

A Guide to the Air Installations Compatible Use Zones Program





Table of Contents

Section	Page
Introduction	1
The AICUZ Program	2
History	2
AICUZ Program Objectives	4
AICUZ Study	5
The AICUZ Study Process	5
Noise Analysis and Noise Contours	6
Accident Potential Zones (APZs) and Flight Safety	
Flight Safety Criteria	9
Land Use Compatibility Analysis and Recommendations	13
Compatible Land Use	14
AICUZ Implementation	15
Roles	
The Installation's Role	
The Community's Role	
Land Use Tools and Recommendations	
Resources	17
Summary	

Introduction

1

The purpose of this primer is to provide the public and local governments located near military airfields (also referred to as air installations) with an increased understanding of the Air Installations Compatible Use Zones (AICUZ) Program and how implementation of this program can benefit local communities and the Air Force. This document provides an overview of the overall AICUZ Program; AICUZ studies and their development; land use compatibility; and AICUZ Program implementation and resources.

The information presented herein is based on guidance developed by the U.S. Department of the Air Force and Department of Defense (DOD): Air Force Instruction (AFI) 32-7063 (2014) and DOD Instruction (DODI) 4165.57 (2011).



The AICUZ Program

Development near military air installations is apparent and the advertisement slogan, "If you lived here...you'd be home by now!" is appealing for many homebuyers. People who work on the air installation want to live nearby and businesses want to provide services for

those employees

As development increases around a military airfield, more people are potentially exposed to the noise and accident potential through incompatible development, which, over time, could potentially degrade the installation's mission.

In the early 1970s, the DOD initiated the AICUZ Program to promote compatible development near military airfields.

The AICUZ program recommends incorporation of noise contours, accident potential zones (APZs), and other safety criteria, into the local land use planning process and provides recommendations for development that is compatible with the air installation's mission.



Signs like this are common near military airfields and acknowledge the development near military airfields.

History

Historically, military installations were located in rural areas, which provided an ample buffer between military training areas and urban areas. Following World War II, rapid development resulted in population growth in many of these formerly rural areas, which began to affect the missions of military installations. Military installations became magnets for employment and economic growth opportunities because of the large number of military and civilian personnel employed at the installations. In addition, expansion of the interstate highway system, lack of developable land near urban centers, affordable real estate, and mortgage programs pushed development outward toward rural areas and increased development near military installations.

Public and military awareness of aircraft safety and accident potential emerged as a concern after different types of development occurred around air installations. In the early 1950s, the federal government initiated studies to better understand the relationship between aircraft operations and neighboring communities. These early studies analyzed land uses, aircraft operations, and human sensitivity to aircraft noise as well as provided recommendations for compatible land uses.





In the 1970s, in response to continuing growth pressure, the DOD established the AICUZ Program.

Today, the Air Force AICUZ Program, supported by two key instructions, is the basis for the encroachment management program for Air Force air installations:

- DOD Instruction 4165.57: Air Installations Compatible Use Zones (AICUZ), DOD Instruction (DODI), 2011; and
- Air Force Instruction (AFI) 32-1015: Integrated Installation Planning.

Through this guidance, the AICUZ Program has been established for Air Force air installations throughout the United States. Today, the Program serves as a crucial tool to promote compatible development; it continues to evolve to address new development trends, emerging encroachment challenges, and critical needs of the mission.

AICUZ Program Objectives

The AICUZ Program has four objectives:

- To protect the health, safety, and welfare of civilians and military personnel by encouraging land use that is compatible with aircraft operations;
- To protect military installation investments by safeguarding the installation's operational capabilities;
- To reduce noise impacts caused by aircraft operations while meeting operational, training, and flight safety requirements, both on and in the vicinity of air installations; and
- To inform the public about the AICUZ Program and seek cooperative efforts to minimize noise and aircraft accident potential affects by promoting compatible development near military air installations.

To satisfy these objectives, the Air Force works with local communities to discourage incompatible development of lands adjacent to an air installation, while promoting development compatible with the mission. Cooperation between

the air installation and neighboring communities is the key to the AICUZ Program's success.

AICUZ Study

The AICUZ Program promotes development compatible with the military flying mission. The Program encourages local governments to incorporate AICUZ guidelines into their land use planning and development practices. AICUZ studies are an integral component of the AICUZ Program and are the tool the Air Force uses to communicate with local governments and provide compatible land use recommendations.

AICUZ studies are advisory planning documents – land use control is the responsibility of local governments. AICUZ studies provide recommendations that will allow the Air Force and local governments to work together to promote compatible development.

An AICUZ study is prepared in consideration of past and projected changes in mission, aircraft, flight paths, and operational levels. The planning year is installation dependent and determined by foreseeable changes that could occur at the installation in the future. This approach allows local governments to properly plan and manage development.

The AICUZ Study Process

AICUZ studies, initiated in coordination with the air installation, major command, the Air Force Civil Engineer Center (AFCEC), and higher headquarters, are updated when an air installation has:

- A significant change or projected change in aircraft operations (i.e., the number of takeoffs and landings);
- Significant changes or projected changes in flight paths or procedures;
- A change or projected change in the type of aircraft stationed and operating from the installation;
- Major changes in land use; or
- When other circumstances require such action.

AICUZ studies, developed through a coordinated and strategic team effort, involve the air installation leadership, installation program manager, planning staff, pilots and air operations personnel, AFCEC representatives, Air Force headquarters (HQ) personnel, and a consulting team composed of technical staff and noise experts.

The three primary components of an AICUZ study presented on the graphic below and discussed in the following sections are designed to address the AICUZ Program objectives.

AICUZ studies are advisory planning documents – land use control is the responsibility of local governments.



Noise Analysis and Noise Contours

The AICUZ process starts with the collection of aircraft operational data from the installation, which is used to develop noise exposure contours. The Air Force identifies noise exposure zones surrounding a military air station as a planning tool for local planning agencies.

The noise exposure from aircraft is measured using the day-night average sound level (DNL) metric. The DNL metric, established in 1980, presents a reliable

measure of community sensitivity to aircraft noise and has become the standard metric used in the United States (except California, which uses a similar metric, Community Noise Equivalent Level [CNEL]). The DNL presents the average sound energy from aircraft operations at a location over a 24-hour period. The DNL also adds an additional 10 decibels (dB) to events occurring between 10:00 p.m. and 7:00 a.m. This 10-dB "night-time adjustment" represents the added intrusiveness of sounds due to the increased sensitivity to noise when ambient sound levels are low.

An AICUZ study provides air installations, local planning

Noise contours, developed using DOD-approved computerized simulation models include the following data inputs:

- ✓ Flight tracks;
- ✓ Type and mix of aircraft;
- Aircraft speed, altitude, and power settings;
- ✓ Ground and maintenance activities;
- Frequency and times of operation; and
- ✓ Environmental considerations.

organizations, the public, and other stakeholders, with maps of the modeled noise-related exposure from aircraft operations. Noise contours, when overlaid with local land uses, can help identify areas of incompatible land uses and can assist in planning for future development.

Every AICUZ study contains a map that depicts the noise exposure contours. The noise exposure contour figure shows the 65, 70, 75, 80 and 85 DNL contours. Contours outside of 65 DNL are not usually mapped unless local conditions,

warrant their use. In California, which utilizes CNEL instead of DNL, the Air Force adds a 60 CNEL contour to align its AICUZ studies with state law.



For land use planning purposes, an area of less than 65 DNL is considered an area of low impact and does not normally require land use controls. 65 to 75 is considered an area of moderate noise impact, where some land use controls are needed The area greater than 75 DNL is the most affected area and requires the greatest degree of land use controls to achieve land use compatibility.



Representative Noise Contours

Accident Potential Zones (APZs) and Flight Safety

The Air Force identifies Accident Potential Zones, or APZs, as areas where an aircraft accident is most likely to occur – if one occurs – in the vicinity of airfields; APZs are not a prediction of accidents or accident frequency. APZs generally follow the extended runway centerline and are based upon analysis of Air Force historical data.

APZs extend from the end of the runway and apply to the predominant arrival, departure, and pattern flight tracks. In the case where more than 80% of the operations follow a particular departure path that varies from straight out, a curved APZ may also be included.



The APZs are not a prediction of accidents or accident frequency. The DOD defines three APZs: the Clear Zone, APZ I, and APZ II. If an accident were to occur, it would most likely occur in the Clear Zone and would be more likely to occur in APZ I than APZ II. Clear Zones and straight out APZs are required for all active runways.

- Clear Zone: Extends beyond the runway and has the highest potential for accidents. Clear Zones are the areas with the greatest potential for occurrence of aircraft accidents and should remain undeveloped.
- **APZ I:** Extends beyond the Clear Zone. Some land uses are compatible but may recommend density restrictions.
- **APZ II:** Extends beyond APZ I. More land uses are compatible within APZ II than APZ I but may recommend density restrictions.



Standard Runway, Fixed-Wing APZs

The Air Force provides APZs as a planning tool to assist local governments with land use planning and future community development. While the possibilities of an aircraft mishap are remote, the AICUZ Program recommends that land uses that promote high concentrations of people be avoided in the APZs.

Clear Zones are the areas with the greatest potential for occurrence of aircraft accidents and should remain undeveloped. APZ I and APZ II have a decreasing probability of an aircraft accident occurring and have less stringent development recommendations.

Flight Safety Criteria

Flight safety not only includes measures for pilot safety during aircraft operations, but also for the safety of those in the community. Height restrictions can prevent man-made structures from creating an obstruction that could prevent aircraft from accessing airports or pose an accident hazard. Aircraft approach and depart from airports on a vertically sloped flight path that gets farther from the ground as distance from the airport increases. The height obstruction criteria reflect this principle, and normally permit the placement of taller structures as distance from the airport increases. Obstructions to air navigation are considered to be:

- Natural objects or man-made structures that protrude above the planes or imaginary surfaces and/or
- Man-made objects that extend more than 500 feet above ground level (AGL) at the site of the structure.

Although the FAA establishes criteria for the height of structures around airports, the FAA does not have the authority to limit their actual construction. Therefore, to protect the health, safety, and welfare of populations around airfields, local communities must enforce the height restriction guidelines established by the FAA. Local communities are encouraged to restrict development that could compromise aircraft operations.



Hazards to Aircraft Flight Zone (HAFZ)

Certain land uses and activities pose potential hazards to flight. To ensure land uses and activities are examined for compatibility; the Air Force has identified a Hazards to Aircraft Flight Zone (HAFZ). The HAFZ is the area within the imaginary surfaces that are shown on Figure 5-4. Please note that the area and shape of the HAFZ may change with the encroachment issue at hand. For instance, issues related to bird/wildlife aircraft strike hazards may follow natural boundaries, encompass local bodies of water, and extend along flight paths. Unlike noise zones and safety zones, the HAFZ does not have recommended land use compatibility tables. Instead, it is a consultation zone recommending that project applicants and local planning bodies consult with the Air Force to ensure the project is compatible with Air Force operations. These land use and activity compatibility considerations include:

Height: Tall objects can pose significant hazards to flight operations or interfere with navigational equipment (including radar). City/county agencies involved with approvals of permits for construction should require developers to submit calculations showing that projects meet the height restriction criteria of 14 Code of Federal Regulations (CFR) 77.17 for the specific airfield described in the AICUZ Study. City and county agencies may also consider requiring a "Determination of No Hazard" issued by the FAA for any tall objects within this zone.

- Visual Interference: Industrial or agricultural sources of smoke, dust, and steam in the airfield vicinity can obstruct a pilot's vision during takeoff, landing, or other periods of low-altitude flight. Close coordination between the installation and landowners can often mitigate these concerns. For example, irrigating before plowing can greatly reduce dust concerns.
- Light Emissions: Bright lights, either direct or reflected, in the airfield vicinity can impair a pilot's vision, especially at night. A sudden flash from a bright light causes a spot or "halo" to remain at the center of the visual field for a few seconds or more, rendering a person virtually blind to all other visual input. This is particularly dangerous for pilots at night when the flash can diminish the eye's adaptation to darkness. The eyes partially recover from this adaptation in a matter of minutes, but full adaptation typically requires 40 to 45 minutes. Specific examples of light emissions that can interfere with the safety of nearby aviation operations include:
 - Lasers that emit in the visible spectrum, which can be potentially harmful to a pilot's vision during both day and night.
 - The increasing use of energy-efficient LED lighting, which poses potential conflicts in areas where pilots use night vision goggles (NVGs). NVGs can exaggerate the brightness of these lights, interfering with pilot vision.
 - The use of red LED lights to mark obstructions, which can produce an unintended safety consequence because red LED lights are not visible on most NVG models, rendering them invisible to NVG users in the area.
- **Bird/Wildlife Aircraft Strike Hazard (BASH)**: Wildlife represents a significant hazard to flight operations. Birds, in particular, are drawn to different habitat types found in the airfield environment, including hedges, grass, brush, forest, water, and even the warm pavement of the runways. Due to the speed of the aircraft, collisions with wildlife can happen with considerable force. Although most bird and animal strikes do not result in crashes, they cause structural and mechanical damage to aircraft as well as loss of flight time.
- Radio Frequency/Electromagnetic Interference: The American National Standards Institute defines electromagnetic interference (EMI) as any electromagnetic disturbance that interrupts, obstructs, or otherwise degrades or limits the effective performance of electronics/electrical equipment.

EMI can be induced intentionally, as in forms of electronic warfare, or unintentionally, as a result of spurious emissions and

responses, such as high-tension line leakage and industrial machinery. In addition, EMI may be caused by atmospheric phenomena, such as lightning or precipitation static.

New generations of military aircraft are highly dependent on complex electronic systems for navigation and critical flight and mission-related functions. Consequently, communities should use care when siting any activities that create EMI. Many of these sources are low-level emitters of EMI. However, when combined, they have an additive quality.

EMI also affects consumer devices, such as cell phones, FM radios, television reception, and garage door openers. In some cases, the source of interference occurs when consumer electronics use frequencies set aside for military use.

Drones/Unmanned Aircraft Systems (UAS): The use of drones near military airfields poses a serious flight safety hazard due to the potential for a mid-air collision between military aircraft and small- to medium-sized drones. The FAA maintains specific guidance about where drones (i.e., UAS) can be flown. Currently, non-DoD drone operations are not permitted within certain zones surrounding military bases. Additional restrictions are in place around airports, sports stadiums, and security sensitive areas. For more information on drone use in and around DoD airfields, visit the FAA's website at: www.faa.gov/uas.



Land Use Compatibility Analysis and Recommendations

The AICUZ footprint of an air installation—the combination of noise contours and APZs—defines the minimum acceptable area in which land use control measures are recommended to protect the public's health, safety, and welfare while sustaining the Air Force's flying mission. Control over land use and development in areas neighboring the air installation is ultimately the responsibility of local governments; however, through the AICUZ Program, local governments are encouraged to plan for compatible development.

The land use compatibility analysis section of an AICUZ study examines existing land uses within the AICUZ footprint and determines the level of compatibility with military air operations. Existing land uses are identified through data acquired from local or state governments and supplemented with aerial photography interpretation and ground verification. General and/or comprehensive plans for the municipalities in the vicinity of the air installation are reviewed for goals and policies that would influence future land uses within the AICUZ footprint, allowing for analysis of future land uses. In addition, local zoning ordinances and zoning maps are reviewed to determine the location of allowable land uses, building heights and densities, and floor-to-area ratios (for non-residential development).

The land use compatibility analysis examines whether existing and future land uses are compatible with current and foreseeable military aircraft operations. The land use controls recommended in the AICUZ study are dependent on the level of incompatibility and intensity of land uses in the AICUZ footprint. Figures depicting compatibility concerns are provided in AICUZ studies and include recommendations for compatible land use as described in the following section. The AICUZ footprint consists of the noise contours and APZs.

Compatible Land Use

The land use compatibility analysis provides the basis for land use recommendations.

As previously discussed, to protect the health, safety, and welfare of the public, land uses should be compatible with noise zones, APZs, and flight safety criteria. Although land use activities outside the installation can affect military operations, the use and development of the surrounding properties is under the jurisdiction of the local governments.

The AICUZ Program's compatibility guidelines encourage noise-sensitive land uses (e.g., houses and churches) to be placed outside high-noise zones and discourages people-intensive uses (e.g., apartments and theaters) in APZs. The table below provides a list of common land use classifications and their generalized compatibility recommendations within AICUZ noise zones and APZs. Land use classifications in this table are generalized and do not represent the local communities' land use designations.

KEY: Compatible	ifications and Compatibility Guidelines									
Land Use	Land Use Compatibility with AICUZ Noise Zone (DNL)					Land Use Compatibility with APZs				
	<55	55-65	65-70	70-75	75-80	>80	Clear Zone	APZ I	APZ II	
Single-Unit, Detached (residential)									(1)	
Multi-Family Residential, (apartment, transient lodging)										
Public Assembly										
Schools and Hospitals			(2)	(2)						
Manufacturing (e.g., petrol/chem, textile)										
Parks								(4)	(4)	
Business Services				(2)	(2)			(3)	(3)	
Agriculture, Forestry, and Mining										

NOTES:

This generalized land use table provides an overview of recommended land use. To determine specific land use compatibility, see AFI 32-7063.

Maximum density of 1-2 dwelling units per acre. 1.

- 2. Land use and related structures generally compatible; however, measure to achieve a Noise level Reduction (NLR) of 25 to 30 dB must be incorporated in the design and construction of the structures.
- 3. Maximum floor area ration that limits people density may apply.
- 4. Facilities must be low intensity.

AICUZ Implementation

The AICUZ Program, specifically AICUZ studies, provides guidance on implementing recommendations.

Roles

Both the Air Force and local government stakeholders share responsibility for the successful implementation of the AICUZ Program within a community. Although the Air Force is responsible for preparing the AICUZ study, the action to implement many of the land use recommendations resides with local governments.

The Installation's Role

The Air Force actively engages the local community throughout implementation of an AICUZ study. Base leadership this effort and often delegates the day-today responsibilities of engaging the community to the installation's AICUZ program manager. The AICUZ program manager works closely with community planners, government officials, and installation leadership to develop appropriate recommendations promoting compatible development within noise zones and APZs as well as recommendations to minimize noise impacts on existing land uses. In addition, the Air Force actively encourages local governments to incorporate AICUZ study maps, land use compatibility tables, and recommendations into their local zoning ordinance.

The Community's Role

Within any jurisdiction, only the local government has authority to regulate land use and, therefore, is responsible for adopting and implementing the appropriate control measures that pertain to zoning ordinances, general plans, and building codes. Partnership and coordination with the Air Force ensures that incompatible land uses are minimized within noise zones and APZs. In addition, local governments may provide valuable land use and zoning information and data to support the AICUZ study process.

Land Use Tools and Recommendations

The purpose of an AICUZ study is to identify the AICUZ footprint, determine land use compatibility with existing and future land uses, and provide recommendations for minimizing land use conflicts and mitigating noise impacts on existing land uses. Local circumstances may require unique solutions, which are often the result of a collaborative effort between the Air Force and local governments. The Air Force and local governments share the responsibility of implementing AICUZ study recommendations. The following recommendations are the most common actions taken by the Air Force to minimize impacts on sensitive land uses in the AICUZ footprint.

- Noise Mitigation Measures. Flight crews (pilots and ground maintenance) are briefed on noise abatement procedures and noisesensitive areas detailed in in-flight guides.
- Hush Houses and Test Cells. These facilities are located on base. Aircraft are positioned inside these facilities to reduce the noise generated during engine maintenance run-ups.
- Acquisition of Real Property or Restrictive Easements. While the Air Force may purchase land or restrictive easements under certain conditions, funding for this program is scarce and other options often pursued. If acquisition is required, the Air Force's first priority is the Clear Zone and then APZ I and APZ II. The primary focus of these acquisition efforts is on undeveloped land.
- Complaint Response Programs. Air Force installations may set up a telephone hotline or website to allow the public to submit noise complaints to the Air Force. The Air Force examines these complaints to determine if further action is needed to minimize the concern. (Contact the installation Public Affairs [PA] office for more information.)
- Encroachment Partnering. Encroachment partnering is a cooperative, multi-party, real estate based program authorized by Congress to mitigate the impacts of potential off-base development that would be incompatible with military operations or to preserve habitat off-base. Under this program the Air Force can partner with state, county, and city governments and private non-governmental organizations to share the costs of acquiring real estate in the vicinity of an installation to prevent development. The DoD provides funding through the Readiness and Environmental Protection Initiative (REPI) and Air Force appropriation funds.
- Monitor and Comment on Proposed Developments. The CO and his staff, primarily the CPLO, are encouraged to monitor development activities within and outside of the AICUZ footprint and, if needed, present their concerns to the appropriate decision-making body (e.g., planning commission or city/county council).

The following actions are taken primarily by local governments in coordination with the Air Force.

Incorporate AICUZ Study Elements into Local Planning. General or comprehensive plans are long-term planning documents that define the vision of a community. These planning documents include goals and policies that guide future development and provide the basis for land use related decisions. Incorporating AICUZ recommendations into the general plan emphasizes the importance of ensuring the AICUZ footprint is free of incompatible land uses and provides the basis for amending zoning ordinances, building codes, and other city or county codes to incorporate AICUZ recommendations.

- Revising Building Codes. Building codes govern the construction and maintenance of new and existing buildings to ensure buildings are safe for occupancy. In some instances, building codes should incorporate additional sound suppression requirements to limit the amount of military aircraft-related noise that is detectable inside a structure, especially residences.
- Real Estate Disclosure. Real estate disclosures require disclosure to prospective buyers and lessees that residential properties are located within noise zones and/or APZs. The Air Force encourages local jurisdictions to adopt legislation that requires this disclosure.

Resources

In addition to the CO, the base-level staff are important resources serving as direct representatives with local communities, public elected officials, other government agencies, and major landowners surrounding installations and within the region.

- Public Affairs (PA) office. The PA manages the day-to-day responsibilities of responding to community complaints or inquiries and keeping the public informed of operational changes
- Installation AICUZ Program Manager. The AICUZ program manager manages the day-to-day responsibilities for administering the installation's AICUZ program.

Public Outreach Materials. A suite of public outreach materials, such as map brochures, tri-folds, factsheets, and presentations, is often developed in coordination with an AICUZ study, which provides excellent tools to communicate with the local community and should be available from the installation PA office.



Summary

The AICUZ Program, initiated by the DOD to protect and promote the public's health, safety, and welfare while concurrently preventing the degradation of the installation's mission, is critical to sustaining our military mission. Communities that surround air stations will continue to grow, and the DOD has the responsibility to communicate and collaborate with local governments regarding land use planning, zoning, and mission impacts.

The AICUZ Program, through AICUZ studies, assists governmental entities and communities in identifying and planning for compatible land use and development. As a planning document, AICUZ studies project aircraft operations and recommend that communities incorporate the projections into their planning documents, encouraging compatible development.

Today, the AICUZ Program is a vital tool used by the military to communicate with neighboring communities regarding public health and safety, compatible land use, and development concerns.

For More Information:

Contact the PA office at the Air Force air installation nearest you.





