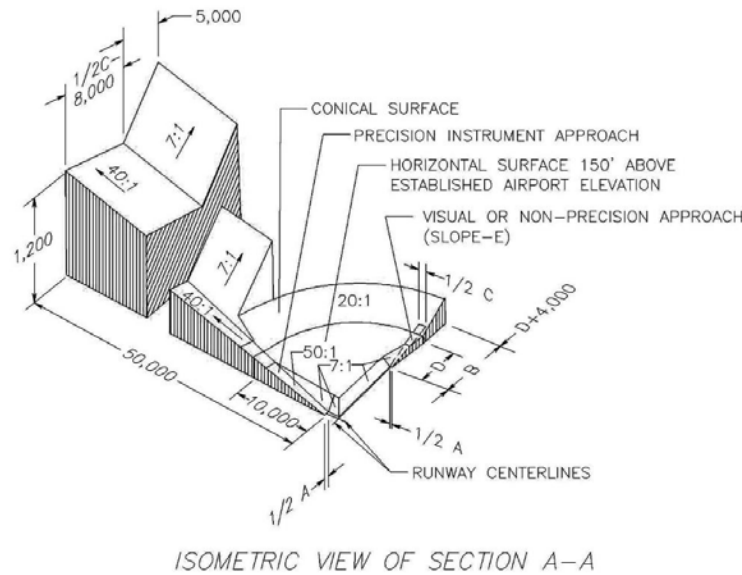


Figure 2-5: FAR Part 77 Surfaces- Profile View

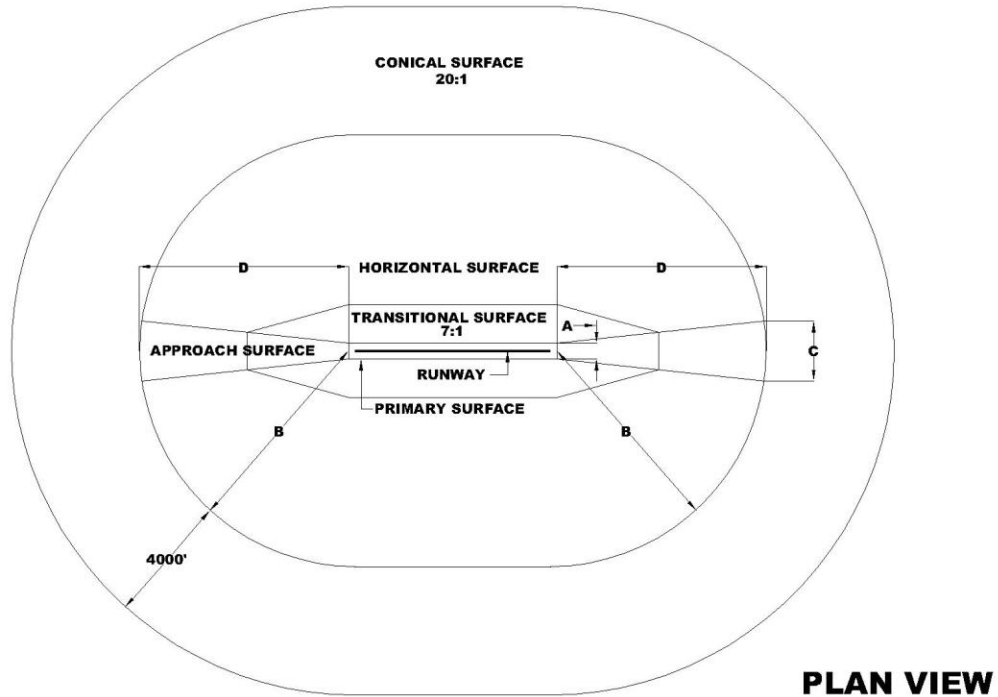


Figure 2-6: FAR Part 77 Surfaces- Plan View

FAA Design Standards

While FAR Part 77 surfaces protect specific airspace areas around the airport, FAA design standards are intended to protect specific ground areas. Safety areas, as defined by FAA Advisory Circular 150/5300-13, *Design Standards*, are meant to be implemented for the safe and efficient operation of an airport.

- A copy of the FAA design standards can be found at:
http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5300-13

There are many design requirements contained in this advisory circular, however, the requirements discussed here are directly related to areas in proximity of the runway ends and approach areas near the runway and include:

- Runway protection zones (RPZs)
- Runway safety areas (RSAs)
- Runway object free areas (ROFAs)

Below is a brief summary of the areas relevant to compatible land use planning:

Runway Protection Zones (RPZ) – Formerly known as clear zones, RPZs were originally established to define land areas underneath aircraft approach paths. Allowing airport operators to control these areas was important in preventing the creation of airport hazards or the development of incompatible land use. Clear zones were first recommended in a 1952 report by the President’s Airport Commission entitled *The Airport and Its Neighbors*, and the intent was to prevent potentially hazardous obstructions to aircraft and to control building construction for the protection of people on the ground. The U.S. Department of Commerce concurred with the recommendation of clear zones on the basis that the area was “primarily for the purpose of safety for people on the ground.” The FAA adopted clear zones with dimensional standards to implement the commission’s recommendation. Recommended guidelines included clear zones being kept free of structures and developments that would create a place of public assembly. Today, clear zones are referred to as Runway Protection Zones (RPZs) and their function is still to protect aircraft and people on the ground.

Runway protection zones (RPZs) are a trapezoidal areas “off the end of the runway end that serves to enhance the protection of people and property on the ground” in the event an aircraft lands or crashes beyond the runway end.

Many people have confused the RPZ with the need for Object Free Areas (OFA), Obstacle Free Zones (OFZ), Object clearing criteria, and Part 77 requirements. While the RPZ also has limitations on obstructions (because it lies below the approach surface and because it includes safety areas and obstacle free areas) the primary purpose of the RPZ is the protection of people and property on the ground.

An RPZ is a trapezoidal area that begins at a point 200 feet beyond the end of the runway. The length of the RPZ extends 1,000, 1,700 or 2,500 feet, depending on the category of runway and type of approach (visual, non-precision, or precision). The inner width of an RPZ is located closest to the runway end with the outer width extending out beyond the runway end. The inner width ranges from 250 to 1,000 feet, and the outer width ranges from 450 feet to 1,750 feet. As with the length of the RPZ, the inner and outer widths are dependent on the runway category and approach type. **Figure 2-7** illustrates these dimensions.

The outer triangular area of the RPZ is referred to as the Controlled Activity Area. Land use in this area is federally restricted. However, the FAA can review and approve certain types of land use such as parking lots.

Runway Safety Area (RSA) – The RSA, shown in **Figure 2-8**, is a rectangular two-dimensional area that starts at the runway threshold and surrounds the runway. RSAs should be cleared, graded, properly drained, and free of potentially hazardous surface variations. RSAs should also be capable of supporting snow removal equipment, aircraft rescue and fire fighting (ARFF) equipment, or an aircraft that overshoots the runway without causing damage to that aircraft. Taxiways also have similar safety area requirements. The actual size of an RSA is dependent upon the FAA classification of the runway (A-I, B-II, C-III, etc). This surface ranges from 120 feet to 500 feet in width and from 240 feet to 1,000 feet in length beyond each end of the runway. **Table 2-6** illustrates the dimensions of RSA lengths and widths according to airplane design groups.

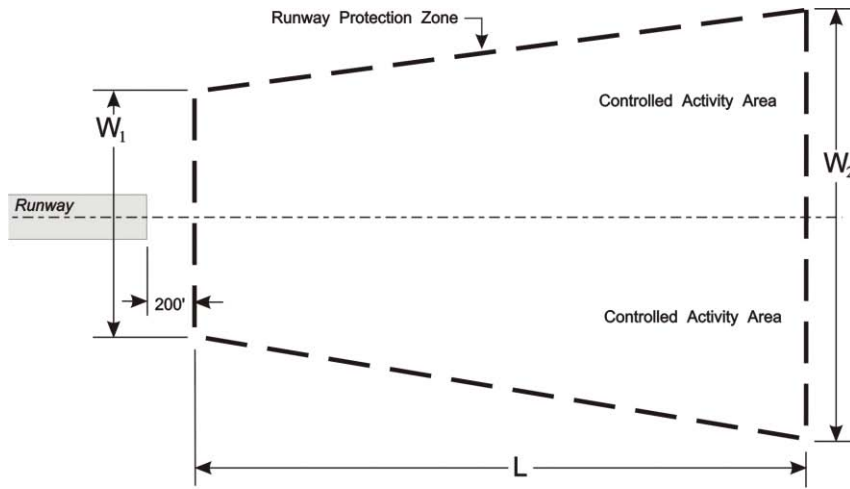


Figure 2-7: Runway Protection Zone

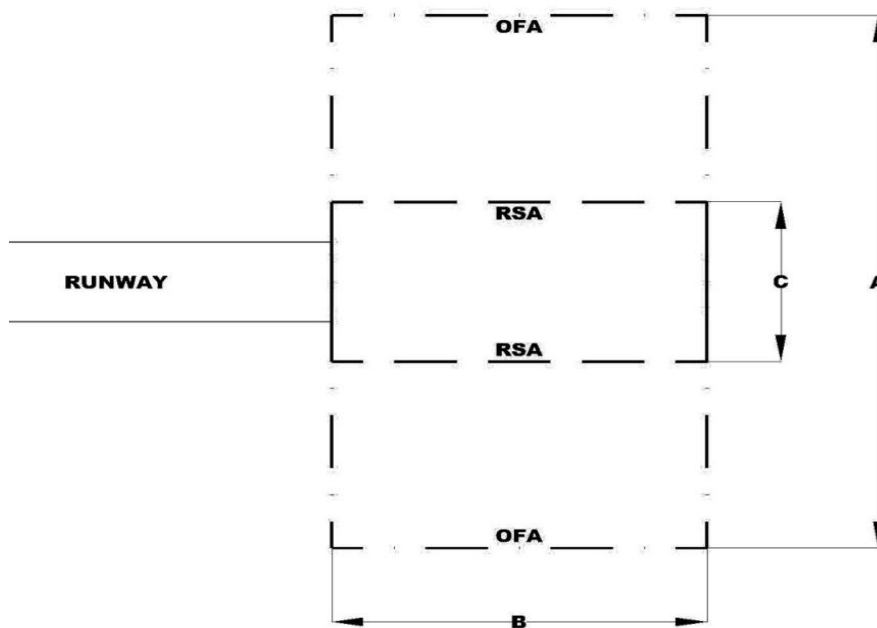


Figure 2-8: Runway Safety Areas and Object Free Areas

Runway Object Free Area (OFA) – The Object Free Area (OFA) is a two-dimensional ground area surrounding the runway where all aboveground objects must be removed unless fixed by their function, such as runway lights. FAA standards prohibit objects and parked aircraft from being located within the runway OFA. Taxiways also have OFAs. **Table 2-6** depicts the dimensions of OFA widths and lengths, ranging from 240 feet to 800 feet in width and 240 feet to 1,000 feet in length, depending on airplane design group. **Figure 2-8** illustrates the proximity of OFAs to the runway.

Table 2-6: Runway Safety Area and Object Free Area Dimension Requirements

Dimension	Item	Dimensional Standards (feet)	
		Smallest Airplane Design Group	Largest Airplane Design Group
A	Runway Object Free Area width	250	800
B	Runway Object Free Area length	240	1,000
B	Runway Safety Area length	240	1,000
C	Runway Safety Area width	120	500

Note: These dimensions are presented as a general range. Exact dimensions vary according to runway approach type and approach visibility- FAA AC 150/5300-13 should be referenced.
 Source: FAA AC 150/5300-13 Change 6

The RSAs and OFAs are almost always contained within airport property. The RPZ, however, can extend beyond airport property. Therefore, from an off-airport land use compatibility planning perspective, the critical safety zone, identified by the design standards, is the RPZ. The FAA recommends that, whenever possible, the entire RPZ be owned by the airport and be clear of all obstructions, if practicable.

Noise Concerns

In addition to safety, compatible land use planning is important to help mitigate noise-related concerns. Historically, airports were constructed on the outskirts of communities and the significant distance from developed areas diminished the impact of aircraft sounds. Through the years, many communities have sprawled and land uses more sensitive to aircraft sound developed closer to airports. This development, coupled with increases in air traffic volume, has intensified the noise concerns related to land use in the airport environs in recent years. Noise is often a primary issue raised by communities when airport development or expansion is proposed. For this reason, it is important for airports and communities to understand noise in order to develop land uses that are compatible.

Understanding Noise

In order to adequately address noise concerns, it is important to understand the terms and metrics related to noise. While *sound* is defined as transmitted vibrations that can be detected by the human ear, *noise* is defined as any sound that is undesirable or interferes with one’s hearing of other things.

The following are commonly used to describe aircraft noise:

- **Decibel (dB):** The ratio of the sound pressure of the sound source of interest (e.g. aircraft overflight) to a reference pressure (e.g. the quietest sound we can hear), expressed in a logarithm. Most people perceive a 10 dB increase to be about a doubling in loudness and changes of less than 3dB are not easily detected outside of a laboratory.
- **Weighted Decibel (dB(A)):** Human ears are less sensitive to low and high frequencies (or “pitches”) and the A-weighting is designed to assess the relative loudness of variations as heard by humans.
- **Day-Night Average Sound Level (DNL):** A 24-hour measure of total noise, with events occurring at night (10 p.m. to 7 a.m.) treated as 10 dB louder than they really are. This dB penalty is designed to account for the fact that events at night are often perceived to be more intrusive because nighttime ambient noise is less than daytime ambient noise. The FAA utilizes the DNL as the primary metric of noise measurement and is widely accepted as a useful measure of noise and land use compatibility.

It is important to be mindful that people perceive aircraft sounds in different ways. Concerns about aircraft sound often reflect the degree to which aircraft sounds intrude on existing background noise. Generally speaking, where ambient sounds are lower, aircraft sound is perceived as “noise,” and therefore, as a problem. For example, in an urban area, sound generated by aircraft is muffled by noise produced by cars, trucks, and industry. In quiet, less developed areas, the sound generated by a small aircraft can be annoying to nearby residents.

Aircraft noise has implications on airport neighbors. A number of studies have attempted to capture the effects of aircraft noise and some of the primary effects of aircraft noise include:

- **Speech interference:** Aircraft flying overhead can produce prolonged loud noises which can overwhelm normal voice levels and make conversations difficult.
- **Difficulty learning:** Aviation noise can affect learning abilities, including reading, speech, memory, and motivation. Speech interference is likely the cause for learning difficulties.

Each airport is likely to have particular noise problem that requires a solution tailored to its specific site. Some common factors that have an impact on the tolerance of noise around the airport area include:

- Number of aircraft operations
- Type of aircraft using the airport
- Location of the airport relative to development
- Size of the airport, commercial services vs. general aviation
- Airfield layout
- Patterns of surrounding land use
- Time of the day

- **Sleep interference:** Aircraft noise could cause people to shift to a lighter stage of sleep or awaken and therefore interfere with the sleep patterns of some people. It is important to note that sleep interference varies from person to person based on a number of factors.
- **Health Effects:** Some studies suggest that chronic exposure to high levels of noise can have adverse effects on one's health, including hearing loss. However, research is largely inconclusive at this time.
- **House vibrations:** Evidence suggests that aircraft can create house vibrations for residences near airports.

FAA Noise Standards

In an effort to address some of the noise-related compatible land use concerns, FAA has created guidance for the development of plans for areas affected by aircraft noise. Some of the notable guidelines are discussed below.

FAR Part 150- Airport Noise Compatibility Planning

FAR Part 150 contains many regulations found in the *Aviation Safety and Noise Abatement Act of 1979* and focuses solely on noise compatibility issues.

- A copy of FAR Part 150 can be found here: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title14/14cfr150_main_02.tpl
- AC 150/5020-1 *Noise Control and Compatibility Planning for Airports* provides additional guidance and can be found here: http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5020-1

It stipulates that local jurisdictions can prepare and submit a Noise Exposure Map (NEM) for the airport's environs and a Noise Compatibility Plan (NCP) to the FAA. The program is open to all publicly owned, public-use airports included in the NPIAS. Although FAR Part 150 is voluntary, airports must participate if they wish to obtain federal funding for noise-abatement measures.

Notable provisions of FAR 150 include:

- Establishing the weighted decibel (dBA) scale as the universal noise measurement tool
- Establishing the Day-Night Level (DNL) as the universal noise contour measure
- Identifying land uses which are normally compatible or incompatible with various levels of noise

Noise impact areas for an airport are identified by noise contours. The basic methodology used to define aircraft noise levels involves the FAA's mathematical model, Integrated Noise Model (INM). The INM contains a database that relates noise levels to each specific type of aircraft. On an irregular three-dimensional grid around the airport, the INM computes the noise exposure level for a specific aircraft and engine thrust used at that point along the aircraft's flight route. Noise levels are then indicated by a series of contour lines superimposed on a map of the airport and its environs. Although lines on a map tend to be viewed as definitive, the INM is only a planning tool. By developing a set of noise contours for an

airport, a community or airport planner can identify areas that are most likely to be impacted by aircraft noise and can plan accordingly.

- Additional information on FAA’s Integrated Noise Model can be found here: http://www.faa.gov/about/offices/headquarters/offices/apl/research/models/inm_model/

After DNL noise contours are developed for an airport area, three basic impact areas can be identified (also known as Noise Corridor Zones):

- Severe Noise Impact Areas- 70 DNL and above contour
- Substantial Noise Impact Areas- 65 DNL to 70 DNL contour
- Moderate Noise Impact Area- 55 DNL to 65 DNL contour

The FAA provides additional guidance for the development of plans for areas affected by aircraft noise in several FARs, including:

- FAR Part 36 – Noise Standards
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:1.0.1.3.19&idno=14>
- FAR Part 91 – Transition to all Stage 3 fleet operating in the 48 contiguous United States and the District of Columbia
<http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&rgn=div5&view=text&node=14:2.0.1.3.10&idno=14>
- FAR Part 161 – Notice and approval of airport noise and access restrictions
http://www.faa.gov/airports/environmental/airport_noise/part_161/

From a noise perspective, areas exposed to 55 DNL or less are not considered to be seriously impacted.

Summary

This chapter discussed the safety and noise concerns related to incompatible land use and the FAA criteria that have been established to combat these issues. The accident data, FAR Part 77 surfaces, FAA design criteria, and noise research outline the importance of protecting the areas around the airport, particularly those in the runway approaches and Runway Protection Zones, from incompatible land uses.

Chapter 3 Land Use Incompatibility Concerns

As Chapter 2 demonstrates, establishing compatible land uses around airports fits into the larger context of public safety and well-being. This chapter outlines common land use compatibility issues, including tall structures, visual obstructions and electronic interference, wildlife attractants, large densities of people, and residential areas. However, please be mindful that the issues addressed in this chapter is not intended to be an exhaustive list, but represent diverse land use issues that planners, airport representatives, and government officials need to understand when developing an airport master plan, a local comprehensive plan, or ordinances.

Safety-Related Concerns

As outlined in Chapter 2, safety is a primary goal in establishing compatible land uses near airports. Safety-related concerns fall into two categories: land use characteristics that create hazards to flight, which can cause or contribute to aircraft accidents, and land use characteristics that affect the severity of accidents when they occur. This section identifies land uses that can create safety hazards.

Tall Structures

As discussed in Chapter 2, FAR Part 77, *Objects Affecting Navigable Airspace* provides basic guidance regarding the airspace in the vicinity of an airport that should be protected from tall structures. However, tall objects in the approach corridors may pose risks even if they do not penetrate the defined Part 77 surface and they can adversely affect minimum instrument approach altitudes. While the most critical locations are beneath the airport approach surfaces, the siting of tall facilities, such as multi-story structures, power lines, telecommunication towers, wind turbines, and meteorological (met) towers, should be carefully considered whenever it is near an airport. Areas beneath aircraft traffic patterns, adjacent to a runway, off the runway ends, and even far away from an airport, can prove hazardous sites for tall structures. Additionally, it is important to be mindful that height hazards are not limited to buildings and other structures: trees, high terrain, temporary objects such as construction cranes, and mobile objects such as vehicles on the road can also be height hazards in some situations.

Visual Obstructions and Electronic Interference

Similar to the obstructions that tall structures can create, there are several land uses that can create visual obstructions and interference for pilots.

Light and Glare

Lights that shine upward, such as those found in commercial areas or parking lots, are potentially hazardous since they can interfere with a pilot's ability to identify an airport at night. A pilot could wrongly perceive such adjacent lights, especially those with a linear layout such as street lights in subdivisions, as part of the airport or as runway lights. Bright lights can also pose a safety concern at night by causing pilots to experience a moment of night blindness as they pass from dark areas into well-lit areas and back into darkness as they approach an airport. Similarly, reflective surfaces can produce a blinding glare, which can distract pilots. Water surfaces, such as storm water detention ponds, light-colored or mirrored building materials, and some solar panels can produce glare.

Dust, Smoke, and Steam

Dust, smoke, and steam can create severe visual difficulties when a pilot is looking to land or preparing to take off. Potential land uses which may generate dust include nearby construction, gravel extraction, and farming. Those land uses that can create smoke or steam include agricultural operations (field burning), manufacturing, utilities, and others. Similarly, thermal plumes potentially associated with these types of buildings can cause air turbulence that could be hazardous to aircraft.

Electronic Interference

Land uses that generate electronic transmissions are detrimental to airport operations because they can interfere with radio communication between aircraft and airport. Thus, this type of land use should not be allowed near airports. There are no Federal Aviation Administration (FAA) standards for specific electronic hazards; however, this kind of hazard generally includes telecommunication devices and power stations. Coordination between airport owners/managers and municipalities is essential to address this area of concern.

Wildlife Attractants

An increased number of birds and wildlife around airports amplify the possibility of collisions with aircraft. Damage to an aircraft and injury to crew and/or passengers from a bird strike – with gulls, geese, or birds of prey (hawks, eagles, etc.) – can be devastating. White-tail deer and even smaller mammals, such as dogs and rabbits, also pose a risk for on-ground collisions. *FAA Advisory Circular (AC) 150/5200-33B, Hazardous Wildlife Attractants on or near Airports* provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports.

Airports are required to report all bird and other wildlife strikes to the FAA, as it is important in the study of this issue.

- The FAA provides a website for reporting: http://wildlife-mitigation.tc.faa.gov/public_html/index.html.

Airports should become familiar with this site.

- *FAA AC 150/5200-33B, Hazardous Wildlife Attractants on or near Airports* can be found here: http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf

It states that it is inadvisable to locate such wildlife attractants within 5,000 feet of air operation areas accommodating piston-type aircraft and within 10,000 feet of air operation areas accommodating turbine-powered aircraft. All proposed land uses that could potentially increase wildlife attractants should be examined within 5 miles of the airport. Attractants can include agricultural features, landscaping, waste disposal sites, wastewater treatment facilities, agricultural or aquacultural activities, surface mining, wetlands, or airport development projects (construction, expansion, renovation). The following are some common land use categories that have potential to attract wildlife that could be hazardous to aircraft.

Water

Water impoundments, wetlands, ponds, sewage lagoons, fountains, and other water sources can be attractive to wildlife. Permanent water sources should be managed by removal, physical exclusion, or alteration of appearance. Underground facilities such as French drains or buried rock fields are examples of successful retention/detention designs, while temporary holding (detention) basins that drain within 24-

48 hours are also an option. If drains and ditches cannot be removed, their banks should be mowed regularly to control bird nesting and perching. Rip rap along banks can also deter waterfowl from “loafing” near the water feature.

Agriculture and Flora/Fauna

The proximity of agricultural operations, including farmland, to airports can cause unwanted interactions between wildlife and aircraft, especially if the crops are highly attractive to birds or wildlife for their nutritive or nesting value. Similarly, certain species of flora and fauna included in nearby landscaping or natural environment have the potential to attract unwanted wildlife. These include certain woody plants, upland weed and shrubs, marsh plants, cultivated plants, and ornamental plants. USDA bulletin “Plants Attractive to Wildlife,” discussed in Chapter 6, outlines specific species to avoid. These species can create problems for departing and approaching aircraft if birds and mammals congregate to eat or nest in farm areas.



Figure 3-1: Man-Made Pond Near End of Runway

Landfills and Sewage Treatment Plants

FAA Order 5200.5B, *Airport Safety during FAA-Funded Airport Construction and FAA Facilities Maintenance* states that sanitary landfills, because of their bird attractant qualities, are considered to be an incompatible land use if located within specified distances. FAA Order 5050.4B, *Airport Environmental Handbook* and FAA Advisory Circular (AC) 150/5200-34A, *Construction or Establishment of Landfills near Public Use Airports* provide important guidance regarding landfills around airports. These documents are discussed further in Chapter 6.

Large Densities of People

The land use characteristic that most closely relates to the severity of aircraft accidents, if and when they occur, is the number of people concentrated in the accident area. Limiting the number of dwellings or people in areas close to the airport is the most direct method for reducing the potential severity of an aircraft accident.

Accident probabilities increase in closer proximity to runway ends because the traffic flow of aircraft is more concentrated and at a lower altitude in these areas. A primary means of limiting the risk of damage and personal injury from accidents that occur near the airport is to limit population density in the areas adjacent to the airport. **Table 3-1** describes general population densities (people per acre) in developments that are typically found in the vicinity of airports.

Based on the degree of risk to which adjacent areas are subjected, the best measure of development density in this context is the number of persons per acre. Some communities have specific development density limitations ranging from 25 to 100 people for different parts of a runway approach corridor. In general, high density residential development and places of public assembly should not be permitted in the airports approach corridors.

Table 3-1: Population Densities by Building Type

Building Type	People per Acre
Light industrial uses	35-50
Two-story motel	35-50
Single-story shopping center	75-125
Single-story office	50-100
Sit-down restaurant	100
Fast food restaurant	150

Source: California Airport Land Use Planning Handbook, 2002

Common methods of estimating allowable density include: analysis of parking requirements designated in the local zoning ordinance, maximum occupancy levels set in accordance with building codes, and surveys of similar uses. Land uses that support higher population densities are less compatible than those that support lower population densities. In determining specific numbers of people per acre for inclusion in a compatibility plan, all local zoning ordinances should be addressed.

Open Areas

Another factor to consider is the risk to airplane occupants in the event of an emergency landing. Even in an emergency descent, pilots can normally control the aircraft to a certain extent, and will head for the best available open space if he or she cannot reach the airport runway. However, in an emergency during the departure or approach phase of the flight, the pilot's ability to select an emergency landing site is limited because of the low altitude of the aircraft. Thus, preserving open areas of land along the approach/departure corridors is highly desirable in order to improve the chance of successfully executing an emergency landing without injury, loss of life or loss of property. However, the actual land use of the open area should be considered since agricultural fields can increase as wildlife attractants in certain seasons, posing other safety concerns for pilots in non-emergency and emergency situations.

Residential Areas

Historically, airports have been located on the outskirts of towns and cities, however, residential areas have spread further into what was once open space near airports, creating an increased threat to public safety on many levels. Distractions like street lighting at night and storm water and residential ponds that

could attract waterfowl to the area pose threats to aircraft operations. Additionally, residential areas near airports increase the population density and decrease the amount of open space near airports, thus increasing the severity of any potential aircraft accident. The successful control of residential site development near airports can help alleviate many incompatible land uses. The 1998 court case of *Northwest Properties v. Outagamie County, WI* provides legal precedence for the municipal control of minimum residential lot sizes in the name of airport protection. Appendix B provides some additional information on case law related to airport compatible land use issues.

Noise-Related Concerns

In addition to safety, noise is a driver for establishing compatible land uses near airports, as it is a considerable factor affecting or limiting airport operations. As discussed in Chapter 2, aircraft operations can create sound levels which are annoying and can produce effects which negatively impact the quality of life for residents located near airports, including speech interference, sleep disturbance, and affected classroom learning. For these reasons, noise issues have the potential to create animosity between the community and the airport.

Residential areas, schools, hospitals, churches, certain types of offices, outside activities, and other noise-sensitive indoor activities should be minimized near airports.

As discussed in Chapter 2, FAR Part 150 addresses many of the noise concerns related to airports and their neighbors. It also describes acceptable types of land use for each DNL sound level. For those areas impacted by the 70 DNL or greater contour, FAA recommends that the land be acquired by the airport owner. Typically, this level of noise impact beyond airport property is associated with large, high activity airports. For airports with low activity, noise contours of 70 DNL and above are usually contained within airport property. For small airports, the 65 SNL will often fall within the existing airport property line. For larger airports, the 65 DNL contour may extend beyond airport property. Mitigation steps include the reduction of indoor noise levels by 25 or 30 decibels. NLR, or noise level reduction, is recommended by FAA when construction of noise sensitive institutions must be allowed within a noise contour area of above 65 decibels.

Summary

This chapter discussed the importance of establishing compatible land uses in terms of safety and noise concerns and highlighted some incompatible land uses around airports. **Table 3-2** summarizes compatible land uses within FAR Part 77 surfaces and FAA safety areas. The table shows compatible land use, incompatible land uses, and land uses that need additional review under different categories of surface.

Table 3-2: Compatible Land Uses within FAR Part 77 Surfaces and FAA Safety Areas

Land Uses	Primary Surface	Transitional Surface	Horizontal Surface	Conical Surface	Approach Surface	Runway Protection Zone
Residential						
Residential	NC	NC	■	C	■	NC
Public use						
Places of public assembly –schools, hospitals, churches, auditoriums	NC	NC	■	C	NC	NC
Government services	NC	■	C	C	■	NC
Transportation – parking, highways, terminals, railroads	NC	■	C	C	■	■
Commercial use						
Office, business, and professional	NC	■	C	C	■	NC
Wholesale and retail – building materials, hardware, and farm equipment	■	■	C	C	■	NC
Retail trade – general	NC	■	C	C	■	NC
Utilities	NC	■	■	■	■	■
Communication	NC	■	■	■	■	NC
Manufacturing and production						
Manufacturing – general	NC	■	■	■	■	NC
Agricultural (except livestock) and forestry	NC	■	C	C	■	C
Livestock farming and breeding	NC	■	■	C	■	NC
Mining and fishing, resource production, and extraction	NC	NC	■	■	■	NC
Recreational						
Outdoor sports arenas, spectator sports, nature exhibits, and zoos	NC	NC	■	C	NC	NC
Amusement parks, resorts, camps, and golf courses	NC	NC	C	C	NC	NC
Parks	NC	■	■	■	■	■
Open water						
Naturally occurred stormwater ponds (i.e. lakes, ponds, wetlands)	NC	■	C	C	NC	NC
Man made water bodies (i.e. mining and extraction, water detention ponds)	NC	■	■	■	NC	NC
<p>Note:</p> <p>C Generally compatible land use</p> <p>NC Incompatible land use</p> <p>■ Not clearly compatible or incompatible, requires specific study, consideration for location-specific issues</p> <p>Criteria for compatibility in specific study:</p> <p>1 Does not exceed height standards</p> <p>2 Does not attract dense concentrations of people</p> <p>3 Does not create a bird attractant</p> <p>4 Does not cause a distracting light and/or glare</p> <p>5 Does not cause a source of smoke</p> <p>6 Does not cause electrical interference</p> <p>7 Does meet compatible Day-Night Level (DNL) sound levels</p>						

Chapter 4 Land Use Regulations and Guidance

There are many laws, policies, and procedures that have been enacted at both the federal and state levels which play important roles in land use compatibility. Many of these items were instituted by agencies such as the Federal Aviation Administration (FAA) and the Wisconsin Department of Transportation (WisDOT). The primary rules and regulations related to land use planning are discussed in this chapter and a discussion of additional rules, regulations, policies, and guidance related to land use can be found in Appendix A.

The following descriptions are not meant to be all-inclusive, but rather a summary of the primary rules and regulations related to land use issues around airports. Additional coordination or involvement with other federal or state agencies may be required on a project-specific basis. Early coordination with the Bureau of Aeronautics (BOA) is recommended in order to identify the potential involvement of these agencies as soon as possible in the planning process.

Federal Laws and Policies

Laws and non-regulatory procedures, provided in the federal statutes, the Code of Federal Regulations (CFRs) or in Advisory Circulars (ACs) by the FAA, are important legal frameworks related to incompatible land uses around airports. These CFRs and ACs lay the foundation for the creation of an airport planning process and provide tools for implementation. These regulations cover a wide range of topics ranging from airspace issues to the content of airport master plans.

Federal Grant Assurances (Airport and Airway Improvement Act of 1982, US Code, Title 49)

Upon the acceptance of federal funds, airport owners are obligated under this code to operate and maintain the airport and comply with specific assurances. These obligations are outlined in the grant documents, which are signed by airport owners when they accept federal funds for a development project.

- For a complete list of FAA grant assurance, please consult http://www.faa.gov/airports/aip/grant_assurances/media/airport_sponsor_assurances.pdf
- *FAA Order 5190.6B, Airport Compliance Manual* provides some guidance on federal grant assurances and can be found here: http://www.faa.gov/airports/resources/publications/orders/compliance_5190_6/

Some land use-related assurances are:

- Compliance with all applicable federal laws, regulations, executive orders, policies, guidelines, standards, specifications and requirements as they relate to the project
- Consistency with local plans
- Public access to project information and planning process

More specifically, Grant Assurance 21 requires all airports accepting federal funds to take appropriate action, to the extent reasonable, against incompatible land uses in the immediate vicinity of the airport. Such actions include the adoption of zoning laws and zoning changes that will increase airport land use compatibility.

Additionally, Grant Assurance 20, Hazard Removal and Mitigation, requires airports accepting federal funds to mitigate existing airport hazards and prevent the establishment or creation of future airport hazards by removal, lowering, relocation, marking, lighting or other means.

FAR Part 77, Objects Affecting Navigable Airspace (CFR Title 14)

FAR Part 77 is discussed in further detail in Chapter 2. It establishes methods for identifying surfaces that must be free from penetrations (i.e., buildings, cranes, cell towers, etc.) and sets forth requirements for the construction or alteration of structures. It also provides for studies of obstructions to determine their effect on the safe and efficient use of airspace as well as public hearings regarding these obstructions. Implementation and enforcement of FAR Part 77 is a cooperative effort between the FAA and the Wisconsin BOA. For additional information, please consult Chapter 2 or FAR Part 77.

- A copy of FAR Part 77 can be found here:
http://www.access.gpo.gov/nara/cfr/waisidx_10/14cfr77_10.html

Proposed Construction or Alteration of Objects that may affect the Navigable Airspace, FAA AC 70/7460-2J (Form 7460-1)

Form 7460-1, *Notice of Proposed Construction or Alteration* works within the requirements of FAR Part 77 and is required at all federally obligated airports to assess each proposed construction project or temporary construction equipment in the vicinity of the airport. In the event that construction or improvements projects taking place in or around a public use airport exceed FAA standards, Form 7460 must be submitted to the FAA. The form should be filed using FAA's Obstruction Evaluation/Airport Airspace Analysis (OE/AAA) website at least 45 days prior to the beginning of the process.

- FAA's OE/AAA website can be accessed here: <https://oeaaa.faa.gov/oeaaa/external/portal.jsp>

Form 7460 must be submitted if the project meets or exceeds any of the following standards:

- A structure that will be 200 feet above ground level
- A structure that breaks the plane greater than a 100 horizontal feet to one vertical foot (100:1) slope within 20,000 feet of a runway longer than 3,200 feet
- A structure that breaks the plane greater than a 50 horizontal feet to one vertical foot (50:1) slope within 10,000 feet of a runway no longer than 3,200 feet
- All towers and antennas transmitting radio frequency. The Federal Communications Commission (FCC) will not grant a transmitting license without an FAA determination.

- The FAA's notice criteria tool can assist in determining whether or not Form 7460 must be submitted and can be accessed here:
<https://oeaaa.faa.gov/oeaaa/external/gisTools/gisAction.jsp?action=showNoNoticeRequiredToolForm>

The FAA conducts an aeronautical study and issues a determination to the airport operator which identifies whether or not the proposed development is a hazard to airspace. The FAA will likely provide a "determination of no hazard to air navigation" or a "determination of hazard to air navigation." A "determination of no hazard to air navigation" indicates that the structure does not impact the airspace. However, if a "determination of hazard to air navigation" is returned, additional steps may be required

prior to the beginning of construction. Specifics related to each airspace case should be addressed with the FAA.

It is important to note that time is necessary for FAA's review and local governments will need to hold on the final approval of land use applications until both FAA and BOA comments are received.

FAA Airport Design Standards, AC 150/5300-13 (09-29-1989)

As discussed in Chapter 2, AC 150/5300-13, *Airport Design*, provides the basic standards and recommendations for airport design, including Runway Safety Areas (RSAs), Runway Object Free Areas (OFAs), and Runway Protection Zones (RPZs). The criteria contained in this AC are the primary spatial standards for on-airport development. For additional information, please consult Chapter 2 or AC 150/5300-13, *Airport Design*.

- AC 150/5300-13, *Airport Design* can be found here:
http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document.information/documentD/23182

FAR Part 150, Noise Compatibility Program, (CFR Title 14)

As discussed in Chapter, 2, this document establishes the measures required by the *Aviation Safety and Noise Abatement Act* (ASNA), which requires that a single system be developed for measuring noise and determining the level of noise exposure caused by airport operations and identification of land uses normally compatible with exposure to noise. For additional information, please consult Chapter 2 or FAR Part 150.

- Additional resources on FAR Part 150 can be found here:
http://www.faa.gov/airports/environmental/airport_noise/

Airport Master Plan, FAA AC 150/5070-6B (05-01-2007)

The airport master plan serves as the foundation for future airport development. This updated advisory circular provides an outline and detailed guidance for the preparation of master plans. It covers the range in size and function of airports, from small general aviation to large commercial service facilities. The intent of this AC is to foster a flexible approach to master planning that directs attention and resources to critical issues. The scope of each master plan must be tailored to the individual airport under evaluation.

- A copy of AC 150/5070-6B, *Airport Master Plan* can be found here:
http://www.faa.gov/airports/resources/advisory_circulars/media/150-5070-6B/150_5070_6b_chg1.pdf

Additional Federal Laws and Policies

The federal laws and policies outlined above represent a brief snapshot of the federal regulatory framework for compatible land use planning. However, Appendix A provides additional resources related to planning and design, environmental, land acquisition, and noise-related regulations and policies. These include:

Planning and Design

- FAA AC 150/5190- 4A, *A Model Zoning Ordinance to Limit Height of Objects around Airports*

- FAA Order 18, *U.S. Standards for Terminal Instrument Procedures* and FAA Order 8260.3B, Change 14

Environmental

- *National Environmental Policy Act of 1969 (NEPA)* and FAA Order 5050.4B, *NEPA Implementing Instructions for Airport Projects*
- FAA AC 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports*
- FAR Part 139.337, *Wildlife Hazard Management Plan*
- CFR Title 40, Part 258, Subpart B, *Criteria for Municipal Solid Waste Landfills*

Land Acquisition

- *The Federal Aviation Authorization Act of 1994*
- FAA AC 150/5100-17, *Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects*

Noise

- CFR Title 14, FAR Part 91, *General Operating and Flight Rules*
- *Airport Noise and Capacity Act of 1990 (National Noise Policy)*
- CFR Title 14, FAR Part 161, *Notice and Approval of Airport Noise and Access Restrictions*
- FAA AC 150/5320-14, *Airport Landscaping for Noise Control*

Please see Appendix A for a more comprehensive discussion of federal laws and policies related to compatible land use planning.

State Laws and Policies

State policies related to compatible land use planning are spread across a wide range of state administrative codes and statutes affecting aviation and airports. Much of the discussion below is an outline of the rights and responsibilities of airports and local communities as it relates to land use planning. Case-by-case coordination with the BOA is suggested in order to address specific issues or concerns.

Chapter 114, Wis. Stats. – Aeronautics

Wis. Stats., Chapter. 114 is a comprehensive outline of Wisconsin’s airport authorizations. The state airport system, landowner rights, land condemnation, land purchasing, advance land acquisition loan program, approach protection, appropriation of federal, state, and local aid, and taxation for airports are authorized by Chapter 114. The following is a summary of the provisions of Chapter 114 that are most relevant to compatible land use planning.

- For the complete text of Chapter 114, Wis. Stats., please see:
<http://legis.wisconsin.gov/statutes/Stat0114.pdf>

Wis. Stats. §114.135. – Airspace Protection

This section of the statute provides for airspace protection in two areas: the immediate vicinity of the airport and all navigable airspace over the state. Subparagraphs 1 through 5 provide for the protection of aerial approaches to all public-use airports. This protection is achieved through actions by the airport owner and may extend into adjoining municipalities, known as extraterritorial zoning. Subparagraphs 6 through 10 require anyone proposing a tall structure to apply for a permit and receive approval from the Secretary of Transportation before starting construction, specifically structures that will be more than 500 feet above the lowest point within one mile of the structure's base, or structures that are 150 feet or higher and exceed a forty to one (40:1) slope from the nearest boundary of a public use airport. TRANS 56 (discussed later in this chapter) contains additional information.

Wis. Stats. §114.136 – Approach Protection Plans

This section of the statute allows any county, city, village, or town to protect the aerial approaches to airports with ordinances regulating, restricting, and determining the use, location, height, number of stories, and size of buildings, structures, and objects of natural growth in the vicinity of the airport. Governments may also divide the territory to be protected into several areas and impose different regulations and restrictions with respect to each area. This is the most critical statute for airport approach protection, and provides the authority for airport sponsors to establish airport zoning overlay districts.

Wis. Stats. §114.136 (2) – Formulation of Ordinances

§114.136 (2), Wis. Stats. allows any airport-owning entity to formulate an ordinance that shall include provisions for the limitation of the height of buildings, structures and objects of natural growth located not more than three miles from the boundaries of the airport site. Wis. Stats §16.195 authorizes funding for those proposed planning grants that address the interests of neighboring jurisdictions, promote the redevelopment of land, protect natural areas, encourage efficient development patterns, promote the economic base, and provide an efficient transportation system.

Wis. Stats. §85.02, § 85.15.– Department of Transportation

Chapter 85, Wis. Stats., authorizes WisDOT to plan, promote, and protect aeronautical activities with state and federal aid. All state, regional, and municipal agencies and commissions must follow the recommendations of the WisDOT secretary. WisDOT is authorized department use, maintenance, or leasing of land acquired for airport use until the property is needed for such a purpose. The following are chapters from Wisconsin Administrative Code related to airports and compatible land use.

- Chapter 85 Wis. Stats. can be found here:
<http://nxt.legis.state.wi.us/nxt/gateway.dll?f=templates&fn=default.htm&d=stats&jd=top>
- TRANS Wisconsin Administrative Code can be found here:
<http://nxt.legis.state.wi.us/nxt/gateway.dll?f=templates&fn=default.htm&d=code&jd=top>

Chapter TRANS 55, Wis. Adm. Code – Conditions of State Aid for Airport Improvement

This chapter identifies the conditions necessary to grant state aid for airport improvements, as required in §114.31, Wis. Stats., in order to protect public investment and to maximize public benefits. The request for state aid may come from a resolution of the airport board of directors or by an agreement between the WisDOT secretary and airport owner to acquire property and to administer the project. For the duration of the state aid conditions, the owner must maintain good title to the property or dispose of it only after

approval by the secretary. TRANS 55 requires that the owner safely operate and maintain all facilities, maintain clear and safe approaches, cooperate in conducting surveys, provide suitable aircraft parking areas, maintain a current layout plan, and preserve airport rights and powers unless granted approval by the secretary to modify such rights. Under this law, airports are specifically required to adopt and maintain a height limitation zoning ordinance (HLZO) and a vehicle/pedestrian ordinance in order to procure state aid for airport improvements.

Chapter TRANS 56, Wis. Adm. Code – Erection of Tall Structures

This chapter prescribes procedures for the permitting of tall structures or other objects affecting airspace in Wisconsin. A permit is required from the Secretary for any structure that exceeds the limitations in §114.135 (7) Wis. Stats. Applications for permits must include, but are not limited to, owner information, location, proposed height, distance to nearest runway, and lighting plans. The construction can commence once a permit is granted and federal, state, and local requirements are met.

- Additional information regarding permits can be found on the BOA website, accessed here:
<http://www.dot.wisconsin.gov/travel/air/airport-ops.htm>

Chapter TRANS 57, Wis. Adm. Code – Standards for Airport Siting

This chapter interprets and implements §114.134 (3) to (5), Wis. Stats., providing procedures and standards for airport site approval. The WisDOT secretary may issue a certificate of airport site approval for a new airport upon determination that the location is compatible with existing and planned transportation facilities in the area. Standards for airport siting are detailed for both airports open to the public and those not open to the public. These standards include the determination of objects in the approach areas and the marking of displaced thresholds. The site application will also be reviewed for its compatibility with other area transportation facilities and regional, county, and local plans. The issuance of a site certificate by the Secretary does not waive or preempt compliance with any applicable ordinances, laws or regulations of any other governmental body or agency.

§59.52, §59.58, §59.69, Wis. Stats. – Counties

These sections of the statute authorize counties to acquire property and plan for and zone county airports. §59.58, Wis. Stats. addresses land acquisition for airports and their allowable construction, maintenance, and improvement by a county board, all of which can be funded through the issuance of revenue bonds. §59.69, Wis. Stats. details the purpose of county planning and zoning and calls for the adoption of a master plan (comprehensive plan) and official map of the county. Airports and their affected areas must be included in the county's development plan (comprehensive plan).

Section.60.61, Wis. Stats. – Towns

This section of the statute outlines the powers and duties of a town planning commission including the appointment of members to the airport commission. It also defines the zoning authority for towns if the county has not enacted its own zoning ordinance. This authority includes the right to regulate the location, height, and size of structures and natural objects in the vicinity of a town or privately-owned airport. By eminent domain, a town can remove or alter any structure or object that does not meet the restrictions.

§62.23, Wis. Stats. – Cities

This section of the statute authorizes the creation of a city planning commission and calls for the development of a master (comprehensive) plan that includes recommendations for airports. The city planning commission has the authority to consider the location, use, abandonment, and sale of land for any airport. An official city map depicting the airport and the affected areas is also required as stated in Chapter 62, Wis. Stats.

§66.1001, Wis. Stats. – Comprehensive Planning

Wisconsin’s comprehensive planning law requires towns, villages, cities, and counties to prepare, adopt, and amend comprehensive plans. The Wisconsin legislature enacted legislation that greatly expanded the scope and significance of comprehensive plans within the state. The legislation, often referred to as the state’s “Smart Growth” law states that “old law” plans will only remain viable until January 1, 2010. After that date, all community land use decisions, e.g., zoning, must be based on an adopted comprehensive plan. Statutes require a plan update at least every 10 years.

- The Department of Administration’s guidance to Wisconsin’s comprehensive planning law can be found here: <http://www.doa.state.wi.us/docview.asp?docid=5436&locid=9> and here: <http://www.doa.state.wi.us/section.asp?linkid=128&locid=9>
- The Wisconsin Department of Transportation’s Transportation Planning Resource Guide provides valuable information for preparing the transportation element of a comprehensive plan and can be found here: <http://www.dot.wisconsin.gov/localgov/docs/planningguide.pdf>
- Southeast Wisconsin Regional Planning Commission has compiled a summary on comprehensive planning requirements, which can be accessed here: http://www.sewrpc.org/smartgrowth/pdfs/summary_of_wisconsin_comp_plan_requirements.pdf

The comprehensive plan includes nine elements, of which the land use and transportation elements are extremely important for airport compatible land use planning. The land use element of a comprehensive plan identifies what is needed in the future and where it should be located. Within the land use element, the future plan should show the land needed for airport purposes and designate uses for surrounding land that are compatible with the airport.

The transportation element is “a compilation of objectives, policies, goals, maps and programs to guide the future development of the various modes of transportation, including highways, transit, transportation systems for persons with disabilities, bicycles, electric personal assistive mobility devices, walking, railroads, air transportation, trucking and water transportation.” The element must compare the community’s objectives, policies, goals and programs to state and regional transportation plans. The element must also identify highways within the community and incorporate state, regional and other applicable transportation plans, including transportation corridor plans, county highway functional and jurisdictional studies, urban and rural area transportation plans, airport master plans, and rail plans, that apply in the community.

A comprehensive plan includes maps, charts, and text that explain goals and objectives regarding future development, past and present conditions, and locations of resources within the community. The comprehensive planning law has undergone several significant updates in the last few years and legislative efforts are still actively being made to reflect and address new issues encountered by communities throughout the state. The latest update added language to the intergovernmental cooperation element of the state statute which called for joint planning and decision making, analysis of the relationship with adjacent local governmental units, incorporation of plans or agreements, identification of existing or potential conflicts and description of processes to resolve those conflicts. Because airport land use compatibility issues often involve multiple communities, intergovernmental cooperation is a significant component that should be considered.

Additional State Laws and Policies

The state laws and policies outlined above represent a brief snapshot of the state legal framework for compatible land use planning. However, Appendix A provides additional resources related to planning and design, noise, environmental, and land acquisition-related regulations and policies, including the following:

Planning and Design

- §30.12, Wis. Stats., *Navigable Waters*
- §66.1009, Wis. Stats., *General Municipality Law*

Environmental

- §101.142 and §101.143, Wis. Stats., *Petroleum Product Storage Tanks*
- Chapter 285, Wis. Stats., *Air Pollution*
- §29.604, Wis. Stats., *Wisconsin Endangered Species Law*
- Chapter TRANS 401, Wis. Admin Code- *Construction Site Erosion Control and Storm Water Management Procedures for Department Actions*
- Chapter NR 216, Wis. Admin Code- *Storm Water Discharge Permits*
- Chapter COMM. 2.17, Wis. Admin Code- *Mines Pits and Quarries*
- Chapter NR 152, Wis. Admin Code- *Model Ordinances for Construction Site Erosion Control and Post Construction Storm Water Management*
- Chapter 281, Subchapter III, Wis. Stats., *Wetlands*
- Chapters 30 and 31, Wis. Stats., *Navigable Waters Protection*
- §59.692, §61.351, and §62.231, Wis. Stats., *Shoreland Zoning Oversight*
- Chapters NR 115 and NR 117, Wis. Admin Code
- § 66.1111, Wis. Stats., *Historic Preservation*
- Chapter 44, Wis. Stats., *Archeological Preservation*
- SARA Title III, Hazardous Materials- *The Emergency Planning and Community Right-to-Know Act of 1986*

Land Acquisition

- §32.05, Wis. Stats., *Eminent Domain*

- Chapter COMM 202 and 222, Wis. Admin Code, *Relocation Rights*
- Chapter TRANS 54, Wis. Admin Code, *Advance Land Acquisition Loan Program for Airports*
- § 27.05, Wis. Stats., *Public Parks and Places of Recreation*
- §350- 10(1)(L) Wis. Stats., *Snowmobiles*

Please see Appendix A for a more comprehensive discussion of state laws and policies related to compatible land use planning.

Summary

The federal and state laws and guidance discussed in this chapter and in Appendix A provide information to use as the foundation for an airport plan or a local comprehensive plan. These laws offer numerous avenues for land use control at the federal and state levels. This guide provides a broad framework of information that should be utilized in a comprehensive and complementary manner in order to achieve effective land use compatibility. However, each airport and community has specific issues and need to employ various techniques to address land use issues within their own community. This guide is not an exhaustive list of laws and policies, nor can it address all of the planning questions that a community might encounter. It is the responsibility of each community to identify where conflicting land uses exist in the airport environs and to determine what strategies are most appropriate to prevent further encroachment and to mitigate existing problems. Additional research is recommended in creating a land use program specifically tailored to your community. Cooperation between the airport manager and community stakeholders is highly recommended during the process of developing an airport plan and the transportation element of a comprehensive plan.

Chapter 5 Roles and Responsibilities for Establishing Compatible Land Use

Communities, airport stakeholders and users, and citizens share the responsibility of ensuring compatible land use around airports. Each group represents a vital element in the overall success of land use compatibility planning and development strategy. This chapter discusses the roles and responsibilities of federal, state, and local governments, airport owners and managers, airport users, and citizens related to land use issues. It is important to be mindful that while federal and state agencies can provide guidance and fill a supportive role, the local entities are pivotal in crafting compatible land uses near their airports.

Developing and implementing compatible land uses will enhance the environmental friendliness of the aviation system and environmental stewardship of parties of different interests and local citizens alike. Both the Federal Aviation Administration (FAA) and the Federal Highway Administration (FHWA) list three principles of environmental justice that must be maintained before, during, and after transportation project developments:

- Avoiding, minimizing, or mitigating disproportionately high and adverse human health and environmental effects, including social and economic effects on minority and low-income populations.
- Ensuring that all potentially affected communities fully and fairly participate in the transportation decision-making process.
- Preventing the denial, reduction, or significant delay in the receipt of benefits to minority and low-income populations.

Consequently, it is important that these responsibilities be applied consistently at each airport within Wisconsin. In an effort to build cooperation, it is vital to identify and involve stakeholders in the process of planning for airport compatible land uses. Stakeholders interested in the preservation of the local aviation system may include persons or groups directly involved in transportation and related industries. Stakeholders:

- Depend on the airport for product transport
- Influence the community planning process
- Are transportation and airport professionals
- Are airport users or pilots
- Are community decision makers
- Are impacted by airport projects
- Are located near airport property

The following is a discussion of some of the common stakeholders in airport land use compatibility planning.

Federal Government

At the federal level, the Federal Aviation Administration (FAA) is the primary agency responsible for aviation-related land use planning. Other federal departments, such as the Federal Communication

Commission (FCC), the U.S. Fish and Wildlife Service (USFWS), and the U.S. Army Corps of Engineers (USACE) have regulatory review of various aspects of airport development and off-airport land issues.

- Federal Aviation Administration: www.faa.gov
- Federal Communication Commission: www.fcc.gov
- U.S. Fish and Wildlife Service: www.fws.gov
- U.S. Army Corps of Engineers: www.usace.army.mil

A Memorandum of Understanding (MOU) exists among the FAA, U.S. Air Force, U.S. Army, Environmental Protection Agency (EPA), USFWS, and U.S. Department of Agriculture to coordinate to more effectively address existing and future environmental conditions contributing to aircraft wildlife strikes throughout the United States.

- A copy of the MOU among these federal agencies can be found here: <http://www.afmb.org/pubs/misc/MOA.SIGNATURE.VERSION.pdf>

The FAA is responsible for federal laws and regulations affecting the national aviation industry. Federal Aviation Regulations (FARs), FAA Orders, and FAA Advisory Circulars (ACs) are the primary tools used for national oversight. Additionally, the FAA is responsible for the expansion and safe operation of airports and aviation-related activities, the preservation of national airspace, and the control of aircraft while in flight. The FAA is also the primary funding source for airport construction, airport master plans, noise studies, land use studies, and other issues related to land use compatibility.

As the national representative for aviation related issues, the FAA is a complex organization with numerous branches, departments, and offices for overseeing the aviation industry. Each branch has a specific area of aviation expertise or interest; however, there can be overlap among offices and branches. Careful coordination is essential to the comprehensive assessment of land use issues. Wisconsin's access to the majority of these branches is available on a local level through the FAA Airports District Office (ADO) in Minneapolis and the Great Lakes Regional Office in Chicago.

Specific FAA regulations that impact land use issues provide a foundation for airport owners to build on when constructing a compatible land use strategy. These regulations have historically focused on on-airport safety and land use. However, as land use issues continue to play a large part in the preservation of the nation's airports, the FAA has become more proactive in developing FAA Orders and ACs to address land use concerns such as wetlands, wildlife attractants, and telecommunication towers. Chapter 6 discusses these issues in greater detail.

The FAA is the primary funding source for capital improvement projects at airports nationwide. Funding opportunities related to land use issues apply to two areas: land acquisition to provide open space around airports and noise related mitigation measures. The primary funding focus is to acquire clear runway safety and approach areas in proximity to the airport. The secondary funding emphasis is to acquire aviation or clear zone easements to ensure height controls over properties near the airport. When warranted by a noise study, the FAA will fund noise mitigation measures. These measures may include soundproofing structures, construction of noise barriers, or acquisition to remove or relocate a noise-

sensitive development. Additionally, funds are available for the development of an airport's master plan, which serves as the foundation for the airport's future development.

State Government and Regional Organizations

At the state level, the Wisconsin Department of Transportation (WisDOT) is responsible for providing leadership in developing and operating a safe and efficient transportation system. The Wisconsin Bureau of Aeronautics (BOA) is responsible for implementing the WisDOT mission as it relates to aviation. The BOA mission includes improving aviation security and safety, developing air transportation facilities, and providing aviation information and technical expertise to clients.

- Wisconsin Department of Transportation (WisDOT): www.dot.wisconsin.gov
- WisDOT Bureau of Aeronautics: www.dot.wisconsin.gov/modes/air.htm

BOA provides the coordination and communication linkage between state agencies, the FAA, local governments, and the associations representing the aviation industry. Other state departments and agencies, such as the Department of Natural Resources (DNR), provide input on various activities proposed at airports on issues such as storm water management and air quality and often work closely with BOA in those endeavors. BOA and DNR have signed a cooperative agreement pledging to consult and cooperate with each other on projects. For a copy of the cooperative agreement, please contact BOA.

WisDOT, Bureau of Aeronautics

To help coordinate and assist federal, state, and local efforts, the BOA has four sections that offer various services and have distinct responsibilities. These sections include:

- Director's Office
- Aeronautical and Technical Services Section
- Airport Engineering Section
- Airport Program and Finance Section

The staff in these four sections provide Wisconsin with a tremendous resource for aviation information and technical expertise. Resources are available to promote the safe and efficient development of airports within the state, including programs to review and issue permits for airport sites and tall structures. Guidance on land use planning, environmental impacts and airport operations are other areas promoted by the BOA through this guidebook, additional publications, educational seminars, and conference presentations.

- For a complete list of publications developed by BOA, please refer to:
<http://www.dot.wisconsin.gov/library/publications/topic/aviation-publications.htm>

Additionally, BOA staff provide assistance on the various elements of federal and state laws and policies which present methods for establishing compatible land uses around airports. The first step to implementing any of these options is to contact BOA staff and discuss the options that are appropriate for a particular airport.

Metropolitan Planning Organizations

Wisconsin has 14 metropolitan planning organizations (MPOs) that share responsibility for transportation planning in 17 metropolitan areas. WisDOT works closely with MPOs to ensure a comprehensive, coordinated approach to local, regional and state transportation planning in Wisconsin's urbanized areas.

An MPO has a two-pronged purpose with regard to transportation planning:

- To develop a long-range transportation plan that will provide a multi-modal investment strategy for meeting the mobility needs of people and businesses throughout a metropolitan area.
- To develop a short-range transportation improvement program that prioritizes improvement projects for federal funding purposes. MPOs ensure that provisions of state and federal laws pertaining to regional transportation planning are implemented in each metropolitan “planning area.” The “planning area” is defined as the existing urbanized area plus the projected 20-year growth area.

Regional Planning Commissions

Wisconsin has nine Regional Planning Commissions (RPCs). All but five counties in the state (Columbia, Dodge, Jefferson, Rock, Sauk) are served by an RPC. In Wisconsin, RPCs are formed by executive order of the governor and provide intergovernmental planning and coordination for the physical, social and economic development of a region. A board, typically appointed by county boards and the governor, directs commission activities.

A map of Wisconsin's MPO and RPC can be found here:

<http://www.dot.wisconsin.gov/projects/planorg/docs/map.pdf>

Detailed contact information for each MPO and RPC can be found here:

<http://www.dot.wisconsin.gov/projects/planorg/docs/contacts.pdf>

Specific examples of RPC services to local governments include:

- Comprehensive plan development
- Zoning ordinance development
- Subdivision ordinance development
- Grant writing
- Geographic information system support
- Map production
- Revolving loan fund administration
- Economic development planning
- Socio-economic data collection and dissemination
- Public policy advocacy on issues affecting a region

Local Governments

Local governments are on the front line in planning for airport compatible land uses. While federal and state agencies create the guidelines and enabling regulations related to land use issues, local units of government are charged with implementing and enforcing these measures. Land use zoning and other methods to control issues such as noise impacts, tall structures, landfills, and wildlife issues are the responsibility of local planners and elected officials. Local governments are also required to develop

plans and regulations that comply with federal and state-mandated airport and transportation-related rules and also with many other, sometimes conflicting, federal and state agency requirements. Coordination and communication is vital in order to ensure effective implementation and subsequent enforcement of land use compatibility initiatives.

Local planning and regulatory tools such as comprehensive plans, zoning ordinances, and plat and survey review work together to provide the structure for successful preservation of airport environs and the protection of surrounding properties from any negative impacts that an airport may have, such as noise levels or aircraft safety. These tools are discussed in greater detail in Chapter 6.

Zoning regulations must reflect the future vision outlined in a community’s comprehensive plan. The vision of the comprehensive plan is, in fact, brought to the implementation phase year by year through zoning regulations. Cooperation among neighboring jurisdictions in the development of comprehensive plans is very important, especially when creating a plan that respects the needs of local airports.

Airport Owners and Managers

Airport owners and managers are responsible for being the ambassadors to local governments and citizens to inform them of the importance of compatible land use planning around airports. Airport owners and managers should be vigilant in their efforts to stay informed about their local communities’ actions regarding land use issues in proximity to the airport. They should also be closely involved with local governments and their officials in developing comprehensive plans and zoning regulations that:

- Preserve the viability of the airport
- Minimize and/or mitigate potential noise impacts on surrounding areas
- Preserve adequate space for airport operations, future expansion, and safety zones
- Protect airports and airport environs from encroachment and incompatible land uses (through state-mandated comprehensive planning, local zoning codes and local height limitation zoning ordinances)

Airport owners and managers can play an active role in the comprehensive planning process by providing an airport inventory. Once all inventories are gathered, they can help the community identify the types of aircraft operations that are available at both the local and regional levels. Airport-specific information provides the community with a good foundation from which to develop the transportation element of the comprehensive plan to include airport issues.

An airport inventory should include the following information:

- Location map of the airport (including noise contours)
- Description of the type of airport involved
- Description of the airport classification
- Description of the runways, activity levels, based aircraft, enplanements, and cargo
- Compilation of all applicable zoning ordinances
- Description of approach clearance considerations
- Copy and explanation of the airport master plan along with any future development expected at the airport
- Opportunities to develop links to other transportation modes

Airport Users

General aviation users, airlines, and cargo carriers are equally responsible for their own awareness of matters relating to land use compatibility. Airlines and air cargo carriers are required to replace or retrofit existing aircraft to meet the most current noise level requirements. Both commercial service and general

aviation pilots are responsible for operating their aircraft in a prudent manner to reduce noise impacts on local land uses. They must operate in accordance with standard operating procedures that include adhering to local noise abatement procedures and following posted traffic patterns during approach and departure operations. Additionally, airport users are responsible for being aware of any hazards, such as wildlife, in and around airports and should report any and all wildlife strikes to the airport.

Citizens

Enhancing citizens' awareness about the necessity of compatible land uses around airports is essential to the viability of the aviation system. Individuals influence the decisions of the local planners, elected officials, and policy-makers who are directly responsible for implementing the planning techniques required for compatible land uses. Public involvement plays an important role in the Wisconsin comprehensive planning law as well as FAA's federal grant assurances.

It is essential to include the public in the planning process in order to enhance awareness and understanding of the importance of compatible land use near the local airport. Public involvement efforts raise public awareness about the detrimental impacts of incompatible land uses and build the commitment to create a safe environment for the airport and residents. Through the process of engaging and educating the public about the two primary land use compatibility topics, safety and noise, communities can build mutual trust and gain the support of citizens.

Citizens are also an important part of the planning process because they are often the ones most affected by the techniques used to develop compatible land use and thus, their support is essential for the successful implementation of those techniques. For example, a homeowner whose residence is located in a runway protection zone of a local airport should be aware of the need for clear airspace within this zone, which may include the need for an aviation easement or purchase of the property.



Figure 5-1: Park Falls Municipal Airport, Park Falls, WI

Summary

When establishing compatible land uses near airports, a number of stakeholders should be involved in the process, including multiple levels of governments, airport personnel and users, and citizens. However, it is important to keep in mind that the stakeholders listed in this chapter are a starting point; communities may have additional stakeholders that should be involved in planning processes.

Chapter 6 Techniques for Establishing Compatible Land Use

Many communities have some form of incompatible land use in proximity to the airport. Developing strategies to address these incompatibilities is an important step in preserving airports throughout the state.

Most Wisconsin airports have three distinct challenges with regard to land use compatibility issues:

- Reduce the number of existing incompatible land uses
- Implement strategies that prevent future incompatibilities
- Undertake activities that will mitigate adverse impacts of incompatible land use

It is always more effective and efficient to prevent incompatible land uses than to correct them later. This chapter outlines a matrix of widely used methods for achieving compatible land use. It is recommended that communities combine applicable methods to meet their specific needs. Techniques for establishing compatible land uses can be divided among four main areas: planning and zoning, natural features mitigation, land acquisition, and noise techniques.

Planning and Zoning Tools

Understanding planning techniques is an important first step in developing compatible land uses around an airport. Planning techniques need to focus on site-specific issues and planning documents should guide the use of preventive, corrective, or mitigating measures to be implemented for the airport's existing development and future growth. Additional coordination or involvement with other federal or state agencies may be required on a project-specific basis. Early communication with the Bureau of Aeronautics (BOA) is recommended to identify the potential involvement of agencies as soon in the planning process as possible and to help in the coordination efforts that may be necessary.

Airport Layout Plans

An airport layout plan is a planning document that guides the growth and development of an airport over a 20-year planning period. This plan is typically developed by the airport owner and its governing body and should also be supported by the local government. This document should be provided to the local land use decision makers when they are evaluating development proposals close to the airport so they can ensure compatibility with the future of the airport.

Airport Approach Protection

As discussed in Chapter 3, Chapter 114, Wis. Stats., requires airports to protect their runway approach areas. Municipal maps must include the approach areas for publicly owned airports and the designation on the municipal map should illustrate the areas that lie beneath the runway approach zone. These areas must be protected from incompatible land uses and local zoning authorities are required to notify the airport of any proposed zoning changes in the airport's vicinity. Likewise, airport managers are urged to share airport protection maps with community stakeholders. The airport can contest proposed changes either verbally or in writing.

Comprehensive Planning

As discussed in Chapter 3, the comprehensive planning law provides a framework for the development, adoption, and implementation of comprehensive plans by regional planning commissions and by county, city, village, and town units of government. The transportation element provides the perfect foundation and opportunity for communities to recognize the importance of their local airport by planning for compatible land uses near the airport. Communities are encouraged to work within the comprehensive planning framework to deter incompatible land uses near airports. For additional information and resources on comprehensive planning, please consult Chapter 3.

Zoning Ordinances

Ordinances are local laws developed by communities which can be used to regulate land use. Ordinances typically reflect what is written in the comprehensive plan and are effective tools to reduce incompatible land uses around airports. They are most effective when implemented early in the development of an airport and its environs. Airport zoning controls on- and off- site uses, including airport hangars, parking areas, vehicle and pedestrian accessibility and height and land uses. When developing a zoning code, a community should consider other existing local zoning and approval actions required by state agencies to determine whether or not they need assistance from an outside consultant, or if in-house analysis is sufficient.

Height Limitation Zoning Ordinances and FAA Regulation

As discussed in Chapters 2 and 3, a Height Limitation Zoning Ordinance (HLZO) dictates the height limitations for structures and vegetation in the vicinity of the airport and helps to preserve navigable airspace. Height provisions in an HLZO supersede zoning in all municipalities within three miles of an airport; this concept is known as "extraterritoriality." All airports receiving aid from the Wisconsin Bureau of Aeronautics must adopt a Height Limitation Zoning Ordinance (HLZO). In the event that there is not a Height Limitation Zoning Ordinance and a new structure's top will be more than 500 feet above the lowest point within a mile of a structure's base, or the structure is 150 feet or higher and exceeds a 40-to-1 slope from the nearest boundary of the closest public use airport, then Wis. Stat. 114.135 mandates that a permit must be applied for at WisDOT.

Also discussed in Chapters 2 and 3, FAA's Federal Aviation Regulation (FAR) Part 77 – *Objects Affecting Navigable Airspace* outlines "imaginary surfaces." Any object or structure that penetrates these surfaces is considered to be an obstruction to air navigation. FAR Part 77 should form the basis of height restrictions identified in an HLZO and specific height restrictions should be included in the development of zoning ordinances. For additional information and guidance on FAA height regulations, please consult Chapter 2.

FAA Form 7460, Notice of Proposed Construction

As discussed in Chapter 3, airspace is protected at the federal level by the use of *FAA Form 7460, Notice of Proposed Construction*. In the event that construction or improvement projects taking place in or around a public use airport exceed FAA standards, Form 7460 must be submitted to the FAA at least 45 days prior to the date on which construction will begin. The FAA conducts an aeronautical study and issues a determination to the airport operator which identifies whether or not the proposed development is a hazard to airspace. It is imperative that local planners be aware of the various critical safety

considerations when positioning developments around airports. The BOA can provide information on this form and the submittal process.

Airport Overlay Zoning

An Airport Overlay Zone (AOZ) is a tool that promotes compatible land uses within a three-mile radius of an airport. This type of zoning applies additional review, conditions and/or restrictions to a specified area while retaining the existing base zoning classification. As mentioned above, airport sponsors have the authority to extraterritorially zone, thus an AOZ supersedes zoning ordinances in those municipalities within a 3-mile radius of the airport. The AOZ can be highly effective in addressing a number of potential incompatibilities relative to airports and airport operations, which are often difficult to address in the general zoning ordinance. For example, the AOZ may limit the height of objects surrounding an airport within three miles, restrict land uses that produce conditions potentially hazardous to air navigation (e.g., smoke and glare), sound-sensitive, or attract hazardous wildlife. AOZs can take a variety of forms depending on the needs of the airport and surrounding community. Sample ordinances can be found in Appendix B. It is important to recognize that there is no one-size-fits-all zoning ordinance and an ordinance that works for one community may not work for another. Each community should structure their ordinance to meet their individual needs. The BOA has resources for AOZ projects, including an AOZ ordinance funding program, and should be contacted before a community begins their zoning endeavor.

Subdivision Plat and Certified Survey Map Review

Another tool for establishing compatible land use involves plan review. Local subdivision ordinances identify requirements for the layout of parcels; certified survey map (CSM) and subdivision plat review is required before construction is allowed to begin on a site. Sites that are set for development must first be analyzed by local planning commissions to verify that the proposed development meets all related zoning requirements and are subject to change based on the approval of the local planning commission. As part of the review process, local commissions have the opportunity to examine population and development density for airport compatibility and ensure that developments of higher density are not allowed in or near airport approach zones.

The layout of property boundaries should also be reviewed to preserve aircraft safety when adjacent or within one mile of the airport. This review guarantees that land use decisions are discussed between local officials and developers before the development is allowed to begin. Plat and CSM review are important tools in preserving airport environs. On parcels adjacent to airports, deed restrictions are also important as they are the legal authority for development or restriction thereof. A successful example of plat review is at the Dane County Regional Airport where there is an aviation covenant held on nearby properties that requires plat approval.

Natural Feature Techniques

Natural features are important considerations when establishing compatible land uses near airports. As discussed in Chapter 3, navigable airspace can be threatened by tall trees and hazardous wildlife. Therefore, it is essential for airports and surrounding communities to effectively plan and undertake mitigation techniques which can minimize or eliminate these threats.



Figure 6-1: Tall trees surround the Manitowish Waters Airport, Manitowish Waters, WI

Tall Trees Mitigation

A large part of height limitation zoning and airport planning involves the impact that tall trees can have on runway approaches. An inventory of existing trees in the approach zone is recommended in order to make knowledgeable decisions about protecting airspace. **Table 6-1** shows tree species and respective heights that are acceptable in runway approach zones due to their shorter maximum heights. This list does not include every type of vegetation that is specifically native to Wisconsin; however, **Table 6-2** depicts common tree species of Wisconsin and their heights for use during the development of an airport plan. Measures should be outlined in the height limitation zoning ordinance that will control the heights of trees allowed near runway approaches. Trees with a maximum height of more than 50 feet should be avoided in runway approach zones, where possible.

- For additional information on vegetation management to reduce wildlife hazard at airports please refer to: http://www.aphis.usda.gov/wildlife_damage/nwrc/publications/04pubs/washburn042.pdf.

Table 6-1: Compatible Tree Heights

Tree Species	Height	Habitat Type
Prairie Crabapple	20 – 35 feet	Dry uplands
Cockspur Hawthorn	20 – 35 feet	Floodplains, rocky pastures
Dotted Hawthorn	20 – 35 feet	Rich, moist soil, open hillsides
Downy Hawthorn	35 – 50 feet	Rocky hillsides and hilltops
American Hophornbeam	35 – 50 feet	Upland, moist to dry
American Hornbeam	35 – 50 feet	Wet lowlands and uplands
Showy Mountainash	20 – 35 feet	Wet lowlands and uplands
American Plum	20 – 35 feet	Dry Uplands
Eastern Wahoo	20 – 35 feet	Wet lowlands
Common Witchhazel	20 – 35 feet	Uplands, moist areas

Source: Hightshoe, Gary: Native Trees, Shrubs, and Vines for Urban and Rural America, 1988.

Table 6-2: Wisconsin Tree Height Index

Tree species	Maximum height	Habitat type
American Elm	90 feet	Rich lowlands or moist hill areas
Balsam Fir	60 feet	Cool, moist, shaded places
Balsam Poplar	80 feet	Northern wetlands
Basswood	80 feet	Statewide loamy soil
Beech	75 feet	Eastern Wisconsin, fertile well-drained soil
Bitternut Hickory	75 feet	Southern, well drained fertile soils
Black & Honey Locusts	50 feet	Wide variety of soils
Black Ash	75 feet	Cold locations, stream banks
Black Cherry	70 feet	Statewide better soils
Black Oak	75 feet	Southern uplands, gravel slopes and ridges
Black Spruce	60 feet	Swamps
Black Walnut	100 feet	Lowlands and fertile hillsides
Box Elder	50 feet	Statewide wetland areas
Bur Oak	80 feet	Statewide, moist soil
Butternut	80 feet	Southern Wisconsin uplands
Chinkapin Oak	100 feet	Lowlands, rocky banks, limestone ridges
Eastern Cottonwood	90 feet	Statewide along waterways
Green Ash	60 feet	Wetlands
Hackberry	75 feet	Rich, alluvial soil
Hemlock	100 feet	Northeastern Wisconsin, moist soils
Jack Pine	70 feet	Sandy soil
Large-Tooth Aspen	80 feet	Sandy or moist, rich soils
Northern Pin Oak	50 feet	Statewide, sandy soils
Northern White Cedar	60 feet	Southern moist soil or northern dry soil
Paper Birch	70 feet	Statewide sand and gravel soils
Quaking Aspen	70 feet	Sandy, gravel soils
Red Maple	65 feet	Statewide, moist soils
Red Oak	90 feet	Statewide, better soils
Red Pine	90 feet	Northern Wisconsin
River Birch	60 feet	Valley wetlands
Rock Elm	100 feet	Well-drained soils
Shagbark Hickory	100 feet	Southern, moist soils or well-drained hills
Silver Maple	100 feet	Southern lowlands
Slippery Elm	70 feet	Stream banks and fertile hills
Sugar Maple	100 feet	Statewide, on better soils
Swamp White Oak	80 feet	Southern lowlands
Tamarack	60 feet	Swamps
White Ash	90 feet	Fertile, well-drained sites
White Oak	100 feet	Southern, better soils
White Pine	150 feet	Ridges, sandy or fertile soil
White Spruce	80 feet	Northern Wisconsin, moist soils
Willow	50 feet	Statewide, variety of soils
Yellow Birch	85 feet	Northern, rich, moist upland soil

Source: Wisconsin Department of Natural Resources

Hazardous Wildlife Mitigation and Planning

According to the FAA, wildlife-aircraft strikes have resulted in the loss of hundreds of lives worldwide, and billions of dollars in aircraft and property damage over the past century. Hazardous wildlife attractants on and near airports can jeopardize safety, making proper wildlife hazards mitigation and planning essential. Most airports have wildlife problems and it is unlikely that wildlife hazards will ever completely be extinguished. What is important is for airports to understand what their hazards are and take steps to address those hazards. *FAA Advisory Circular 150/5200-33B, Hazardous Wildlife Attractants on or Near Airports* provides guidance on certain land uses that have the potential to attract hazardous wildlife on or near public-use airports and discusses airport development projects (including airport construction, expansion, and renovation) affecting hazardous wildlife attractants. Additionally, the following are important resources in hazardous wildlife mitigation and planning.

- FAA Advisory Circular 150/5200-33B, *Hazardous Wildlife Attractants on or Near Airports* can be found here: http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf
- FAA Order 5050.4B *NEPA Implementing Instructions for Airport Projects* can be found here: http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/
- *Wildlife Hazard Management at Airports: A Manual for Airport Personnel* addresses mostly commercial service airports and can be found here: http://wildlife-mitigation.tc.faa.gov/wildlife/downloads/2005_FAA_Manual_complete.pdf
- Airport Cooperative Research Program Report 32: *Guidebook for Addressing Aircraft/Wildlife Hazards at General Aviation Airports* can be found here: http://onlinepubs.trb.org/onlinepubs/acrp/acrp_rpt_032.pdf

For example, constructed or natural areas—such as poorly drained locations, detention/retention ponds, roosting habitats on buildings, landscaping, odor-causing rotting organic matter (putrescible waste) disposal operations, wastewater treatment plants, landfills, agricultural or aquaculture activities, surface mining, or wetlands—can provide wildlife with ideal locations for feeding, loafing, reproduction, and escape. Even small facilities, such as fast food restaurants, taxicab staging areas, rental car facilities, aircraft viewing areas, and public parks, can produce substantial attractions for hazardous wildlife. Such facilities, if located near airports, are defined as “hazardous wildlife attractants” and thus should be eliminated or techniques should be employed to minimize the hazard potential. The following tools can help to mitigate the impact of hazardous wildlife.

Strike Reporting and Wildlife Logs

Monitoring wildlife activity on or near the airport is an important first step in determining how to protect the airport from wildlife hazards. It is essential for airports and airport users to report wildlife strikes to the FAA, including the type of strike and type of animal.

- Wildlife Strike Reporting can be done using FAA Form 5200-7, found here: <http://www.faa.gov/forms/index.cfm/go/document.information/documentID/185872>

In addition to reporting wildlife strikes, airports should keep a wildlife log to document the types of wildlife prevalent on and near the airport, where wildlife have been spotted, and techniques that have been used to address wildlife issues. Compiling this information helps airports identify wildlife population changes and alerts the airports to mitigation techniques that are more or less successful.

Wildlife Hazard Assessments and Wildlife Hazard Management Plans

A Wildlife Hazard Assessment (WHA) can be conducted by a wildlife management biologist (typically USDA wildlife service staff) to identify the wildlife species observed at an airport and document the numbers, locations, local movements, and daily and seasonal occurrences. For additional information on WHAs, please contact BOA.

A Wildlife Hazard Management Plan (WHMP) is a comprehensive tool that includes control techniques and habitat modifications on airport property, identifies the parties responsible for implementing these techniques, and creates a schedule for implementation. A WHA can provide the scientific basis for the development, implementation, and refinement of a Wildlife Hazard Management Plan, if needed. A Wildlife Hazard Committee can be helpful in implementing the plan and evaluating the success of the plan's techniques and can vary in size and format, depending on each individual airport's needs. In Wisconsin, the United States Department of Agriculture (USDA) Animal and Plant Health Inspection Service (APHIS) is available to conduct wildlife consultations at airports. For additional information, please contact the BOA.

- USDA APHIS Wildlife Services Wisconsin
http://www.aphis.usda.gov/wildlife_damage/state_office/wisconsin_info.shtml

Habitat Identification and Modification

Identifying and modifying habitats that are attractive to hazardous wildlife is the most effective and long term solution to wildlife problems. Plants that should be minimized near airports include:

- Woody plants such as oaks, firs, pines, maples, and cedars
- Upland weeds and shrubs such as oats, sunflower and crabgrass
- Marsh plants such as water lily, wild celery, and wild rice
- Cultivated or ornamental plants such as alfalfa, barley, corn, birch trees, and dogwoods
- Other plants that have large seeds or fruits that may provide food for wildlife

Agricultural leases should follow guidelines regarding location as well as type of crops permitted on the airport.

Additional habitat modification techniques include spacing non-fruit and non-nut bearing trees, mowing grass to less than 10 inches, eliminating standing water and nesting/perching sites, and removing abandoned facilities. These methods make habitats less attractive to wildlife, particularly birds.

In addition to lessening the attractiveness of wildlife habitat, there are several options for discouraging or removing wildlife. These include repellents, gates, grids, nets, sirens, horns, egg/nest destruction, pyrotechnics, and propane canons. Shooting and trapping can also be options, however, please keep in mind that permits may be required for certain species. Please consult the BOA or a wildlife permitting authority before undertaking shooting or trapping techniques.

Project Review

Airport managers and the surrounding community must be mindful of the impact on- airport and near-airport projects can have on wildlife. As mentioned previously, construction projects and community facilities such as landfills and sewage treatment plants can attract wildlife and negatively impact the

airport. It is important to review all projects for potential wildlife impacts on the airport. The BOA can assist in project review.

- FAA Order 5200.5B, *Airport Safety During FAA-Funded Airport Construction and FAA Facilities Maintenance*
http://www.faa.gov/regulations_policies/orders_notices/index.cfm/go/document.information/documentID/2065
- FAA Advisory Circular (AC) 150/5200-34A, *Construction or Establishment of Landfills near Public Use Airports*
http://www.faa.gov/airports/resources/advisory_circulars/index.cfm/go/document.current/documentNumber/150_5200-34

Land Acquisition and Agreement Techniques

Land acquisition is the primary tool used for corrective or preventive measures to ensure land use compatibility. As a corrective technique, land acquisition can be used to remove, lower, or control existing land uses. As a preventive tool, acquisition of property and easements can take place prior to the development of a conflicting land use or to prevent future undesirable changes to the property. Acquisition typically has two forms: fee simple acquisition and acquisition of easements. Covenants, transfers of development rights (TDRs), and purchases of development rights (PDRs) are additional land control techniques. Each of these methods is discussed in this section and shown in **Table 6-3**.

- Please consult the Bureau of Aeronautics' *Airport Owner's Guide to Land Acquisition*, found here: <http://www.dot.wisconsin.gov/localgov/docs/airport-guide.pdf> and be sure to utilize the supplements to the guide, found here:
 - <http://www.dot.wisconsin.gov/business/engrserv/airports/documents/pdf/enviroinvest-guide-landacq.pdf>
 - <http://www.dot.wisconsin.gov/business/engrserv/airports/documents/pdf/survmap-guide-landacq.pdf>
 - <http://www.dot.wisconsin.gov/business/engrserv/airports/documents/pdf/appraisrev-guide-landacq.pdf>

It is important to be mindful of the complexity of land acquisition, especially as it relates to airport development. Airport sponsors should contact BOA before undertaking a land acquisition project.

Table 6-3: Land Acquisition Options for Establishing Compatible Land Use

Technique	Description	Key value	Primary shortcoming	When to use
Fee simple acquisition	Purchase of land and all interests, benefits, and rights. Included as airport property.	Allow complete control over future and pre-existing land use; not reversible	May be costly with possible legal opposition; may take land off the tax roles	To protect critical Runway Protection Zones (RPZ's) and areas subject to high levels of noise impact. Most effective for resolving existing problems, also use to avoid problems. May be eligible for FAA funding.
Easements	An interest held in the property of another; allows the right to use or restrict use in a specified manner	Can provide more positive control than zoning; less expensive than acquisitions, land remains on active tax roles	Does not completely alter existing incompatible land uses	Can be used to compensate land owner for substantial noise impacts and can be used to gain right to remove existing and prevent future obstructions (i.e. trim trees)
Transfer of development rights	Property development rights transferred to alternative location	Less costly than fee simple acquisition	Applicable in very limited situations, requires the creation of a TDR "market." not suitable to large areas, requires coordination	Transfer of Development Rights (TDR) opportunities may substantially differ between cities and counties. Coordination with the U.S. Department of Agriculture and Land and Water Conservation Department is suggested if this action is considered
Purchase of development rights	Property development rights are purchased by the local government and held in perpetuity	Less costly than fee simple acquisition	Requires coordination; taxpayer money	PDR opportunities may substantially differ between cities and counties. Coordination with the BOA and the local community is suggested if this action is considered
Hold Harmless Agreements, Non-Suit Covenants, and Disclosure Notices	A legal agreement between an airport and a land owner	Acknowledges incompatible land uses and releases the airport from lawsuits pertaining to complaints	Does not completely alter the existing incompatible land uses	Can be used to compensate land owner for airspace rights, and protects the airport from nuisance lawsuits

Source: Airport Land Use Compatibility Guide, Oregon Department of Aviation, 2003, with 2009 edits.

Fee Simple Acquisition

Fee simple acquisition is the process by which the airport purchases adjacent property from the existing property owner in its entirety. This includes the land with its accompanying interests, rights and benefits (such as air rights), as well as all structures and improvements on the land. This is the most effective means of protection because it places sole ownership of the property into the hands of the airport, which allows the airport to maintain the property in a compatible manner. The FAA recommends airport sponsors own the property under the runway approach and departure areas which include, as a minimum, the limits of the Runway Protection Zones (RPZs).

The federal process outlined in FAA Advisory Circular (AC) 150/5100-17 change 3 – *Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects* and the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* (P.L. 91-646) must be adhered to when purchasing property with federal funds. The FAA has developed a useful information brochure entitled *Land Acquisition for Public Airports*, which summarizes the required process for land acquisition.

- The *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970* can be found here: <http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&sid=a592e75ef03f421aa9ef4452b3f0606a&rgn=div5&view=text&node=15:1.1.1.1.16&idno=15>
- FAA Order 5100.37B, *Land Acquisition and Relocation Assistance for Airport Projects* can be found here: http://www.faa.gov/airports/resources/publications/orders/media/environmental_5100_37b.pdf
- FAA AC 15-/5300-17 Chg 3, *Land Acquisition and Relocation Assistance for Airport Improvement Program Assisted Projects* can be accessed here: [http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/a5e60a3a816f625786256d870070385b/\\$FILE/150-5100-17.pdf](http://rgl.faa.gov/Regulatory_and_Guidance_Library/rgAdvisoryCircular.nsf/0/a5e60a3a816f625786256d870070385b/$FILE/150-5100-17.pdf)
- Additional FAA information on land acquisition, including *Land Acquisition for Public Airports*, can be found here: http://www.faa.gov/airports/environmental/relocation_assistance/

If federal funding is anticipated for an acquisition, guidance should be sought from the BOA to ensure that the proper process is followed.

Property acquisition does include taxpayer funding; however, it is a positive, long-term investment to acquire property prior to development rather than after development creates incompatible land uses. As airport expansion becomes imminent, the value of land adjacent to the airport often increases due to development potential. Land acquisition prior to cost increases represents potential savings for the airport owner and taxpayers.

RPZs and Land Acquisition

As discussed in Chapter 2, the Runway Protection Zones (RPZs) are trapezoidal areas off the end of the runway end that provide protection to people and property in the event an aircraft lands or crashes beyond the runway end.

Under FAA design criteria, the airport owner is required to have a sufficient interest in the RPZ to protect it from both obstructions and incompatible land use. Sufficient interest in the RPZ can be accomplished in three primary ways. The preferred method is for the airport to purchase the approach areas in fee simple; however, alternative options include adequate zoning and the purchase of an easement (or a combination of easement and zoning). Ownership in fee is preferred because it provides maximum control for the airport and is generally less expensive in the long run than acquiring an easement due to the fact that an easement must be very restrictive in order to provide adequate control.

Easements

An easement is a right or privilege that one party has over the property of another party. Easements are often bought by a land trust or a government and used in order to protect a property from a use that is detrimental to the community. An easement is a legal interest which restricts, but does not nullify, the fee owner’s rights. An easement may benefit a specific person or entity, such as a public utility easement, or may “run with the land,” and remain in effect when the property is sold. Easements are typically a less

expensive method of land use control but are governed by the same rules as the fee simple process, including the *Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970*, and associated FAA Advisory Circulars (ACs).

Easements may be used as an effective method of land use control to reduce incompatible land uses in the airport environs, but should be used in concert with a broader land use plan. It is important to note that easements must be enforced to be effective. Common easements related to airports include:

- A **conservation easement** allows for restrictions to be placed on the type of land uses that can be developed on a specific parcel of property and are typically used to protect land from certain development types.
- An **avigation easement** can be used to mitigate existing incompatible land uses that are hazardous to airports and aircraft operations, such as trimming natural vegetation back to appropriate heights or preventing structures from exceeding certain heights.
- A **clearzone easement** grants the right to remove growth above a specified surface, generally ground level, but does not address aviation or right-of-flight. A combined clearzone/avigation easement is recommended when clearance rights are required.

➤ For additional information on easements, please consult:
<http://www.dot.wisconsin.gov/library/publications/topic/air/avigation-easements.pdf>

Transfer of Development Rights

The Transfer of Development Rights (TDR) involves separate ownership and the use of “rights” associated with a parcel of land. Under the TDR concept, a property’s development rights (sending zone) are transferred to an alternate location (receiving zone) where they may be used to strengthen allowable development. For example, land identified by a community within the approach to an airport could be defined in the master plan as open space or agricultural use, and its development rights for residential use will be purchased by developers and transferred to locations outside the approach area. Landowners are fairly compensated for the transferred rights. In areas where future development is planned, the developers can benefit from purchasing development rights where development would be incompatible or costly and applying those to their own residential or commercial developments. In order to be a viable option, the TDR approach must be fully coordinated with the comprehensive planning and zoning processes. The TDR “market” may substantially differ among municipalities.

Purchase of Development Rights

The Purchase of Development Rights program (PDR) is another tool in which a community purchases the development rights of parcels. Landowners voluntarily apply for this program, which is funded typically through community taxing. The governing entity that purchases the land holds onto the development rights in perpetuity, thereby restricting the development that would otherwise take place. Successful PDR programs include those that target farmland, scenic viewsheds, historic areas, and environmentally sensitive lands. PDR may be a cost-effective way to protect airports through the acquisition of development rights on adjacent land areas that are not yet developed.

Land Agreements and Notifications

In addition to the land acquisition techniques outlined above, there are several agreements and notices that can protect the airport from incompatible land use issues. These include:

- A **hold harmless agreement** is a legal contract between a property owner and an airport sponsor in which the property owner acknowledges the potential for incompatible land use issues.
- A **non-suit covenant**, typically used in conjunction with an aviation easement, is a legal agreement between an airport and a landowner. Under a covenant, the land owner has agreed not to sue the airport if noise issues should arise because the land owner has acknowledged that he or she is aware of the noise levels and has been monetarily compensated for the easement.
- **Disclosure notices** are recorded legal documents that follow specific parcels of property in perpetuity and notify future property owners of the proximity to an airport or area impacted by aircraft use. Disclosure notices can be established as part of a site plan review, local zoning ordinance, or as a standalone process for properties near airport environs.

Noise Mitigation

Aircraft sound is an important concern regarding land use compatibility around airports. The land acquisition techniques discussed in this chapter are one option to mitigate noise concerns around airports. Additional techniques include sound barriers and soundproofing.

Sound Barriers

Sound barriers are one mitigation option with a very specific focus. Since sound barriers have limited applications, they are typically used on airport property to shield noise-sensitive areas from the most intense levels of airport noise. For example, when aircraft depart an airport they must do a “run-up,” meaning the engine(s) of the aircraft are brought to full power and then tested. The action creates a high decibel noise level and is normally done at the end of the runway just prior to takeoff. If an airport has a noise-sensitive area near the run-up area, then a sound barrier may be considered to shield it from the noise. This also applies to airports that have aircraft repair or maintenance facilities. Since these facilities often test the engines, a specific location for engine run-ups may be necessary. A sound barrier can surround the specific area in an effort to contain aircraft noise.

Sound barriers take many different forms. Coniferous trees and shrubs, for example, provide limited sound reduction, but also act as visual barriers and are thus perceived as sound barriers. However, it is important to be mindful that if vegetative sound barriers are not properly managed, they can become wildlife attractants or height obstructions. Topographic features can also be used as barriers. Earthen berms are the most common of these features since they are easy and fairly inexpensive to construct and maintain.

Man-made barriers such as fences and masonry walls are the most costly option. Fences are the most common type of noise barrier because they screen out both views and sound. Masonry walls also are used in areas where there is a specific point of sound generation, such as the engine run-up areas.

Soundproofing

Soundproofing is a mitigation measure for addressing a noise issue within an indoor environment. If a structure such as a home is determined to be within an area experiencing a high level of aircraft noise, the building can be improved to reduce the levels of noise within the structure. The installation of windows and doors with denser materials, air conditioning units or a central air system (which reduces the need to open windows), and additional insulation can deaden the outside noise. Building codes regulating new construction, alterations, remodeling, repairs, maintenance, and changes within homes or structures

impacted by aircraft noise can serve as a tool to ensure proper soundproofing measures are undertaken. However, all of these measures, though helpful to the indoor setting, do not lower the outdoor noise levels. For example, soundproofing will do nothing to mitigate a complaint that comes from a resident who is entertaining guests in a backyard. It is therefore important to recognize the limitations of this mitigation technique.

Sound barriers and soundproofing are typical methods of addressing sound-related land use issues; however, both may have limited applications depending upon the nature of complaints around each airport. Often, land acquisition may be the most viable option since it addresses the heart of the problem – incompatible land uses in proximity to the airport.

Summary

This chapter outlined several techniques for establishing compatible land uses near an airport, some of which are summarized in **Table 6-4**. The techniques described above may be used as part of a larger comprehensive plan or can be used as independent methods to establish land use compatibility. Common to all of the techniques for correcting or mitigating incompatible land use is the need for both an updated airport master plan and a local comprehensive plan that details the needs of the airport. If an overall airport plan is not in place to guide the selection, implementation, and maintenance of these techniques, they may not be effective. Using a combination of these techniques offers an airport a wide range of opportunities to ensure compatible land uses within its vicinity.

Table 6-4: Techniques for Establishing Compatible Land Uses Around Airports

Technique	Description	Key value	Primary shortcoming	When to use
Airport layout plan	A 20-year plan that shows the ultimate footprint of airport development	Graphically depicts airport development plans including property needs	Reflects future growth on the airport only	Should be adopted by the airport, developed with surrounding communities, and updated as development occurs
Airport approach protection	A layout that depicts runway approach areas and outline of the controls that are required within those areas	Zoning and height restrictions can be controlled within three miles of an airport	Can be undermined if local zoning authorities do not include these plans during development and zoning reviews	When land use compatibility in runway approach areas is or may become an issue for the airport
Comprehensive plan	Wisconsin statutes planning requirements and overall guidelines for local governments	Low cost and less controversy if airport is not in a developed area	Not effective when existing, incompatible development has encroached on the airport	Required by 2010; updating a plan is important to the tool's effectiveness
Height limitation zoning ordinances	A safety ordinance that protects navigable airspace	Prevents the location of tall objects that are violations of Part 77	Only prevents new construction; may not be effective when existing terrain or trees are issues	Should be adopted and implemented as part of zoning; required for airports receiving state aid
Airport overlay zoning	Places additional conditions on land near an airport; underlying zone is unchanged	Reduces hazards and incompatible land use	Does not necessarily fix incompatible uses that are currently allowed by underlying zone	Use to provide additional review criteria; especially effective in areas of growth.
Plat and Certified Survey Map review	Local planning commissions can review proposed development near airports	Allows restrictions to be placed on developments near airports	Not effective for developments that already exists near airports	When development threatens to encroach on open/ low population density areas near airport
Wildlife hazard mitigation and planning	An inventory and plan for mitigating wildlife occurrences in airport environs	Mitigation tools can be immediate; plans can decrease future wildlife	May not be effective on off-airport wildlife attractants without support of community	When deer and bird strikes are seen as a threat to aircraft and passengers
Fee Simple Acquisition	Purchase of land and all interests, benefits, and rights	Airport property; allows complete control forever	May be costly; possible legal opposition	To protect RPZs and areas subject to noise impact
Easements	An interest held in property of another; allows right to use/limit use in specified manner	Can provide more control than zoning; less expensive than acquisitions	Does not completely alter existing incompatible land uses	Can be used to compensate land owner for substantial noise impacts and right to remove obstructions
PDRs and TDRs	Property development rights purchased by government (PDR) or transferred to another location (TDR)	Less costly than fee simple acquisition	Taxpayer money (PDR); applicable in limited situations, requires creation of TDR market (TDR); requires coordination	Opportunities may differ substantially among cities and counties; coordination with BOA, USDA, etc if action is being considered
Agreements/ Notification	A legal agreement between airport and land owner	Acknowledges and releases airport from complaints/ lawsuits	Does not alter the existing compatible land uses	Can be used to compensate land owner for airspace rights, protects airport from lawsuits
Sound barriers	Tools that protect existing land uses from aircraft sound decibels	Helps mitigate conflicts between the airport and surrounding properties	Is a reactive tool; does not proactively prevent incompatibility issues	When sound complaints have been made by local residents, or when a noise-sensitive development exists
Soundproofing	Installation of sound proofing materials better shield the interior of a structure from noise	Provides interior relief from noise	Does not solve underlying problem of having noise-sensitive development near the airport; not effective for outdoor noise control	When sound complaints have been made by residents, or when a noise-sensitive development exists

Communication between all stakeholders is essential for the successful implementation of these techniques. **Table 6-5** identifies some key stakeholders, including the Federal Aviation Administration (FAA), the BOA, the local planning commission, and local zoning administrator. In some cases, the county and regional planning commissions, Wisconsin Department of Natural Resources (WDNR), the U.S. Fish and Wildlife Service (USFWS), the state historic preservation office, and land trusts should be involved as well. BOA can help identify which stakeholders should be involved in each particular case and thus, should be the first point of contact when implementing these techniques.

Table 6-5: Stakeholder Communication Directory

<u>Groups</u>	<u>Tools</u>							
	Airport approach protection and layout planning	Comprehensive planning	Airport overlay and height limitation zoning	Wildlife hazard mitigation and planning	Fee simple acquisition	Easements	Purchase and transfer of development rights	Sound barriers and sound proofing
Airport owners and managers	X	X	X	X	X	X	X	X
Local zoning administrator/Planner	X	X	X	X	X	X	X	X
Local planning commission	X	X	X	X	X	X	X	X
Bureau of Aeronautics	X	X	X	X	X	X	X	X
Federal Aviation Administration	X		X	X	X	X	X	X
State Historic Preservation Office	X	X				X		X
County Planning Commission	X	X	X	X			X	
Regional Planning Commission	X	X	X				X	
Department of Natural Resources	X			X		X	X	
US Fish and Wildlife Service	X			X		X		
Land trust (where present)						X		
An "x" notes groups who should communicate during the implementation and use of various tools listed above								

BOA is always a valuable resource for airports and their surrounding communities when developing compatible land use techniques. **Figure 6-2** presents an example of a compatible land use planning process; however, processes can vary among airports. It is important to be mindful that each community has its own unique set of issues which should be managed on a case-by-case basis.

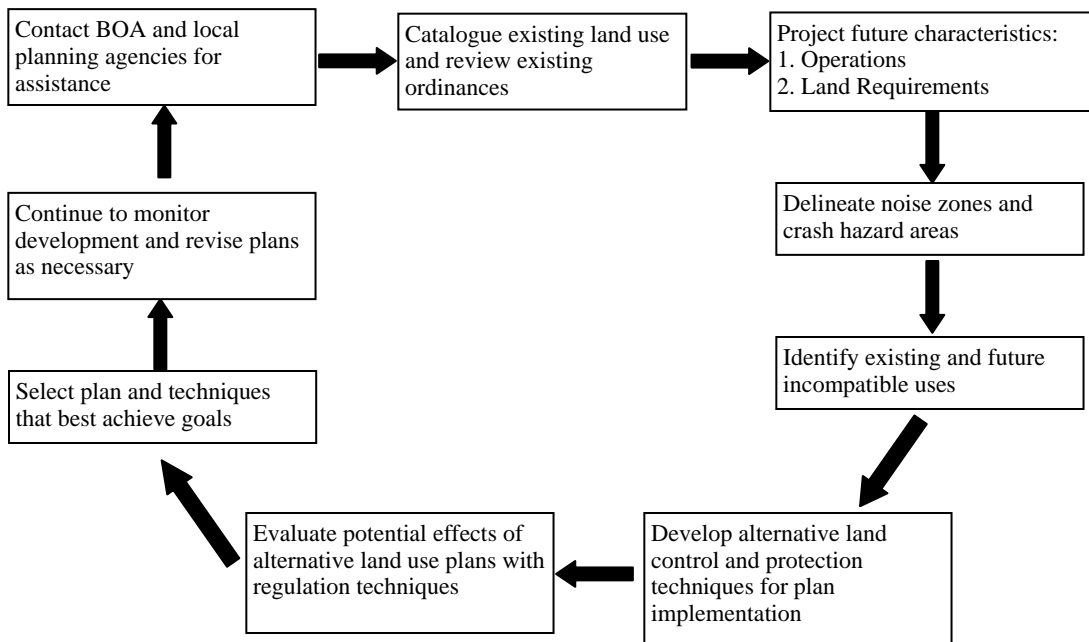


Figure 6-2: Land Use Compatibility Planning Steps

Summary

Given the importance of the aviation industry for the national, state, and local economies, the viability of airports must be protected by mitigating incompatible land uses. Establishing compatible land uses around airports increases the safety of those in the air and on the ground and alleviates some of the negative impacts of airport operations and aircraft sounds on the surrounding community. Airport and government officials, planners, residents, and state and federal agencies are all stakeholders in the airport land use compatibility planning process. These groups should work together to limit tall structures, visual obstructions, electronic interference, wildlife attractants, large densities of people, and residential development near airports using the techniques and guidance outlined in this guidebook. However, it is important for stakeholders to be aware that the guidance and information in this guidebook may not be inclusive of all relevant regulations, resources, problems, and solutions; rather it is meant serve as a foundation. Each airport and community is different and each will have unique problems and solutions to their land use compatibility issues; there is no one-size-fits-all approach to compatible land use planning. Early coordination with relevant agencies, including the Wisconsin Bureau of Aeronautics, is advisable when issues related to aviation planning arise.



New Richmond Regional Airport, New Richmond, WI

Appendix A: Additional Land Use Regulations and Guidance

This appendix complements Chapter 4 and provides additional information regarding rules, regulations, policies, and guidance related to land use. The discussion is separated into four primary categories, planning, environmental issues, land acquisition, and sound, and discusses both federal and state regulations and guidance.

- The Wisconsin State Statutes that are referenced in this appendix can be accessed at the following site:
<http://nxt.legis.state.wi.us/nxt/gateway.dll?f=templates&fn=default.htm&d=stats&jd=top>

Planning-Related Regulations and Guidance

The following are some of the federal and state regulations and guidance related to planning. Please be mindful that this is not an exhausted list of planning documents and each airport project sponsor should work with their local municipal planners and BOA on issues related to their airports.

Federal

A Model Zoning Ordinance to Limit Height of Objects around Airports, FAA AC 150/5190-4A (12-14-1987)

This advisory circular discusses the adoption of zoning ordinances to control the height of objects. It is based upon the surfaces described in Subpart C of FAR Part 77, Objects Affecting Navigable Airspace and provides sample language and model ordinances for use by local airports.

- A copy of AC 150/5190-4A can be found here:
http://www.faa.gov/regulations_policies/advisory_circulars/index.cfm/go/document/information/documentID/22826

FAA Order 18, November, 1999, US Standards for Terminal Instrument Procedures and FAA Order 8260.3 B, Change 14 (April 7, 1976 with changes January 19 through May 2002)

This document contains standards for establishing and designing Terminal Instrument Flight Procedures (TERPS). The criteria are applicable at any location over which the United States has jurisdiction. Similar to FAR Part 77, TERPS places constraints on the airspace in the vicinity of the airport that may have an impact on the allowable land uses beneath those surfaces.

- TERPS tools can be found here:
http://www.faa.gov/about/office_org/headquarters_offices/avs/offices/afs/afs400/afs420/terps_tools/

State

§30.12, Wis. Stats. – Navigable Waters

This section of the statute defines the navigability of various types of water bodies in Wisconsin and the legal framework for building structures over or in said water bodies. The powers and duties of harbor commissions are also defined in this chapter along with guidelines for harbor improvements,

maintenance, and leasing. In addition, the regulation of seaplanes by municipal ordinance is described in Chapter 30, Wis. Stats, which states requirements for safety guidelines and prescribes all takeoff and landing areas.

§66.1009, Wis. Stats. – General Municipality Law

This section of the statute authorizes any city, village, or town to purchase or lease land for the use as an aerial landing field by the public. It also releases the municipality from any liability if an accident should occur on the field. The transportation element in §66.1001, Wis. Stats calls for a local comprehensive plan that blends state and regional transportation plan goals with its own.

Environment-Related Regulations and Guidance

This section is a general guide for the review of environmental impacts, however, is not a complete list. It illustrates the diverse range of issues that may be impacted by or create an impact upon airport development. Each airport project sponsor should work with BOA on site-specific and project-related environmental issues.

Federal

National Environmental Policy Act of 1969

The NEPA resulted in the development of guidelines for the application of a national policy to consider impacts of proposed action on the environment. The act specifically states that “governments, and other public and private organizations, use all practical means and measures to create and maintain conditions under which man and nature can exist in harmony.” When an airport sponsor proposes a project or action requiring federal approval, all actions are reviewed to determine their impacts on the environment.

National Environmental Policy Act (NEPA) Implementing Instructions for Airport Projects, FAA Order 5050.4B

This order establishes the instructions and guidance for preparing and processing an Environmental Assessment (EA), Finding-of-No-Significant-Impacts (FONSI), and an Environmental Impact Statement (EIS) for airport development proposals requiring federal environmental approval.

- This order, updated in 2009, can be accessed online at:
http://www.faa.gov/airports/resources/publications/orders/environmental_5050_4/

Categories of impact regulated by NEPA include:

- Noise
- Compatible land uses
- Social impacts
- Induced socioeconomic impacts
- Environmental justice
- Air quality
- Water quality
- Historical, architectural, archaeological, and cultural resources
- Biotic communities
- Endangered and threatened species of flora and fauna
- Wetlands
- Floodplain
- Coastal zone management
- Coastal barriers
- Wild and scenic rivers
- Farmland
- Energy supply and natural resources
- Light emissions
- Solid waste impacts
- Construction impacts
- Design, art, and architectural application

Hazardous Wildlife Attractants on or near Airports, FAA AC 150/5200-33B (08-28-2007)

This document provides guidance on land uses that are wildlife attractants, and thus incompatible near airports. These include, but are not limited to, wastewater treatment facilities, wetlands, dredge spoil containment areas, and solid waste landfills. Typically, these uses should be located at least 5,000 feet away from an airport runway end if the airport serves piston-type aircraft; and at least 10,000 feet away from an airport runway end if the airport serves turbine powered aircraft. However, airport sponsors should review all potential wildlife hazards proposed within 5 miles of the airport.

- AC 150/5200-33B *Hazardous Wildlife Attractants on or near Airports* can be found here: http://www.faa.gov/documentLibrary/media/advisory_circular/150-5200-33B/150_5200_33b.pdf

Criteria for Municipal Solid Waste Landfills, CFR Title 40, Part 258, Subpart B

This subpart establishes criteria for the expansion of existing and/or development of new landfills with regard to airports. In part, it states: “Owners or operators of new Municipal Solid Waste Landfills (MSWLF) units and lateral expansions located within 10,000 feet (3,048 meters) of any airport runway end used by turbojet aircraft, or within 5,000 feet (1,524 meters) of any airport runway end used by piston-type aircraft only, must demonstrate that the units are designed and operated in such a way that the MSWLF unit does not pose a bird hazard to aircraft.”

Owners or operators proposing to site new MSWLF units and lateral expansions within a five-mile radius of any airport runway end used by turbojet or piston-type aircraft must notify the affected airport and the FAA.

- CFR Title 40, Part 258 can be accessed here: http://ecfr.gpoaccess.gov/cgi/t/text/text-idx?c=ecfr&tpl=/ecfrbrowse/Title40/40cfr258_main_02.tpl

State

Like many other states, environmental regulations related to compatible land use are spread over a multitude of departments and statutes. Those airports not included in the Wisconsin State Airport System Plan (SASP) may not be covered by WisDOT requirements. Additionally, some airports may be located in an area with more stringent local regulations than state requirements. These airports should contact and work with their local governments.

Wis. Stats., §29.604 – Wisconsin Endangered Species Law

This section indicates that while no one is exempt from the implementation of these laws, an endangered or threatened species permit can allow certain activities under specified conditions. Permitted species and records relating to them are subject to inspection at any time. Permit holders are also required to submit annual reports (holders of non-living specimens submit reports every three years) and therefore should keep accurate records of any actions pertaining to the endangered or threatened species the permit holder possesses. Accurate up-to-date records are to be maintained at all times in the event of an inspection and for the annual report.

An applicant can request an Endangered Resources Review be conducted through the Natural Heritage Inventory (NHI). An applicant must submit an Endangered Resources Review Form 1700-047 to find out whether there is potential for a proposed project to impact rare species. This review provides a letter to the applicant explaining what rare species, natural communities, or natural features tracked in the NHI database are found in or near the proposed project area. The letter will also explain whether additional steps should be followed to ensure compliance with the Wisconsin Endangered Species Law. This letter may be necessary for other WDNR permits, since it is illegal to take, transport, possess, process, or sell any wild animal that is included on Wisconsin Endangered and Threatened Species List. In addition, it is illegal to remove, transport, carry away, cut root up, sever, injure, or destroy a wild plant on the Wisconsin Endangered and Threatened Species List on public lands.

Wis. Stats. Chapters 30 and 31– Navigable Waters Protection

Regulations for construction and waterway alteration in and adjacent navigable waters, including dams, filling, water diversion, grading, and dredging are outlined in this chapter. Alteration of non-navigable waterways, such as dredging, is also regulated. This chapter is relevant to aviation land uses because it provides guidance on work that may be performed on navigable waters, but which may be incompatible with an airport.

Wis. Stats. Chapter 44– Archaeological Preservation

Wisconsin statutes state that archaeological sites can be protected during the course of state agency activities (e.g., grants, funding, permits, ground disturbing projects) if the sites have been recorded with the Office of the State Archaeologist. Archaeological sites may also be protected during the course of village, city, county, and other political subdivision projects (e.g. building, road construction, etc.) but, only if the site is listed on the National Register of Historic Places (§44.43 Wis. Stats.). All human burial sites, including cemeteries and Indian mounds, are protected under §157.70, Wis. Stats. This law applies to both public and private lands. Owners of burial sites may receive property tax exemptions and the law is administered by the Wisconsin Historical Society (WHS) Burial Sites Program.

Wis. Stats. §59.692, §61.351, and §62.231– Shoreland Zoning Oversight

These sections require the WDNR to provide technical assistance to local zoning officials, oversight of local decisions, and general development and wetland protection standards for “shorelands” adjacent to navigable waters, which are administered by local government.

Wis. Stats. §66.1111– Historic Preservation

§66.1111 enables any city, village, town, or county to acquire by gift, purchase or condemnation any property rights in any real or personal historic property. It enables such political subdivisions to preserve or rehabilitate any historic property that it owns, construct buildings on that property, own and maintain that property for public purposes, or lease or convey that property. The statute directs any political subdivision to determine in the earliest stage of planning whether any of its proposed actions will affect any property listed in the national or state registers of historic places or are on the list of locally designated historic places under §44.31, Wis. Stats. The statute also requires the political subdivision to notify the state historic preservation officer of any proposed action that the political subdivision determines will affect any historic property.

Wis. Stats. §101.142, and §101.143 – Petroleum Product Storage Tanks

Chapter 101 of the Wis. Stats. calls for an inventory of any above-ground and underground petroleum product storage tanks, regulated by the Wisconsin Department of Commerce. This section authorizes remedial action planning and activities, financial assistance, and inter-departmental coordination.

Wis. Stats. Chapter 285 – Air Pollution

This chapter of the statute requires and authorizes the Wisconsin Department of Natural Resources (WDNR) to organize a comprehensive and integrated program to enhance the quality, management, and

To fulfill these responsibilities WisDNR has developed the air pollution control rules of the Wisconsin Administration Code, NR 400-499. The key provisions of these rules are:

- The state ambient air quality standards – NR 404
- Construction and operation permit requirements – NR 405 to 409 and 411
- Required fees – NR 410
- Control requirements for particulate matter – NR 415
- Control requirements for sulfur – primarily sulfur dioxide – NR 417 and 418
- Control requirements for organic compounds – primarily volatile organic compounds – NR 419 to 425
- Emission reporting requirements – NR 438
- Methods and procedures for compliance determination – NR 439
- Control requirements for hazardous air pollutants – NR 445 to 469
- Requirements for motor vehicle inspection and/or maintenance program – NR 485

The largest chapter, NR 440, reflects the state-implemented requirements of the federal new source performance standards program of 40 CFR Part 60. Chapters NR 460 to 469 reflect the state-implemented requirements of the federal Maximum Achievable Control Technology (MACT) standards most relevant to Wisconsin from 40 CFR Part 63.

protection of the state's air resources and develop plans for the prevention, abatement, and control of air pollution.

Wis. Stats. Chapter 281, Subchapter III– Wetlands

This chapter explains that the presence of wetlands may affect where and whether or not an airport can be built or improved. In Wisconsin and throughout the United States, wetlands are protected on public and private property. Contact should be made with local or regional zoning offices for general guidance and information, application forms for local zoning programs, review of wetland maps, assistance with wetland boundary determinations, and explanation of permitted uses. Call the municipal office in cities, villages, or counties to reach the zoning administrator or building inspector.

Wis. Admin Code, Chapter TRANS 401– Construction Site Erosion Control and Storm Water Management Procedures for Department Actions

This chapter presents basic principles and performance standards for erosion control during construction and post-construction. The requirements for developing an erosion control plan stated in TRANS 401.07,

as well as the maintenance of Best Management Practices (BMPs) in TRANS 401.09. BMPs are activities or structural controls that prevent or reduce pollutants from entering water bodies. Criteria for the release of water from detention ponds is addressed in TRANS 401, as are tools for mitigating "wet ponds" to avoid waterfowl hazards.

Wis. Admin. Code, Chapter COMM 2.17 - Mines Pits and Quarries.

Mines, pits, and quarries located near airports can pose detrimental effects to the airport's operation. Holes left by mines, gravel pits and quarries often store storm water or fill with groundwater, potentially creating hazardous wildlife attractants. Although no state statute addresses this problem specifically, this chapter of Wisconsin Administer Code

(<http://nxt.legis.state.wi.us/nxt/gateway.dll/?f=templates&fn=default.htm>) provides a certain level of regulation to these entities. Basically, the code requires that the person or firm operating the crushing, screening or washing equipment shall submit the following items, with the fee specified in sub. (2): the name of the mine, pit or quarry; the name of the company; the mailing address; the telephone number; and the type of product to be mined, such as ore, stone, clay, lime or aggregate to the Wisconsin Department of Commerce.

Wis. Admin. Code, Chapters NR 115 and NR 117,

Counties, cities and villages are required by state statutes to adopt shoreland-wetland zoning ordinances to regulate activities in shoreland-wetlands. Communities may decide to also zone those wetlands which are smaller than five acres or outside the shoreland zone.

Wis. Admin. Code, Chapter NR 152– Model Ordinances for Construction Site Erosion Control and Post Construction Storm Water Management

This chapter provides sample erosion control and storm water management ordinances for use by local governments in protecting groundwater from erosion and other runoff pollution.

The minimum standards for counties are found in Chapter NR 115, Wis. Admin. Code and in Chapter NR 117, Wis. Admin. Code for cities and villages. The shoreland zone is land located with 1,000 feet of the ordinary high water mark of a lake, pond or flowage; or within 300 feet of the ordinary high water mark of a river or stream; or to the landward side of the flood plain, whichever distance is greater. Shoreland-wetlands are five acres in size or larger and are located in the shoreland zone.

Wis. Admin. Code, Chapter NR 216– Storm Water Discharge Permits

This chapter establishes criteria defining storm water discharges needing Wisconsin Pollutant Discharge Elimination Systems (WPDES) in order to lessen erosion and other polluting runoff on construction and post-construction sites. BMPs are also defined in this chapter.

Hazardous Materials – The Emergency Planning and Community Right-to-Know Act of 1986(SARA Title III)

The intent of this legislation is to bring industry, government, and the general public together to address emergency planning for accidental chemical releases. It requires communities to prepare for hazardous chemical releases through emergency planning. It also provides essential information for emergency responders

Wisconsin Emergency Management (WEM) is responsible for implementing the Emergency Planning and Community Right-to-Know Act (EPCRA) at the state and local levels. Each of the 72 counties in Wisconsin have Local Emergency Planning Committees (LEPCs) that are set up in accordance with the federal legislation and are responsible for implementing the EPCRA at the county level. The county emergency management director is a member of the LEPC to ensure continuity and coordination of emergency response planning.

Land Acquisition-Related Regulations and Guidance

Laws related to land acquisition are primarily focused on the fair and equitable treatment of land owners. The following are some pertinent land acquisition documents; however, this list is not meant to be all-inclusive and each airport should work with BOA on land acquisition projects.

Federal

The Federal Aviation Authorization Act of 1994

This act authorizes the Airport Improvement Program (AIP), which provides federal assistance for airport development and noise compatibility programs. Title 49, CFR Part 24 implements the “Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs.”

- The *Uniform Relocation Assistance and Real Property Acquisition for Federal and Federally Assisted Programs* can be found here: http://www.access.gpo.gov/nara/cfr/waisidx_06/49cfr24_06.html

State

Wis. Stats. §27.05 – Public Parks and Places of Recreation

This section of the statute empowers a county park commission or general manager to acquire the land necessary for aircraft landings, maintenance, takeoffs, and storage through purchase, land contract, or condemnation, etc. The park commission or manager may also lease the land for such purposes. Income received must be paid into the county park fund.

Wis. Stats. §32.05– Eminent Domain

This section of the statute sets forth standards for acquiring private land for public purposes, without the consent of private owners, otherwise known as the power of eminent domain (granted by the State Constitution, Art. IX, WS3). Transportation projects are included as legally acceptable reasons for municipalities to undertake eminent domain actions. Standards include the requirement for a property appraisal and environmental or agricultural impact statements, the need for a relocation order, and negotiations with the property owner before condemnation is allowed.

Wis. Stats. §350-10(1)(L)– Snowmobiles

This section of the statute declares that no person can operate a snowmobile on the lands of an operating airport or landing facility except for personnel in performance of their duties or with consent.

Wis. Admin. Code, Chapter COMM 202 and 222– Relocation Rights

These chapters outline the rights of property owners in the event of displacement due to a public project, such as airport improvements or construction. Relocation services and replacement housing payment guidelines for owner-occupants and tenant-occupants are presented as well.

Wis. Adm. Code, Chapter TRANS 54– Advance Land Acquisition Loan Program for Airports

The Advance Land Acquisition Loan Program for Airports establishes policies and procedures necessary to implement the advance land acquisition loan fund for airports as provided for in. §114.37, Wis. Stats. Land to be purchased must be part of a planned airport improvement project, included in the State Airport System Plan, and have an approved airport layout plan in compliance with state and federal environmental laws. The airport owner must pay the cost of any loan initiation plan, execute a contract of responsibility and petition for the relocation order to acquire land if condemnation of adjacent property is required. The BOA may loan up to 80 percent of the land acquisition costs, including plans and environmental studies and may retain a security interest in the land until the loan is repaid. The primary source of repayment may include any federal, state, or airport owner share of funds received for the land acquisition or income derived from the sale of surplus land. Repayment periods cannot exceed five budget years, and interest will be at four percent of the unpaid balance.

Noise-Related Regulations and Guidance

Federal

The following regulations provide federal guidelines for two primary areas: The measurement of noise and methods of noise mitigation. This section is not meant to present an all-inclusive list; rather, a summary of primary federal laws related to noise issues.

General Operating and Flight Rules – CFR Title 14, FAR Part 91

This federal regulation establishes general rules for the operation of aircraft for diverse aircraft and airport types. This includes various flight conditions, such as Instrument Flight Rules (IFR) or Visual Flight Rules (VFR), maintenance, special flight operations, foreign aircraft operations, and operating noise limits. FAR Part 91 is specifically concerned with planning regulations.

- Additional information related to FAR Part 91 can be found here:
http://www.faa.gov/library/manuals/aircraft/amt_handbook/media/FAA-8083-30_Ch12.pdf

Airport Noise and Capacity Act of 1990 (National Noise Policy)

Increasing public outcry against aircraft noise required the establishment of a procedure to eliminate Stage I (the noisiest) and Stage II aircraft from operating in the United States. As of December 31, 1999, all turbojet aircraft must meet Stage III (the quietest) noise levels or cease operations. These requirements are predominantly focused on aircraft used by the airline industry.

- Additional information related to National Noise Policy can be found here:
http://www.law.cornell.edu/uscode/49/usc_sup_01_49_10_VII_20_B_40_475_50_II.html

Notice and Approval of Airport Noise and Access Restrictions, CFR Title 14, FAR Part 161

FAR Part 161 established the implementation of the Airport Noise and Capacity Act of 1990 (Title 49, US Code App. 2153, 2154, 2155 and 2156), which requires notification and creation of procedures for the operation of Stage II and Stage III aircraft noise restrictions.

Airport Landscaping for Noise Control, FAA AC 150/5320-14

This document establishes guidance for the implementation of landscaping for noise control purposes. It also recommends a variety of vegetative species to use for such purposes.

State

Wisconsin does not currently have a state statute or administrative code that specifically oversees aviation-related noise. However, the state does recognize noise-overlay zones that are implemented at the local level. Noise overlays are placed over existing zoning districts and dictate airport compatible land uses based upon noise levels. If a noise overlay coincides with a high-density residential district adjacent to an airport, any new development in the district must be restricted to low-density where airport noise would be most intense.

Case Law

The following samples of federal and state case law provide the legal background for various compatibility issues.

City of Burbank v. Lockheed Air Terminal (1973)

This is the key decision on the issue of whether local government can regulate aircraft noise. The court held that the general police powers of state and local authorities do not extend to aircraft noise because of federal preemption (authority vested in the FAA and EPA). However, the court left open what limits, if any, should be applied to the exercise of the proprietary rights of municipalities and counties that own and operate airports. This question was later addressed in *National Aviation v. City of Hayward* (N.D. Cal., (411 U.S. 624, 93 S.Ct. 1854, 36 L.Ed.2d 547)

Clausen and Thompson v. City of Kenosha (1997)

From the State of Wisconsin Court of Appeals District II: §114.136 Stats. This case law grants municipality's extraterritorial zoning power to ensure the safety of aerial approaches to airports. Pursuant to this statute, the City of Kenosha enacted such an ordinance. Certain landowners affected by the ordinance, but residing outside the corporate limits of the city, claim that §114.136, Wis. Stats., unconstitutionally infringed upon their right to participate in the political process which culminated in the ordinance.

Northwest Properties v. Outagamie County (1998)

In this Wisconsin case, a developer, Northwest Properties, sought a judgment against Outagamie County, requesting that a trial court find the county ordinance's residential density restriction invalid and unenforceable. After Circuit Court granted a summary judgment to the developer, the County appealed, and the Court of Appeals held that (1) under statute authorizing zoning for protection of aerial approach to airport runways, the municipality was permitted to limit residential units to minimum lot size, and (2) the ordinance did not violate the equal protection clause.

Appendix B: Sample Land Use Ordinances

The following are examples of land use ordinances used at Wisconsin airports. Airport owners should be mindful that there is no one-size-fits-all land use ordinance and what works for one community might not work for the next. Each airport sponsor should work to develop a land use ordinance that accommodates the needs of their community.

Austin Straubel International Airport Zoning Ordinance

- http://www.co.brown.wi.us/departments/page_7a3bf12a8389/?department=2f6d7cc8e7df&subdepartment=0b1a72f8f956

In 1986, Austin Straubel International Airport enacted an ordinance that established noise zone, crash hazard, over flight, and height districts. Limitations on land uses and densities in the airport affected areas were authorized by the airport ordinance in order to meet the requirements of the various districts.

Chippewa Valley Regional Airport Zoning Ordinance

- <http://www.chippewavalleyairport.com/index.php/about/C4/>

The Chippewa Valley Regional Airport enacted an airport ordinance that established noise control, over flight, and height limitation districts.

Iowa County Airport Zoning Ordinance

- <http://iowacounty.org/DOCUMENTS/pdf/airportzoning2007.pdf>

Iowa County Airport enacted a ordinance to regulate the use of property and to regulate and restrict the height of structures in the vicinity of the airport.

Kenosha Regional Airport Area Land Use Study

- http://www.co.kenosha.wi.us/plandev/smart_growth/documents/KenoCoChIMJAC.pdf

This study established a comprehensive plan designed to provide for the orderly growth of the area surrounding the Kenosha Regional Airport. The recommendations in this study were intended to minimize the public's exposure to excessive noise and safety hazards. In formulating this plan, provisions were established for the regulation of land use, building height, safety, and noise insulation within areas adjacent the Kenosha Regional Airport.

City of Kenosha Airport Overlay Zoning Ordinance

- <http://www.kenosha.org/departments/neighborhood/zoning/chpt13.pdf>

The City of Kenosha enacted an “airport overlay district” that promotes a compatible relationship between airport operations and other land uses in the vicinity of these operations.

Taylor County Airport Zoning Ordinance

- <http://www.co.taylor.wi.us/code/Chapter35.pdf>

Taylor County enacted an airport ordinance that establishes height, noise, approach and departure zones, and over flight districts.

Southern Wisconsin Regional Airport Land Use Plan & Zoning Ordinance

- http://www.co.rock.wi.us/images/web_documents/departments/planning_development/airport_overlay_zoning_chapter_29.pdf

The Airport Overlay Zoning District Ordinance established five airport overlay zones which govern land uses within a three-mile jurisdictional boundary of the airport. Compatible land uses within the airport overlay zones were based upon the proposed development location and land use in relationship to the airport, more specifically the proximity to runway ends and extended runway centerlines. In addition to the five airport overlay zones, the AOZD regulates both the height limitations and noise contours that are associated with the Airport.

Appendix C: Agency Contacts

There are a multitude of state and federal agencies that have various interests in compatible land use planning related to airports. It is suggested that you begin your search for answers with the BOA. The BOA web page, listed below, has a staff roster with telephone extensions to help you reach the correct person. Additionally, there are many other state and federal agencies that may serve as resources for land use issues. A brief summary of function and contact information for these various agencies is included in this chapter.

Wisconsin Department of Transportation (WisDOT), Bureau of Aeronautics

- www.dot.wisconsin.gov/modes/air.htm

WisDOT is responsible for planning, building and maintaining Wisconsin's transportation system and plans, promotes and financially supports statewide air, rail and water transportation, as well as bicycle and pedestrian facilities. The department works closely with other state, federal and local agencies to meet changing and growing travel needs. The Bureau of Aeronautics aims at providing leadership to maintain and develop a safe and is an important first resource for issues on and near airports.

Federal Aviation Administration (FAA)

- www.faa.gov

The Federal Aviation Administration (FAA) provides aid to communities and their airports in meeting federal requirements for airspace protection and airport development. As a national governing body, the FAA provides regional officials that can help local airports meet these requirements.

FAA Community and Environmental Needs Division

- http://www.faa.gov/about/office_org/headquarters_offices/arp/offices/app/app400/environmental/

The Community and Environmental Needs Division in FAA provide guidance and assistance to airports in implementing the National Environmental Policy Act (NEPA) and other federal environmental laws and regulations. This entails administering the program for environmental review and approval of airport development, airport noise compatibility planning (Part 150), airport noise and access restrictions (Part 161), and other airport program activities relating to environmental issues. The division also reviews draft and final environmental impact statements and administers the application of the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970 to airport improvement projects receiving federal financial assistance. The FAA has developed valuable resources for airport sponsors and their communities to plan and manage land use compatibility and airport noise.

FAA Advisory Circulars

- http://www.faa.gov/airports/resources/advisory_circulars/

Advisory Circulars are the FAA's means of providing non-regulatory guidance to the public through the publication of instructional documents. They have a comprehensive library of these circulars addressing aviation issues.

Wisconsin Department of Natural Resources (WisDNR)

- www.dnr.state.wi.us

The Department of Natural Resources is dedicated to the preservation, protection, effective management, and maintenance of Wisconsin's natural resources. It is responsible for implementing the laws of the state and, where applicable, the laws of the federal government that protect and enhance the natural resources of our state. It is the one agency charged with full responsibility for coordinating the many disciplines and programs necessary to provide a clean environment and a full range of outdoor recreational opportunities for Wisconsin citizens and visitors.

United States Department of Agriculture (USDA)

- www.aphis.usda.gov/ws/statereports/wisconsin.html

In addition to the resources available from the WDNR regarding wildlife issues, the Animal and Plant Health Inspection Service (APHIS) Wildlife Services Division of the US Department of Agriculture (USDA) can provide guidance when wildlife and waterfowl issues are affecting an airport. According to its Wisconsin State Report of 2002, one of APHIS's top assistance activities in Wisconsin is in protecting passengers and aircraft from collisions with wildlife.

United States Army Corps of Engineers

- <http://www.usace.army.mil/Pages/default.aspx>

The Army Corps of Engineers provides engineering services across the country. As part of the Memorandum of Understanding among FAA, U.S. Air Force, U.S. Army, Environmental Protection Agency (EPA), U.S. Fish and Wildlife Services, and the U.S. Department of Agriculture, they are committed to addressing existing and future environmental conditions contributing to aircraft wildlife strikes.

Metropolitan Planning Organizations (MPOs) and Regional Planning Commissions (RPCs)

- <http://www.dot.wisconsin.gov/projects/planorg/mpo.htm>
- <http://www.dot.wisconsin.gov/projects/planorg/rpc.htm>

Wisconsin has 14 metropolitan planning organizations (MPOs) that share responsibility for transportation planning in 17 metropolitan areas and eight Regional Planning Commissions (RPCs). All but six counties in the state (Columbia, Dane, Dodge, Jefferson, Rock, and Sauk) are served by an RPC. WisDOT works closely with MPOs and RPCs to ensure a comprehensive, coordinated approach to local, regional and state issues affecting transportation planning.

University of Wisconsin – Extension (UWEX)

➤ www.uwex.edu/ces/cty

University of Wisconsin – Extension programs in Community, Natural Resource and Economic Development (CNRED) help Wisconsin communities deal with their own unique challenges in areas of land use and smart growth initiatives, natural resource and water quality issues, local government operations and finance, economic development including labor force issues, community decision-making and leadership issues.

Wisconsin Chapter of the American Planning Association

➤ www.wisconsinplanners.org

The Wisconsin Chapter of the American Planning Association (WAPA) contributes to public forums for teaching, exchanging information, sharing professional experience regarding planning issues, and promoting decision-making processes based on sound planning and community development principles, to effectively resolve land use, natural resource, and development issues.

Glossary

A-weighted Sound Level (also referred to as dBA) – The sound pressure level which has been filtered or weighted to reduce the influence of the low and high frequency noise; designed to approximate the manner in which the human ear responds to sounds.

Advisory Circular (AC) – A document published by the Federal Aviation Administration (FAA) giving guidance on aviation issues and which becomes binding on those airports receiving federal grant funding.

Acoustical – Relating to the deadening or absorbing of sound.

Aeronautical Study – A study performed pursuant to FAR Part 77 “Objects Affecting Navigable Airspace” concerning the effect of proposed construction or alternation on the use of air navigation facilities or navigable airspace by aircraft. The conclusion of each study is normally a determination as to whether the specific proposal studied would be a hazard to air navigation and/or a determination for marking and/or lighting.

Aircraft Operation – An aircraft arrival or departure from an airport. There are two types of operations: local and itinerant.

Air Traffic Control – Control of the airspace by an appropriate authority to promote the safe, orderly and expeditious movement of terminal air traffic.

Airport – Any area of land or water, within or without this state, that is used, or intended for use, for the landing and take-off of aircraft, and any appurtenant areas that are used, or intended for use, for airport buildings or other airport facilities or rights of way, together with all airport buildings and facilities located thereon.

Airport Approach Safety Zone – An element of either an Airport Impact Zone or an Airport Overlay Zone which consists of a portion of the Airport Approach surface as defined in FAR Part 77. The actual boundaries and land use provisions are determined by the local jurisdiction.

Airport Development Zone – A zone which replaces the existing zoning for the airport property encompassing the land presently owned by the airport and, if feasible, areas identified for future purchase, clear zones and areas with noise levels greater than DNL 70.

Airport Elevation – The highest point on an airport’s usable runway(s) expressed in feet above mean sea level.

Airport Environs – The land use and people in the areas surrounding an airport which can be directly affected by the operation of the airport.

Airport Hazard – Any structure or object of man-made or natural growth located on or near the airport, or any use of land near the airport that obstructs the airspace required for the flight of aircraft in landing or taking off, or is otherwise hazardous to such landing and taking off.

Airport Impact Zones – A zone used to place land use conditions on land impacted by airport operations. It establishes a new zone and provisions which replaces an existing zone and standards.

Airport Improvement Program (AIP) – The AIP is authorized by the Airport and Airway Improvement Act of 1982 (P.L. 97-248, as amended). The act's broad objective is to assist in the development of a nationwide system of public-use airports adequate to meet the current and projected growth of civil aviation. The act provides funding for airport planning and development projects at airports included in the National Plan of Integrated Airport Systems. The act also authorizes funds for noise compatibility planning and to carry out noise compatibility programs as set forth in the Aviation Safety and Noise Abatement Act (ASNA) of 1979 (P.L. 96-143).

Airport Layout Plan (ALP) – A scaled drawing of existing and proposed airside and landside facilities necessary for the operation and development of the airport. The ALP shows (1) boundaries and proposed additions to areas owned or controlled by the sponsor, (2) the location and nature of existing and proposed airport facilities and structures and (3) the location on the airport of existing and proposed non-aviation areas and improvements. The ALP may also depict those properties adjacent to the airport ownership that may have legal access to the airport.

Airport Layout Plan Set – This document typically contains a set of drawings which illustrate the existing and future development of the airport. An ALP set may often contain the following: (1) Airport Layout Drawing (Plan), (2) Airport Airspace Drawing, (3) Inner Portion of the Approach Surface Drawing, (4) Terminal Area Drawing, (5) Land Use Drawing and (6) Airport Property Map. The drawings depict existing and proposed airport facilities, land uses, approach zones and other defined areas of airspace, and environmental features that may influence airport usage and expansion capabilities.

Airport Manager – The person authorized by the airport sponsor to exercise administrative control of the airport.

Airport Master Plan – Long-term development plan for the airport adopted by the airport proprietor and local jurisdictions.

Airport Noise Abatement Program – A program designed to reduce noise around an airport through changes in the manner in which aircraft are flown, or changes in the operation or layout of the airport.

Airport Noise and Capacity Act of 1990 – This act required the establishment of a National Noise Policy and a requirement to eliminate Stage 2 aircraft weighing 75,000 pounds or greater operating in the contiguous United States by the year 2000.

Airport Obstruction Zoning Ordinance – A local height restriction ordinance which follows FAR Part 77, implements a local community's comprehensive plan and provides specific height standards for the area beneath the airport imaginary surface.

Airport Owner – Any person or authority having the operational control of an airport as defined in the ASNA Act. (See OAR 660-113)

Airport Overlay Zone – A zone intended to place additional land use conditions on land impacted by the airport while retaining the existing underlying zone.

Airport Reference Code (ARC) – The ARC is an FAA coding system used to relate airport design criteria to the operational and physical characteristics of the airplanes intended to operate at the airport.

Airport Reference Point – The latitude and longitude of the approximate center of the airport, based upon the runway facilities.

Airport Sponsor – The airport owner or tax-supported organization such as an airport authority, that is authorized to own and operate, to obtain property interests, to obtain funds, and to legally, financially and otherwise able to meet all applicable requirements of current laws and regulations related to the operation of an airport. (See OAR 660-13)

Airside – That portion of the airport facility where aircraft movements take place, airline operations areas, and areas that directly serve the aircraft, such as taxiway, runway, maintenance and fueling areas.

Airspace – Space above the ground in which aircraft travel. Often airspace is divided into corridors, routes, and restricted zones.

Ambient Noise – All encompassing noise associated with a given environment, being usually a composite of sounds from many sources near and far.

Approach and Runway Protection Zone Map – The approach and Runway Protection Zone Map is compiled from the criteria in FAR Part 77, Objects Affecting Navigable Airspace. It shows the area affected by the Airport Obstructions Zoning Ordinance, and includes the layout of runways, airport boundaries, elevations, and area topography. Applicable height limitation areas are shown in detail.

Approach Slopes – The ratios of horizontal to vertical distance indicating the degree of inclination of the Approach Surface. The various ratios include:

- 20:1 – For all utility and visual runways extended from the primary surface a distance of 5,000 feet.
- 34:1 – For all non-precision instrument runways extended from the primary surface for a distance of 10,000 feet.
- 50:1/40:1 – For all precision instrument runways extending from the primary surface for a distance of 10,000 feet at an approach slope of 50:1 and an additional 40,000 feet beyond this at a 40:1 Approach Slope.

Approach Surface – A surface defined by FAR Part 77 “Objects Affecting Navigable Airspace,” that is longitudinally centered on the runway centerline and extends outward and upward from each end of the primary surface. An approach surface is applied to each end of each runway based on the type of approach available or planned for that runway end.

Attainment Area – An area in which the federal or state standards for ambient air quality are being achieved.

Attenuation – The lessening of the magnitude.

ASNA Act – The Aviation Safety and Noise Abatement Act of 1979, as amended (49 USC 2101 et seq.).

Average Sound Level – The level in decibels of the mean square, A-weighted sound pressure during a specified period, with reference to the square of the standard reference sound pressure of 20 micropascals.

Average Day-Night Sound Level (DNL) – Average day-night sound level (DNL) is the FAA standard metric for determining the cumulative exposure of individuals to noise. DNL is the equivalent of noise levels produced by aircraft operations during a 24-hour period, with a ten decibel penalty applied to the level measured during nighttime hours (10:00 pm to 7:00 am).

Avigation Easement – A grant of a property interest in land over which a right of unobstructed flight in the airspace is established; which prohibits any structures, growth, or other obstructions from penetrating the approach surface; and which provides a right of entry to remove, mark, or light any structure or any such obstruction.

Based Aircraft – An aircraft permanently stationed at an airport by agreement between the aircraft owner and the airport management.

Building Codes – Codes, either local or state, that control the functional and structural aspects of buildings and/or structures. Local ordinances typically require proposed buildings to comply with zoning requirements before building permits can be issued under the building codes.

Commercial Service Airport – A public airport that has at least 2,500 passenger boardings each year and is receiving scheduled passenger aircraft service.

Compatibility – The degree to which land uses or types of development can coexist or integrate.

Compatible Land Use – As defined in FAR 150: The use of land (e.g. commercial, industrial, agricultural) that is normally compatible with aircraft and airport operations, or sound insulated land uses (e.g. sound insulated homes, schools, nursing homes, hospitals, libraries) that would otherwise be considered incompatible with aircraft and airports operations.

Comprehensive Plan – Similar to a master plan, the comprehensive plan is a governmental entity's official statement of its plans and policies for long-term development. The plan includes maps, graphics and written proposals, which indicate the general location for streets, parks, schools, public buildings, airports and other physical development of the jurisdiction.

Conditional Zoning – The imposition or exaction of conditions or promises upon the grant of zoning by the zoning authority.

Conformity (Air Quality) – No department, agency or instrumentality of the federal government shall engage in, support in any way or provide financial assistance for, license, or permit, or approve, any activity which does not conform to a State Implementation Plan (SIP). There are two types of Air Quality Conformity: General Conformity and Transportation Conformity:

Conformity (General) – All federal actions (except those involving highways and transit projects) within non-attainment and maintenance areas that result in a net increase in emissions above specified de minimis levels.

Conformity (Transportation) – Federally funded or approved highway or transit projects; (and regionally significant non-federal highway and transit projects) within non-attainment and maintenance areas.

Decibel (dB) – A unit for describing the intensity or level of sound, equal to 20 times the logarithm to the base 10 of the ratio of the pressure of the sound measured to a standard reference pressure.

Easement – A grant of one or more of the property rights by the property owner to and/or for the use by the public, a corporation or another person or entity.

Enplanement – A passenger boarding of a commercial flight.

Environmental Assessment (EA) – A concise document that assesses the environmental impacts of a proposed federal action. The EA discusses the need for and environmental impacts of the proposed action and alternative actions. An EA should provide sufficient evidence and analysis for a federal determination whether to prepare an Environmental Impact Statement or a Finding of No Significant Impact.

Environmental Impact Statement (EIS) – A document that provides full and fair discussion of the significant environmental impacts that would occur as a result of a proposed project and informs decision makers and the public of the reasonable alternatives that would avoid or minimize adverse impacts.

Euclidean Zoning – A traditional legislative method or device for controlling land use by establishing districts with boundaries and providing for specific uniform regulations as to type of permitted land use, height, bulk and lot coverage of structure, setback and similar building restrictions. (Reference from 1929 US Supreme Court landmark decision upholding zoning as a means of land use control in “City of Euclid, Ohio v. Ambler Realty)

Federal Aviation Administration (FAA) – A federal agency charged with regulating air commerce to promote its safety and development; encourage and develop civil aviation, air traffic control, and air navigation; and promoting the development of a national system of airports.

Federal Aviation Regulations (FAR) – Regulations established and administered by the FAA that govern civil aviation and aviation-related activities.

FAR Part 36 – Regulation establishing noise standards for the civil aviation fleet.

FAR Part 91 – Regulation pertaining to air traffic and general operating rules, including operating noise limits.

FAR Part 150 – Regulation pertaining to airport noise compatibility planning.

FAR Part 161 – Regulation pertaining to notice and approval of airport noise and access restrictions.

FAR Part 77 – Objects Affecting Navigable Airspace - Part 77 (a) establishes standards for determining obstructions in navigable airspace; (b) defines the requirements for notice to the FAA Administrator of certain proposed construction or alteration; (c) provides for aeronautical studies of obstructions to air navigation to determine their effect on the safe and efficient use of airspace; (d) provides for public

hearings on the hazardous effect of proposed construction or alteration on air navigation; and (e) provides for establishing antenna farm areas.

Federal Grant Assurance – The terms and conditions of accepting Airport Improvement Program (AIP) grants from the FAA for carrying out the provisions of Title 49 United State Code. The terms and conditions become applicable when the airport sponsor accepts a grant offer from the FAA.

General Aviation – Refers to all civil aircraft and operations that are not classified as air carrier, commuter or regional. The types of aircraft used in general aviation activities cover a wide spectrum from corporate multi-engine jet aircraft piloted by professional crews to amateur-built single engine piston acrobatic planes, balloons and dirigibles.

Hold Harmless Agreement – An agreement which holds airport sponsors or jurisdictions harmless for alleged damages resulting from airport operations. Such agreements are recorded in deeds or permits as a condition of approval of a regulatory land use decision.

Housing Codes – The codes that usually apply to both existing and future living units. The codes include minimum standards of occupancy, and usually govern spatial, ventilation, wiring, plumbing, structural and heating requirements.

Imaginary Surfaces – Those areas established in relation to the airport and to each runway consistent with FAR Part 77 in which any object extending above these imaginary surfaces, by definition, is an obstruction.

Incompatible Land Use – The use of land (which is defined in Appendix A, Table 1 of FAR Part 150) which is normally incompatible with the aircraft and airport operations (such as homes, schools, nursing homes, hospitals, and libraries).

Infrastructure – A community's built elements that establish the community's foundation for maintaining existing populations, activities, future growth and development. Infrastructure elements include airports, roads, highways, bridges, water and sewer systems, waste disposal facilities, utilities, telecommunications systems, schools, and governmental and community facilities.

Instrument Approach – A series of predetermined maneuvers for the orderly transfer of an aircraft under instrument flight conditions from the beginning of the initial approach to a landing or to a point from which a landing may be made visually.

Instrument Flight Rules (IFR) – Rules by which aircraft are operated without visual reference to the ground. These rules are in effect when cloud ceilings are equal to or less than 1,000 feet, or visibility is less than three miles.

Instrument Landing System (ILS) – The instrument landing system is designed to provide electronic instrument guidance to the pilot to permit exact alignment and angle of descent of a properly equipped aircraft on final approach for landing.

Integrated Noise Model (INM) – FAA's computer model used by the civilian aviation community for evaluating aircraft noise impacts near airports. The INM uses a standard database of aircraft characteristics and applies them to an airport's average operational day to produce noise contours.

Itinerant Operation – Any aircraft arrival and/or departure other than a local operation.

Land Banking – The purchase of property by the government to be held for future use and development either by the government or for resale for the development of compatible uses.

Land Use Compatibility – The coexistence of land uses surrounding the airport with airport-related activities.

Land Use Controls – Measures established by state or local government that are designed to carry out land use planning. The controls include: zoning, subdivision regulations, planned acquisition, easements, covenants or conditions in building codes and capital improvement programs, such as the establishment of sewer, water, utilities or their service facilities.

Land Use Management Measures – Land use management techniques that consist of both remedial and preventive measures. Remedial, or corrective, measures typically include sound insulation or land acquisition. Preventive measures typically involve land use controls that amend or update the local zoning ordinance, comprehensive plan, subdivision regulations, and building code.

Landside – That part of an airport uses for activities other than the movement of aircraft, such as vehicular access roads and parking.

Lighting and Marking of Hazards to Air Navigation – Installation of appropriate lighting fixtures, painted markings or other devices to such objects or structures that constitute hazards to air navigation.

Limited Aviation Easement – An easement which provides right of flight above approach slope surfaces, prohibits any obstruction penetrating the approach slope surface, and provides right of entry to remove any structure or growth penetrating the approach slope surface.

Local Operation – Any operation performed by an aircraft that (a) operates in the local traffic pattern or within sight of the tower or airport, or (b) is known to be departing for, or arriving from, flight in local practice areas located within a 20-mile radius of the control tower or airport, or (c) executes a simulated instrument approach or low pass at the airport.

Maintenance Area – a geographical area which was once designated as nonattainment, but in which the pollution levels have met the National Ambient Air Quality standards for two consecutive years and has an approved maintenance plan that outlines how the geographical area will continue to meet these standards.

Mediation – The use of a mediator or co-mediators to facilitate open discussion between disputants and assist them to negotiate a mutually agreeable resolution. Mediation is a method of alternative dispute resolution that provides an initial forum to informally settle disputes prior to regulatory intervention on the part of the FAA.

Mitigation – The avoidance, minimization, reduction, elimination or compensation for adverse environmental effects of a proposed action.

Mitigation Measure – An action taken to alleviate adverse impacts.

National Environmental Policy Act of 1969 (NEPA) – The original legislation establishing the environmental review process.

National Plan of Integrated Airport Systems (NPIAS) – A primary purpose of the NPIAS is to identify the airports that are important to national transportation and are eligible to receive grants under the Airport Improvement Program (AIP). The NPIAS is composed of all commercial service airports, all reliever airports, and selected general aviation airports.

Nautical Mile – A measure of distance equal to one minute of arc on the earth’s surface, which is approximately 6,080 feet.

Navigation Aids (NAVAIDs) – Any facility used by an aircraft for guiding or controlling flight in the air or the landing or take-off of an aircraft.

Noise – Defined subjectively as unwanted sound, the measurement of noise evaluates three characteristics of sound: intensity, frequency, and duration.

Noise Abatement Procedures – Changes in runway usage, flight approach and departure routes and procedures, and vehicle movement, such as ground maneuvers or other air traffic procedures that shift aviation impacts away from noise sensitive areas.

Noise Compatibility Plan (NCP) – The NCP consists of an optimum combination of preferred noise abatement and land use management measures, and a plan for implementation of the measures. For planning purposes, the implementation plan also includes the estimated cost for each of the recommended measures to the airport sponsor, the FAA, airport users, and the local units of government.

Noise Compatibility Program – See “Part 150 Study”

Noise Exposure Contours – Lines drawn around a noise source indicating constant energy levels of noise exposure. DNL is the measure used to describe community exposure to noise.

Noise Exposure Map (NEM) – The NEM is a scaled map of the airport, its noise contours and surrounding land uses. The NEM depicts the levels of noise exposure around the airport, both for the existing conditions and forecasts for the five-year planning period. The area of noise exposure is designated using the DNL (Day-Night Average Sound Level) noise metric.

Noise Impact – A condition that exists when the noise levels that occur in an area exceed a level identified as appropriate for the activities in that area.

Noise Level Reduction (NLR) – The amount of noise level reduction in decibels achieved through incorporation of noise attenuation (between outdoor and indoor levels) in the design and construction of a structure.

Noise-Sensitive Area – Areas where aircraft noise may interfere with existing or planned use of the land. Whether noise interferes with a particular use depends upon the level of noise exposure and the types of activities that are involved. Residential neighborhoods, educational, health, and religious structures and sites, outdoor recreational, cultural and historic sites may be noise sensitive areas.

Non-attainment – Areas that exceeded the national ambient air quality standards for any of six pollutants (ozone or smog, carbon monoxide, lead, particulate matter, PM-10 or nitrogen dioxide).

Non-conforming Use – Any pre-existing structure, tree, or use of land that is inconsistent with the provisions of the local land use or airport master plans.

Non-Precision Instrument Runway – A runway having an existing or planned instrument approach that is essentially aligned with the runway centerline, has horizontal information for guidance of the aircraft on course, and relays altimeter and intermediate fixes for descent to the touchdown point on the runway.

Off-Airport Property – Property that is beyond the boundary of land owned by the airport sponsor.

Official Map – A legally adopted map that conclusively shows the locations and width of proposed streets, public facilities, public areas, and drainage rights-of-way.

On-Airport Property – Property that is within the boundary of land owned by the airport sponsor.

Overlay Zone – A mapped zone that imposes a set of requirements in addition to those of the underlying zoning district.

Part 150 Study – Part 150 is the abbreviated name for the airport noise compatibility planning process outlined in Part 150 of the Federal Aviation Regulation (FAR) that allows airport owners to voluntarily submit noise exposure maps and noise compatibility programs to the FAA for review and approval. See “Noise Compatibility Plan.”

Passenger Facility Charge (PFC) Program – The PFC Program, first authorized by the Aviation Safety and Capacity Expansion Act of 1990 and now codified under Section 40117 of Title 49 USC provides a source of additional capital to improve, expand and repair the nation’s airport infrastructure. The legislation allows public agencies controlling commercial service airports to charge enplaning passengers using the airport a facility charge. The FAA must approve any facility charges imposed on enplaning passengers.

Performance Standards – Minimum acceptable levels of performance, imposed by zoning that must be met by each land use.

Precision Instrument Runway – A runway having an existing or planned instrument approach that is essential aligned with the runway centerline and has horizontal information for guidance of the descent of the aircraft to the touchdown point of the runway.

Primary Surface – A primary surface is longitudinally centered on a runway. When the runway has a specially prepared hard surface, the primary surface extends 200 feet beyond each end of that runway. When the runway has no specially prepared hard surface, or planned hard surface, the primary surface terminates at each end of the runway. The width of a primary surface ranges from 250 feet to 1,000 feet, depending on the existing or planned approach system. The elevation of any point on the primary surface is the same as the elevation of the nearest point on the runway centerline.

Primary Runway – The runway used for the majority of airport operations. Large, high-activity airports may operate two or more parallel primary runways.

Proponent – Any person who proposes to erect or construct any object or structure that exceeds certain minimum altitudes that may be a potential hazard to air navigation and who may be responsible for lighting and marking such object or structure.

Public Use Airport – A publicly or privately owned airport that offers the use of its facilities to the public without prior notice or special invitation or clearance.

Reliever Airport – An airport that meets certain FAA criteria and relieves the aeronautical demand on a busier air carrier airport.

Runway Protection Zone (RPZ) – A trapezoid-shaped area centered about the extended runway centerline that is used to enhance the protection of people and property on the ground. It begins 200 feet beyond the end of the runway or area usable for takeoff or landing. The RPZ dimensions are functions of the design aircraft, type of operation, and visibility minimums.

Sound Attenuation – Acoustical phenomenon whereby a reduction of sound energy is experienced between the noise source and the receiver. This energy loss can be attributed to atmospheric conditions, terrain, vegetation, constructed features (e.g., sound insulation) and natural features.

Sound Exposure Level (SEL) – A measure of the physical energy of the noise event that takes into account both intensity and duration. By definition SEL values are referenced to a duration of one second. SEL is higher than the average and the maximum noise levels as long as the event is longer than one second. Sound exposure level is expressed in decibels (dB). People do not hear SEL.

Sound Transmission Class (STC) – A number rating of the sound that indicates the amount of noise attenuation in tested acoustical materials.

Special Exceptions – Land uses that are not specifically permitted as a matter of right, but can be permitted in accordance with performance standards and other local criteria, also known as “conditional use.”

Stage 2 Aircraft – Aircraft that meet the noise levels prescribed by FAR Part 36 and are less stringent than noise levels established for the quieter designation Stage 3 aircraft. The Airport Noise and Capacity Act requires the phase-out of all Stage 2 aircraft by December 31, 1999, with case-by-case exceptions through the year 2003.

Stage 3 Aircraft – Aircraft that meet the most stringent noise levels set forth in FAR Part 36.

Statute Mile – A measure of distance equal to 5,280 feet.

Terminal Area – A general term used to describe airspace in which airport traffic control or approach control service is provided.

Transfer of Development Rights (TDR) – The removal of the right to develop or build, expressed in dwelling units per acre, from land in one location to land in another location where such transfer is permitted.

Transitional Surface – An element of the Imaginary Surfaces extending outward and upward at right angles to the runway centerline and runway centerline extended at a slope of 7:1 from the sides of the primary and approach surfaces to where they intersect the horizontal and conical surfaces.

Turbofan Aircraft – A turbofan is a type of aircraft gas turbine engine that provides propulsion using a combination of a ducted fan and a jet exhaust nozzle. Part of the airstream from the ducted fan passes through the core, providing oxygen to burn fuel to create power. However, the rest of the air flow bypasses the engine core and mixes with the faster stream from the core.

Turbojet Aircraft – Aircraft operated by jet engines incorporating a gas turbine-driven air compressor to take in and compress the air for the combustion of fuel, the gases of combustion (or the heated air) being used both to rotate the turbine and to create a thrust-producing jet.

Turboprop Aircraft – Aircraft in which the main propulsive force is supplied by a gas turbine driven conventional propeller. Additional propulsion may be supplied from the discharged turbine exhaust gas.

Variance – An authorization for the construction or maintenance of a building or structure, or for the establishment or maintenance of a use of land that is prohibited by a zoning ordinance. A lawful exception from specific zoning ordinance standards and regulations predicated on the practical difficulties and/or unnecessary hardships on the petitioner being required to comply with those regulations and standards from which an exemption or exception is sought.

Visual Approach – An approach to an airport conducted with visual reference to the terrain.

Visual Approach Runway – A runway intended for visual approaches only, with no straight-in instrument approach procedure either existing or planned for that runway.

Visual Flight Rules (VFR) – FAA rules that govern procedures for flight under visual conditions.

Wetland Mitigation Banking – involves consolidating fragmented wetland mitigation projects into one large contiguous site. Unites of restored, created enhanced or preserved wetlands are expressed as “credits” which may be withdrawn to offset “debits” incurred at a project development site.

Yearly Day-Night Average Sound Level (YDNL) – The 365-day average, in decibels, day-night average sound level. The symbol for YDNL is also Ldn.

Zoning – The partitioning of land parcels in a community by ordinance into zones and the establishment of regulations in the ordinance to govern the land use and the location, height, use and land coverage of buildings within each zone. The zoning ordinance usually consists of text and zoning map.

Zoning Ordinance – Primarily a legal document that allows a local government effective and legal regulation of uses of property while protecting and promoting the public interest.

Acronyms

The following list identifies some commonly used acronyms in aviation land use planning:

AGL	Above Ground Level
AIP	Airport Improvement Program
ALP	Airport Layout Plan
BOA	Bureau of Aeronautics
CBD	Central Business District
DNL	Average Day-Night Sound Level
DOD	Department of Defense
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
GA	General Aviation
HIRL	High Intensity Runway lighting
HUD	Housing and Urban Development
LCDC	Land Conservation and Development Commission
LIRL	Low Intensity Runway Lighting
MIRL	Medium Intensity Runway Lighting
MSL	Mean Sea Level
UBC	Uniform Building Code
UGB	Urban Growth Boundary
WisDOT	Wisconsin Department of Transportation

Reference

Numerous references were used to create this document. In the interest of brevity, the following sources are listed as the primary references:

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