Enhancing Airport Land Use Compatibility, Volume 2: Land Use Survey and Case Study Summaries

DETAILS

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AIRPORT COOPERATIVE RESEARCH PROGRAM

ACRP REPORT 27

Enhancing Airport Land Use Compatibility

Volume 2: Land Use Survey and Case Study Summaries

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AIRPORT COOPERATIVE RESEARCH PROGRAM

Airports are vital national resources. They serve a key role in transportation of people and goods and in regional, national, and international commerce. They are where the nation's aviation system connects with other modes of transportation and where federal responsibility for managing and regulating air traffic operations intersects with the role of state and local governments that own and operate most airports. Research is necessary to solve common operating problems, to adapt appropriate new technologies from other industries, and to introduce innovations into the airport industry. The Airport Cooperative Research Program (ACRP) serves as one of the principal means by which the airport industry can develop innovative near-term solutions to meet demands placed on it.

The need for ACRP was identified in *TRB Special Report 272: Airport Research Needs: Cooperative Solutions* in 2003, based on a study sponsored by the Federal Aviation Administration (FAA). The ACRP carries out applied research on problems that are shared by airport operating agencies and are not being adequately addressed by existing federal research programs. It is modeled after the successful National Cooperative Highway Research Program and Transit Cooperative Research Program. The ACRP undertakes research and other technical activities in a variety of airport subject areas, including design, construction, maintenance, operations, safety, security, policy, planning, human resources, and administration. The ACRP provides a forum where airport operators can cooperatively address common operational problems.

The ACRP was authorized in December 2003 as part of the Vision 100-Century of Aviation Reauthorization Act. The primary participants in the ACRP are (1) an independent governing board, the ACRP Oversight Committee (AOC), appointed by the Secretary of the U.S. Department of Transportation with representation from airport operating agencies, other stakeholders, and relevant industry organizations such as the Airports Council International-North America (ACI-NA), the American Association of Airport Executives (AAAE), the National Association of State Aviation Officials (NASAO), and the Air Transport Association (ATA) as vital links to the airport community; (2) the TRB as program manager and secretariat for the governing board; and (3) the FAA as program sponsor. In October 2005, the FAA executed a contract with the National Academies formally initiating the program.

The ACRP benefits from the cooperation and participation of airport professionals, air carriers, shippers, state and local government officials, equipment and service suppliers, other airport users, and research organizations. Each of these participants has different interests and responsibilities, and each is an integral part of this cooperative research effort.

Research problem statements for the ACRP are solicited periodically but may be submitted to the TRB by anyone at any time. It is the responsibility of the AOC to formulate the research program by identifying the highest priority projects and defining funding levels and expected products.

Once selected, each ACRP project is assigned to an expert panel, appointed by the TRB. Panels include experienced practitioners and research specialists; heavy emphasis is placed on including airport professionals, the intended users of the research products. The panels prepare project statements (requests for proposals), select contractors, and provide technical guidance and counsel throughout the life of the project. The process for developing research problem statements and selecting research agencies has been used by TRB in managing cooperative research programs since 1962. As in other TRB activities, ACRP project panels serve voluntarily without compensation.

Primary emphasis is placed on disseminating ACRP results to the intended end-users of the research: airport operating agencies, service providers, and suppliers. The ACRP produces a series of research reports for use by airport operators, local agencies, the FAA, and other interested parties, and industry associations may arrange for workshops, training aids, field visits, and other activities to ensure that results are implemented by airport-industry practitioners.

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FOREWORD

By Michael R. Salamone
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ACRP Report 27: Enhancing Airport Land Use Compatibility presents a comprehensive account of issues associated with land uses around airports. The report is a comprehensive resource to both airports and local jurisdictions near airports. Volume 1 provides guidance to help protect airports from incompatible land uses that impair current and future airport and aircraft operations and safety. Volume 2 details 15 case studies that targeted a wide range of airports and land use issues. The case study sites include large commercial service, military, and general aviation airports and were geographically diverse. Volume 2 also offers states and local governments examples and a common basis for establishing zoning that protects the public interest and investment in airports. Volume 3 includes aircraft accident data, a framework for an economic assessment of airport costs, and an annotated bibliography. Volumes 1 and 2 are printed volumes. Volume 3 is located at www.trb.org.

Under ACRP Project 03-03, Mead & Hunt was asked to investigate and present the current breadth and depth of knowledge surrounding land uses around airports and to develop guidance to protect airports from incompatible land uses that impair current and future airport and aircraft operations and safety and constrain airport development. The research focused on providing a summary of current information on the topic of compatible land use near airports. Key tasks in this research included collecting published material related to land uses that are incompatible with federal and/or state land use safety standards for airports; collecting and evaluating state compatible land use legislation, rules and directives to identify commonality; collecting data on aircraft accident locations in the vicinity of airports to establish potential high risk areas; identifying airports where major expansion projects have been delayed or abandoned due to opposition from surrounding communities that arose from a failure to have taken appropriate measures to ensure compatible land uses around those airports; and developing land use compatibility zoning examples incorporating land use and third party risk that state and local governments can use as a basis for their ordinances.

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VOLUME 2 Land Use Survey and Case Study Summaries

PREFACE

This document, produced in fulfillment of ACRP Project 03-03: Enhancing Airport Land Use Compatibility, consists of

- Volume 1: Land Use Fundamentals and Implementation Resources provides information that helps frame the discussion of land use compatibility; provides the background of why land use compatibility near airports is important; and focuses on the various regulations, tools, and techniques that can be utilized to address land use compatibility issues.
- Volume 2: Land Use Survey and Case Study Summaries contains summaries of both the case study survey that was an integral part of the data collection effort, as well as the individual case study summary reports for the 15 case study sites.
- Volume 3: Additional Resources contains some of the resource documents developed to support the information discussed in the first volume. It provides additional detail for those readers who may want to delve deeper into the specific topics of aircraft accident data and third-party risk, as well as the economic methodology for assessing the costs associated with incompatible land uses. An annotated bibliography also is provided which contains approximately 300 entries related to airport land use compatibility

Volumes 1 and 2 are printed volumes. Volume 3 is located at www.TRB.org.

VOLUME 2

Land Use Survey and Case Study Summaries

VOLUME 2, CHAPTER 1

Introduction and Survey Summary

Introduction

Volume 2 summarizes the findings from the airport land use survey and the associated case study efforts that were conducted. As discussed throughout the overall document, incompatible land uses are those that pose a hindrance to safe airport and aircraft operations, as well as those that threaten the safety of persons, both in the air and on the ground. Airports of all sizes and types (commercial, general aviation, military) are faced with the challenge of protecting their infrastructure and airspace from encroachment.

In 2004, the NASAO conducted a land use survey that was distributed to representatives of all 50 state aviation departments to assess their perceptions on land use issues within their respective states. While this was a great starting point for the 03-03 project, the project team believed that a broader approach that reached a larger number of airports across the country would be necessary to thoroughly assess land use concerns today.

While it is known that incompatible land uses are a common concern for airports, the types and degrees of incompatibility are not necessarily known; nor are the strategies airports use to mitigate incompatible land uses. Furthermore, studies such as the one conducted by NASAO do not draw any distinction between multiple types of airports, such as the differences in noise impacts between general aviation and commercial service airports. Another example is the difference between the types of zoning implemented in communities surrounding military bases versus the zoning used in general aviation communities.

Because this information is not readily available, it was necessary to conduct a more detailed land use survey to achieve a better understanding of land use issues near airports of all types in all geographic regions. Consequently, a two-pronged approach was undertaken to query airports about individual land use concerns. A survey effort was initiated to identify possible airports for inclusion in the case studies as well as provide a pool of airports from which to assess land use concerns. A set of case study airports were identified, which provided a significant amount of detailed information related to specific land use issues, tools, and activities that provided an important perspective. Both of these efforts combine to paint a vivid picture of the importance of land use compatibility planning.

Land Use Survey

The survey was conducted to query respondents on several categories including:

- Existing incompatible land uses;
- Existing land use plans, zoning, and strategies;

- Completion of FAR Part 151 noise study, and FAR Part 161 study;
- Noise threshold;
- Land uses that impact development;
- Aircraft restrictions;
- Litigation;
- Community involvement; and
- State guidance.

Two methods of distribution were used to disseminate the survey to individual airports. First a request for participation on the NASAO web page was used to reach as many airports as possible. Second, a select group of airports was identified by the project team as potential respondents, based upon project team experience at these airports. The survey was sent out in hard copy, and an electronic version was available on the web for completion. A total of 124 airports responded to the survey. The responses were collected and analyzed with distinctions between the responses from commercial service, general aviation, and military base operations being made. It is from this analysis that the case study airports were chosen. The following is the summary of the survey responses by question, followed by the individual case study reports. In an effort to keep survey responses anonymous, specific airport names are not used in the survey summary.

Case Studies

Utilizing information collected from the airport survey effort, 15 airports were selected for case study interviews based upon their survey responses. The airports that were chosen display a variety of common themes; however, in many instances they have unique situations related to land use that can be drawn upon. Interviews were conducted through telephone and in-person site visits. During these interviews, the team gathered a more detailed assessment of land use topics at each individual airport. This information was then analyzed and compiled into individual case study reports. The following reports have been developed to summarize the interpretation of each individual airport and situation.

Airport Name - State

- Baltimore/Washington International Thurgood Marshall Airport – MD
- Buckley Air Force Base - CO
- Centennial Airport - CO
- Collin County Regional Airport - TX
- Denver International Airport - CO
- Fort Bragg Army Base and Pope Air Force Base - NC
- Fort Lauderdale Executive Airport - FL
- Independence State Airport - OR
- Indianapolis International Airport - IN
- Naples Municipal Airport - FL
- Naval Air Station Pensacola - FL
- O'Hare International Airport - IL
- Randall Airport - NY
- Sacramento County Airport System - CA
  - Sacramento International Airport
  - Sacramento Executive Airport
  - Mather Airport
  - Franklin Field
  - McClellan Airfield
- Willmar Municipal Airport - MN

Land Use Survey Summary

The survey that was conducted to assess land use compatibility issues identified a number of land use compatibility concerns. Each of the individual questions that were asked of the survey respondents is summarized in the following pages. General themes that were identified from the surveys were utilized in the development of the overall document. These themes covered general issues as well as more detailed topics such as safety related concerns, airspace, and noise sensitivity. Each of these topics is discussed below, along with the summary of each question. It should be noted that consideration was given to the difference between air carrier (AC) airports and general aviation (GA) responses in an attempt to further assess the specific land use concerns that impact the aviation system.

General Findings for Enhancing Airport Land Use Compatibility

Local jurisdictions appear to generally understand and appreciate the overall economic benefit of an airport. Most, however, do not view land use incompatibility issues as truly jeopardizing the existence of the airport. While the overall economic impact of the airport is demonstrated or calculated in some communities through economic impact studies, there typically isn't enough emphasis placed on the incremental economic impacts of incompatible development near airports. Without a clear and quantifiable link between a particular development and a resulting negative economic impact to the airport and more importantly, the community, local jurisdictions often have little motivation to restrict land uses.

Historically, if ample land exists nearby for relocation of an airport, there have been few negative consequences to a local airport owner allowing incompatible uses around an existing facility. Federal and state grants pay for the vast majority of airport relocation and reconstruction costs. In many cases, the airport owner can recover its share of the costs over time through the sale of the former airport lands and redevelopment of these lands with tax-generating uses. Funding for airport relocation may need to be structured so that local airport owners share more of the cost burden or are otherwise motivated not to fall back on relocation as an attractive alternative to good land use planning.

Often local governments do not share proportionately in the risks and benefits of airport land use compatibility. Airports can be penalized for airport land use incompatibility with raised approach minimums or displaced thresholds that limit the utility of the airport. The airport sponsors typically have no ability to require surrounding local jurisdictions to adopt or enforce airport land use compatibility zoning. In some cases, local jurisdictions intentionally use land use guidance to achieve outcomes other than airport protection. For example, by permitting the construction of incompatible uses such as structures with increased densities or tall structures, local governments may restrict runway expansion, limit airport operations, or change airport traffic patterns.

Many communities take their lead from the FAA or their state aviation agencies regarding what needs to be accomplished or implemented at their airport. Since the FAA recommends compatible land use near airports, but has no legal authority to implement or regulate local land use ordinances, that responsibility falls to the state and local jurisdictions. Many state agencies have not taken the initiative to create enabling legislation that empowers airports to develop compatible land use plans and zoning ordinances and, often, extraterritorial zoning power that is critical for effective land use planning. Consequently, many communities and airport sponsors have a very lax view of the need to prevent incompatible land uses.

Many of the airport owners/sponsors that were contacted for interviews acknowledge an active communication with community members (i.e., citizens, governmental bodies, airport association groups, etc.) as instrumental in protecting their airports from incompatible land uses.

Maintaining a proactive, two-way dialog, both formal and informal, regarding airport activities and community development is essential. It allows opportunities for open discussion where citizens and governmental bodies can comment on and are also educated about current and future operational needs and requirements of the airport, as well as community activities and plans. Continued education and information exchange can breed community pride and buy-in (sense of ownership). For example, in the Pensacola case study, the residents of that community are vested in the airbase and feel a sense of pride and ownership of the airport. Residents are aware of the need to zone and protect the airport from incompatible land use that would threaten its viability.

Airspace Related Themes

Many local jurisdictions inherently understand the need to keep tall buildings out of runway approach and departure. Fewer accept the need for strict height controls under the other FAR Part 77 Surfaces, particularly near airports where few flights vary from standard airport traffic patterns. It appears that some local governments interpret the lack of federal requirements to protect the FAR Part 77 Surfaces to mean that adjustments to airport traffic patterns are an acceptable mitigation alternative to height restrictions on individual land uses.

Often, surrounding jurisdictions are cognizant of airspace restrictions for obstructions if they are proposed within a 5 nautical mile (nm) radius of the airport. Seldom do jurisdictions understand that a proposed 50-foot tower located 10 to 30 nm from the airport may exhibit similar obstruction hazards. However, the implication is that the proposed tower may alter the airports' airport traffic pattern, which impacts airport operations, even though alternate flight paths are available. Unfortunately, airports are often not informed about the proposed hazard until the public hearing and by then have little power to negotiate with the jurisdiction against developing this potential hazard and incompatible land use.

Noise Related Themes

Communities and airports nationwide appear to pay the most attention to the noise element of airport land use compatibility. Implementation of noise compatibility land use regulations continues to be contentious and patchwork, particularly where an airport is surrounded by a jurisdiction(s) that is not the airport owner. Many communities find that using the 65 DNL is not adequate to resolve noise impacts or complaints. This is either because of the contrast where ambient noise levels are low, and/or because the DNL calculation, which uses average noise level, does not address the degree of annoyance and disruption caused by single noise events. Some airports/communities, therefore, strive to use the 60 DNL contour as the basis for land use restrictions, which often covers substantially more land area. Without strong state or federal guidance, many local jurisdictions do not have the political will to restrict or condition development in this larger contour area, even where current residents within this contour complain. The FAA or states could help local jurisdictions by providing clear, alternative noise land use compatibility recommendations for areas where ambient noise conditions are low.

Airports often have access to funding associated with noise related issues through Part 150 studies. Utilizing these funds to develop programs, which address land use compatibility through fee-simple acquisition and sound insulation programs, is highly recommended. For example, Indianapolis International Airport utilizes funds from their Part 150 study, as well as passenger facility charges (PFCs) and bond revenues, to do traditional fee-simple acquisition well beyond the 65 DNL contour. This may include sound insulation or more innovative techniques such as right-of-first-refusal agreements, purchase assistance programs, and purchase and redevelopment for more compatible uses. This is complemented by an airport zoning ordinance that provides land use guidance in the vicinity of the Airport.

Safety Related Themes

Land use compatibility as it relates to safety concerns appears to be the aspect of airport land use compatibility that is least understood or accepted by local jurisdictions. More than noise and height, safety compatibility guidance tends to be questioned because of the limited amount of accident data points and the very low probability of airplane crashes. As such, the aviation industry track record on safety works against acceptance of local land use restrictions for safety compatibility. Very few local governments have adopted regulations to limit land use and development density. Even basic safety restrictions, such as prohibition of above-ground storage of flammable materials, are often lacking. Airports are reluctant to bring the issue of safety compatibility to the public's attention for fear of creating adversaries in the community and creating a perception that the local airport is unsafe.

Based upon the study findings, communities are more likely to accept land use restrictions to address safety compatibility around military airfields than civilian airports. It appears that due to the clear economic link and possibility of base closure, as well as, a citizenry with close military ties, there is a greater tendency to support regulations to safeguard the installation.

One of the significant challenges associated with the issue is defining the appropriate level of population intensity or concentration of people in proximity to an airport. The definition of intensity varies from one community to another and from one type of land use to another; therefore, providing clear cut guidelines that affect the use of a structure or general land use is very difficult for local jurisdictions. For example, residential housing is not encouraged in proximity to an airport as noted by the FAA guidance; however, there are airports throughout the nation that have a residential airpark component that allows residential development on or near an airport. Many locations view these airparks as a compatible land use because the home owners, usually pilots, understand the potential danger of living in proximity to an airport. Airparks often provide value for the community with an increased tax base. In addition, residents often sign covenants and/or avigation easements acknowledging the existence of the airport and potential impacts such as noise, risk, and increased accident potential. Additionally, residents are often willing to tolerate more noise exposure and risk than what the FAA guidance provides.

Another example of the population intensity issue and the related development density issue is highlighted by some growth management initiatives such as urban growth boundaries (UGBs). In some states, state legislation requires communities to establish UGBs or their equivalent, in an attempt to encourage in-fill in urbanized areas and limit urban sprawl. This theory, which is often focused on the preservation of agricultural areas and limiting demands for expansion of infrastructure beyond the typical urban development area, has good applications for basic development. However, if an airport is located within the UBG, quite often there is a direct conflict between the compatible land use needs of the airport and the directives of the UBG policies and principles. Consequently, there often are discrepancies between the needs of the local airport and the development needs of the local community.

Summary

Many airport sponsors are often hesitant to pursue the topic of land use compatibility because of the ramifications that can be associated with the process of implementing a compatibility program. For example, the fear of litigation related to a claim of a "taking" is often a prevalent concern. Additionally, there are even instances where inverse condemnation has been argued by property owners when compatibility guidelines have been instituted. The cost of litigation is a significant concern for many airport sponsors, as they try to defend themselves in court against the property owners who view themselves as being wronged. In addition, the intangible costs

associated with the negative publicity that is often associated with these types of cases is a significant concern for many sponsors.

Survey Question Summary

Question 1: Do You Have Land Uses Off Airport Property that Create any of the Following Compatibility Concerns?

In order to evaluate the frequency of land compatibility issues and utilized methods of mitigating incompatible land uses around airports, the Preliminary Interview Assessment Survey began with a general question. Question 1 asked respondents if their commercial service (CS) or general aviation (GA) airports had land uses off airport property that created any of the following compatibility concerns: concentrations of people, residential developments, noise-sensitive land uses other than residential, tall structures, land uses that create visual obstructions, and/or land uses that attract wildlife. Respondents were allowed to provide more than one response, and in doing so they identified each compatibility concern as either not a concern, a minor concern, a moderate concern, or an extensive concern.

The majority of commercial service airport responses identified concentrations of people to be a moderate concern; residential developments to be a moderate concern; noise-sensitive land uses to be a minor concern, tall structures to be a minor concern, land uses that create visual obstructions to be either no concern or a minor concern; and land uses that attract wildlife to be a minor concern. The majority of general aviation responses identified concentrations of people to be moderate concern, residential developments to be a moderate concern, noise-sensitive land uses to be of no concern, tall structures to be a minor concern, land uses that create visual obstructions to be of no concern, and land uses that attract wildlife to be a minor concern. Tables 2.1-1–2.1-4 illustrate the survey responses for Question 1. Organized by level of concern, these tables identify the percentage of responses to each compatibility concern.

Table 2.1-1. Question 1 Survey Results – No Concern.

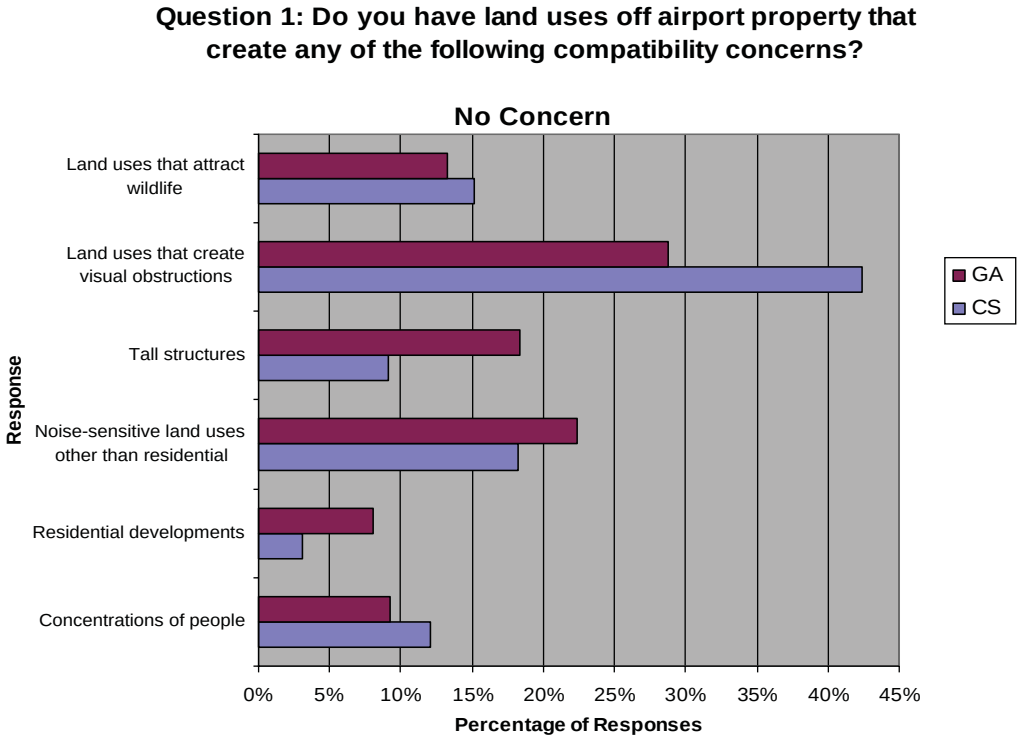


Table 2.1-2. Question 1 Survey Results – Minor Concern.

Question 1: Do you have land uses off airport property that create any of the following compatibility concerns?

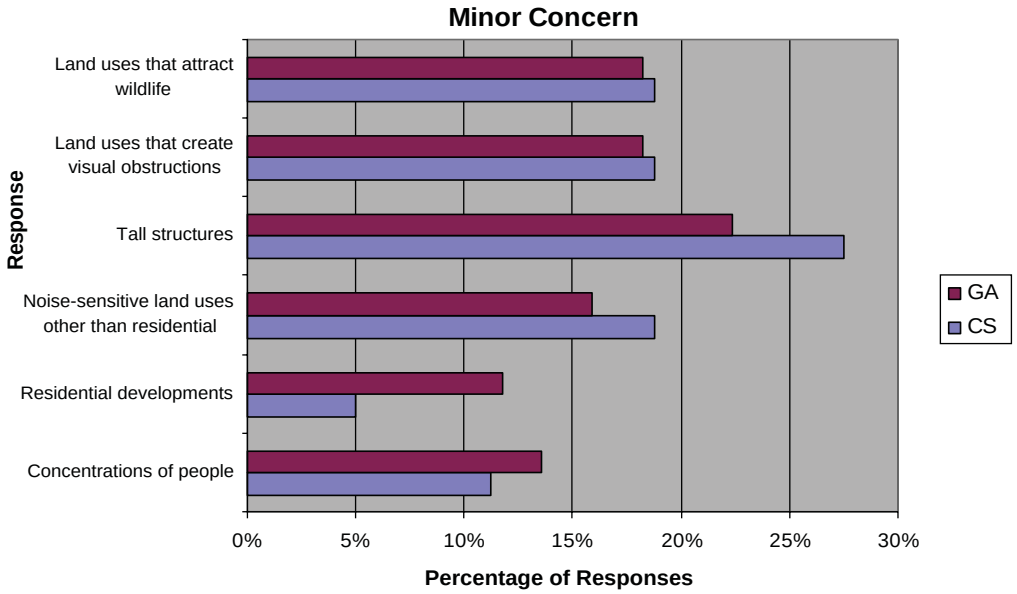


Table 2.1-3. Question 1 Survey Results – Moderate Concern.

Question 1: Do you have land uses off airport property that create any of the following compatibility concerns?

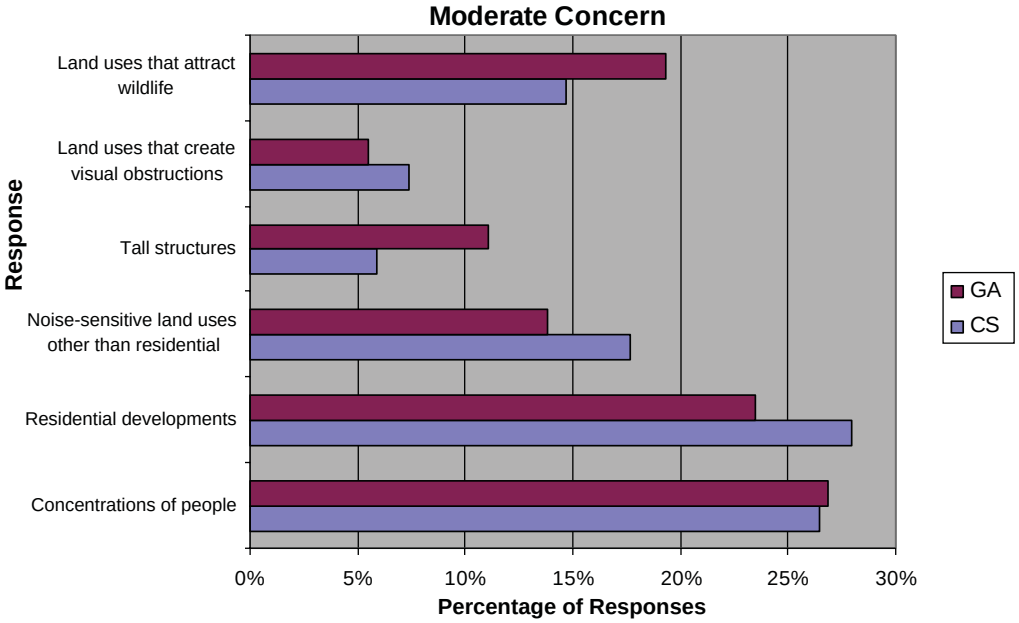
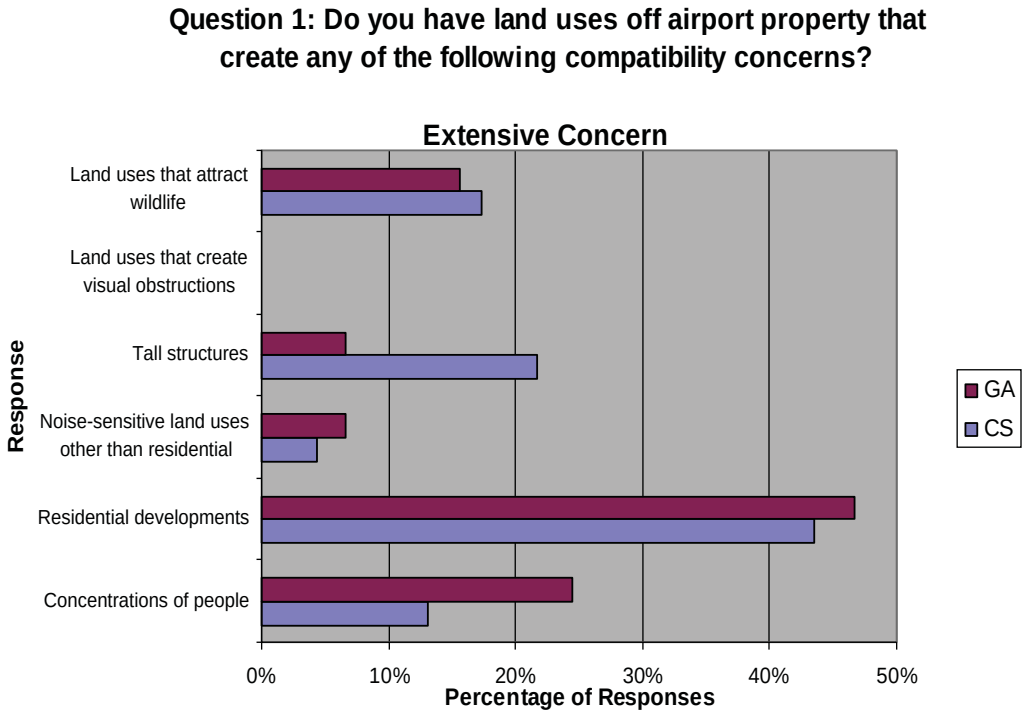


Table 2.1-4. Question 1 Survey Results – Extensive Concern.



Question 2: Do You Have any Formal Land Use Compatibility Plans for the Area Surrounding the Airport, and if so, What Type?

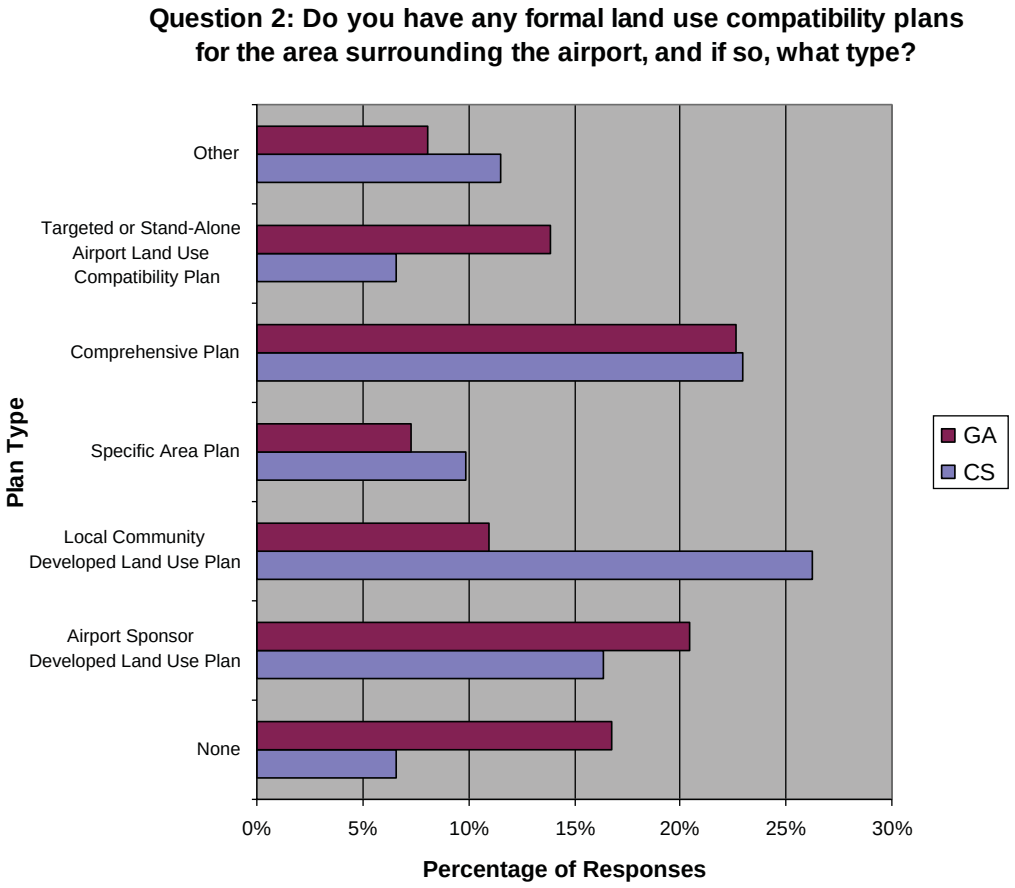
Question 2 asked respondents whether they have any formal land use compatibility plans for the area surrounding the airport, and if so, what type. More than one response was possible, and respondents could answer that they had no plan, an airport sponsor-developed land use plan, a local community-developed land use plan, a specific area plan, a comprehensive plan, a targeted or stand-alone airport land use compatibility plan, and/or another type of plan.

Commercial service respondents identified a local community-developed land use plan (26% of responses), a comprehensive plan (23% of responses), and/or an airport sponsor-developed land use plan (16% of responses) to be the most common methods of formal land use compatibility plans for the area surrounding their airports. General aviation respondents identified a comprehensive plan (23% of responses) and an airport sponsor-developed land use plan (20% of responses) to be the most common forms of formal land use compatibility plans for the area surrounding their airports. Additionally, general aviation responses included 17% that do not have any formal land use compatibility plans. Table 2.1-5 illustrates the responses to Question 2.

Question 3: What is Regulated by Zoning or Other Land Use Regulations?

Having identified respondents' land use compatibility concerns in Question 1 and the types of land use plans utilized in Question 2, Question 3 followed up to identify whether the respondents employ zoning or land use regulatory measures to achieve land use compatibility between their airports and the surrounding area. Question 3 specifically asked respondents whether zoning or land use regulations in the areas surrounding their airports regulated concentrations of people, residential or other noise-sensitive land uses, height/tall structures, visual obstructions, wildlife attractants, and/or other compatibility concerns. More than one response was possible.

Table 2.1-5. Question 2 Survey Results.



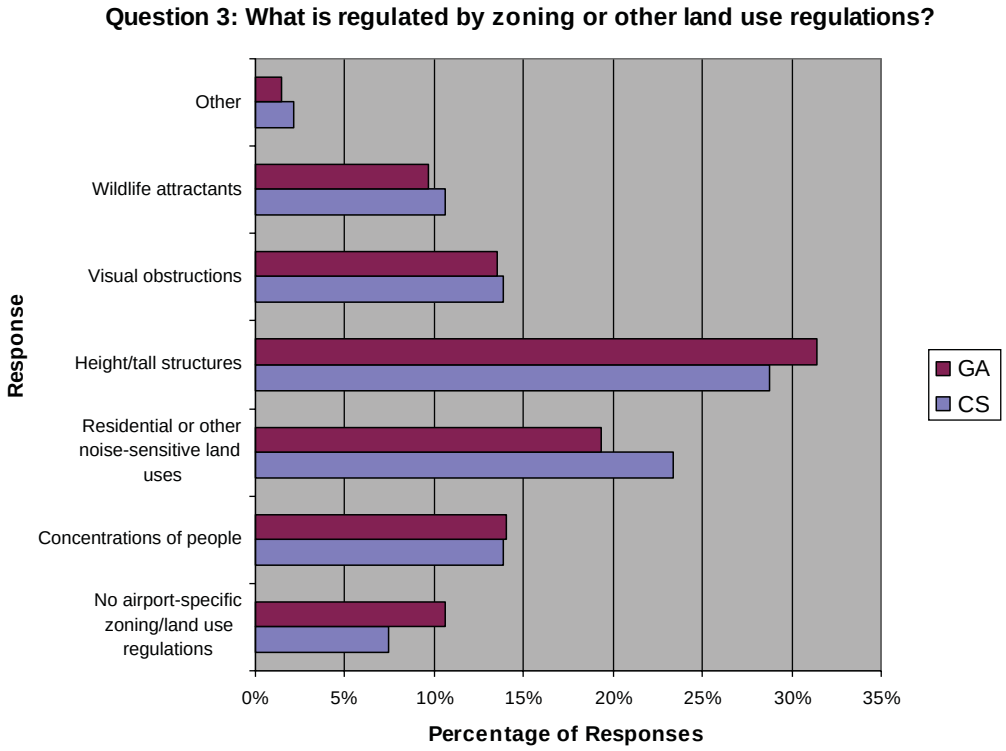
Commercial service airports identified height/tall structures (29% of responses) and residential or other noise-sensitive land uses (23% of responses) to be the most regulated land uses in the areas surrounding their airports. Similarly, general aviation respondents identified height/tall structures (31% of responses) and residential or other noise-sensitive land uses (19% of responses) to be the most regulated land uses in the areas surrounding their airports. Table 2.1-6 illustrates the responses to Question 3.

Question 4: What Preservation and Mitigation Strategies are Utilized by the Airport and/or Local Jurisdictions to Achieve Land Use Compatibility?

Extending the questions already posed and encompassing both planning and zoning measures, Question 4 inquired about the existing measures commercial service and general aviation airports use to minimize land use compatibility concerns. Question 4 specifically asked respondents what preservation and mitigation strategies their airport and/or local jurisdictions utilized to achieve land use compatibility. More than one response was possible, and respondents could report that planning techniques, zoning ordinances, deed restrictions, land acquisition, avigation easements, noise easements, operational restrictions, disclosure notices, transfer/purchase of development rights, nonsuit covenants, vegetation and wildlife management, and/or other strategies are used.

The commercial service airports and general aviation airports identified, with similar frequencies, the most prevalent preservation and mitigation strategies. Commercial service airports most frequently identified planning techniques (15% of responses), avigation easements (15% of responses), zoning ordinances (14% of responses), and land acquisition

Table 2.1-6. Question 3 Survey Results.



(14% of responses). Similarly, general aviation airports most frequently identified planning techniques (18% of responses), zoning ordinances (17% of responses), avigation easements (16% of responses), and land acquisition (13% of responses). Table 2.1-7 illustrates the responses to Question 4.

Question 5: Have You Completed a FAR Part 150 Noise Study? Do You Have a Noise Compatibility Program in Place? Has it Been Helpful in Addressing Land Use Compatibility?

Although noise-sensitive land uses were not identified to be of extensive concern in Question 1, they are one of the most regulated land use concerns by both commercial service and general aviation airports as assessed in Question 3. Because noise-sensitive land uses should be considered in land use compatibility plans to balance operational needs with impacts to surrounding areas, Question 5 asked respondents whether they had completed a FAR Part 150 Noise Study. Respondents were also asked whether they have a noise compatibility program in place and whether the FAR Part 150 Noise Study has been helpful in addressing land use compatibility.

Sixty-two percent (62%) of commercial service respondents reported having completed a FAR Part 150 Noise Study, while only 25% of general aviation respondents have completed the FAR Part 150 Noise Study. Sixty-seven percent (67%) of commercial service respondents reported that they do have a noise compatibility study in place; of those commercial service respondents who answered the follow up question "has it been helpful in addressing land use compatibility," 82% responded affirmatively. Twenty-one percent (21%) of general aviation respondents reported having a noise compatibility program in place, yet only 17% of those respondents replied that it has been helpful in addressing land use compatibility. Tables 2.1-8–2.1-10 illustrate the responses to Question 5.

Table 2.1-7. Question 4 Survey Results.

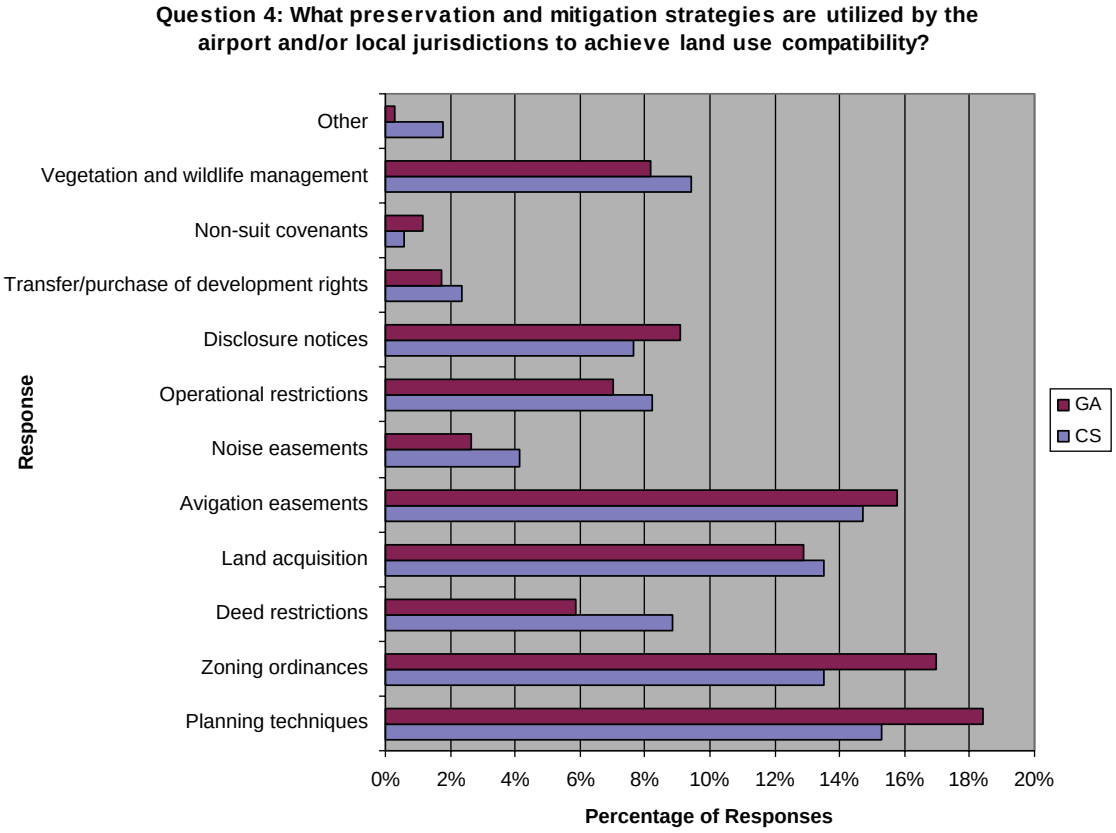


Table 2.1-8. Question 5a Survey Results.

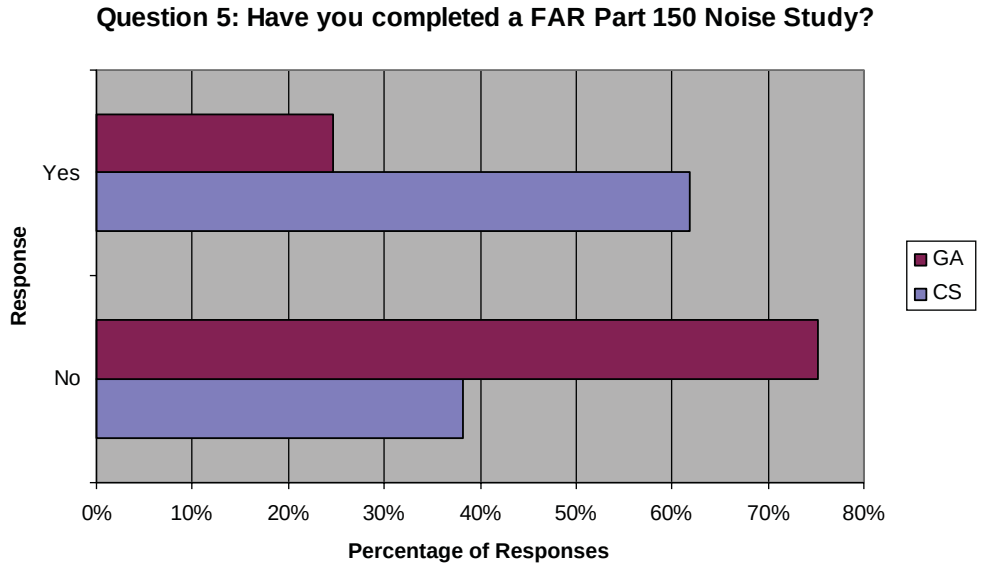
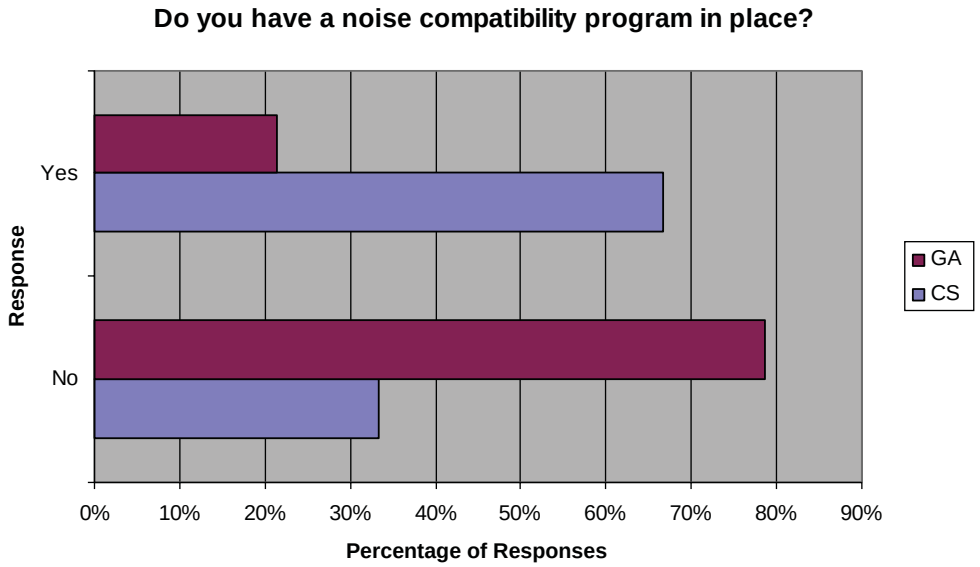


Table 2.1-9. Question 5b Survey Results.



Question 6: Have You Initiated a FAR Part 161 Study?

Question 6 extends the survey's inquiry into the respondents' considerations of noise-sensitive land uses in land use compatibility planning. This question asked respondents whether they have initiated a FAR Part 161 Study. Seventy-six percent (76%) of commercial service respondents and 84% of general aviation respondents replied that they have not completed a FAR Part 161 Study. Table 2.1-11 illustrates the responses.

Question 7: What Criteria or Threshold Does Your Airport Utilize to Delineate the Noise Compatibility Boundary?

Again, furthering an evaluation of noise-compatibility planning, Question 7 asked respondents what criteria or threshold their airport utilizes to delineate the noise-compatibility boundary. Respondents could reply 65 DNL, 55 DNL, or other; 82% of commercial service respon-

Table 2.1-10. Question 5c Survey Results.

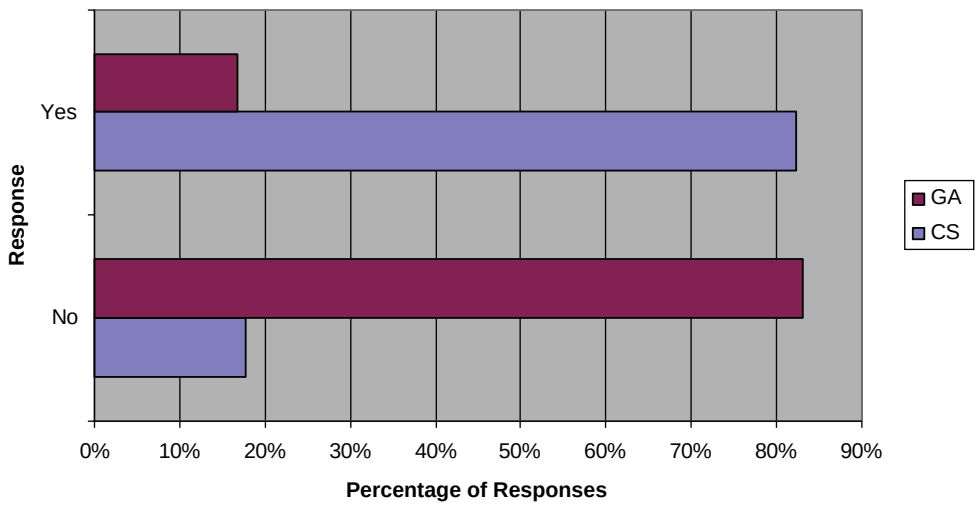
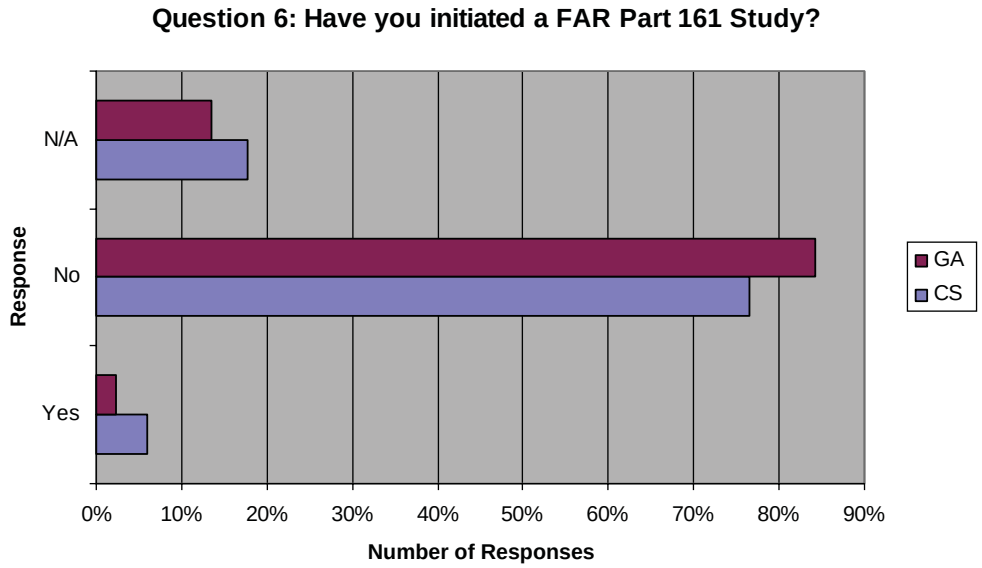


Table 2.1-11. Question 6 Survey Results.

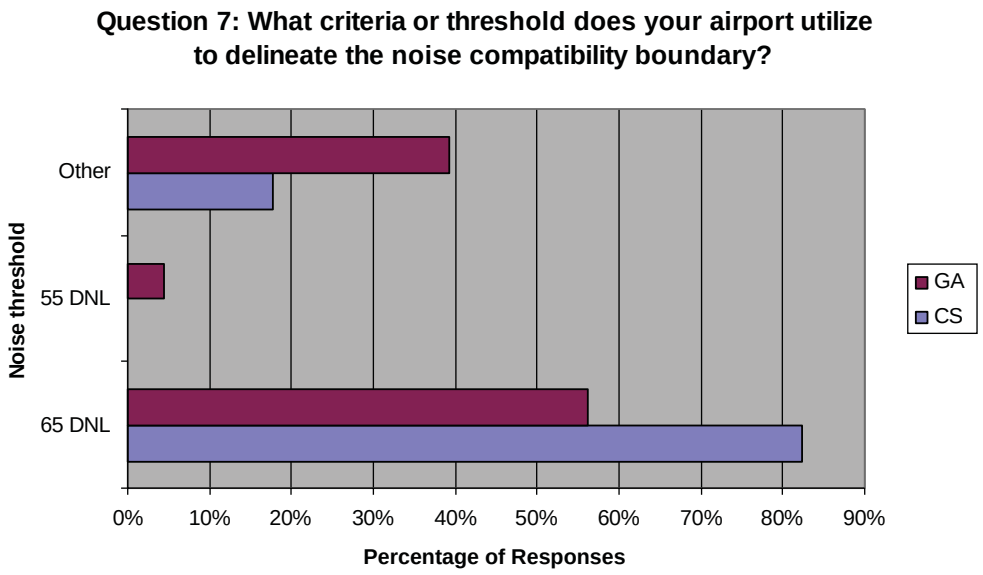


dents and 56% of general aviation respondents replied that their airports utilize a 65 DNL threshold. Table 2.1-12 illustrates the responses to Question 7.

Question 8: Have any Land Uses Stopped or Delayed Airport Development from Taking Place or Impacted Airport Operations?

In order to evaluate the significance of planning for land use compatibility, Questions 8-10 consider land use issues that have arisen and instigated problems that stall airport development, interfere with operational activities, and result in litigation. Question 8 asked respondents whether any land use issues have stopped or delayed airport development from taking place or impacted their airport operations. Forty-one (41%) of commercial service respondents and 38% of general aviation respondents replied affirmatively to the question. Those respondents who have had land use issues stop or delay airport development or impact airport operations were asked what

Table 2.1-12. Question 7 Survey Results.



type of development or operation was impacted. More than one response was possible, including runway/taxiway development, terminal development, approach protection, aircraft operations, and/or other. The most frequently impacted development for both commercial service and general aviation airport respondents was runway/taxiway development (47% of commercial service responses and 37% of general aviation responses).

Those respondents who have not had land use issues stop or delay airport development or impact airport operations were asked why their airport development has not been impacted. More than one response was allowed, including lack of development near the airport, local community support, airport acquisition of property, strong regulations that promote compatibility, other, and/or no airport development has been required in the past X years. For commercial service respondents, airport acquisition of property (29% of responses) and local community support (27% of responses) were the most frequently cited reasons for lack of impact on airport development. Similarly, general aviation responses reveal that local community support (29% of responses) and lack of development near the airport (24% of responses) were the most frequently cited reason for lack of impact on airport development. Tables 2.1-13–2.1-15 illustrate the responses to Question 8.

Additionally, respondents were given the opportunity to provide comments specific to their experiences, regarding both the delays of airport development or operations and the lack of developmental and operational delays. Reflecting the answers and percentages provided above, the majority of comments about delays reflected frequency of runway and taxiway development concerns. For instance, one airport reported that "an adjacent municipality filed lawsuit against the airport sponsor restricting runway extension and strengthening. The recent Master Plan Update was placed on hold due to community pressures." Another airport reported delays before a new runway was built, but that the airport won all related litigation. A third airport reported a recent issue with relocating a cemetery in the path of a runway.

Of those respondents who commented regarding minimal or no delays due to land uses, comments reflected the lack of development near the airport and the lack of recent airport development. Nonetheless, some airports acknowledged that the lack of development near the airport may not be the case in the future. For instance, one airport reported that "there has been very little development around the airport in the past, but this situation is rapidly changing and this part of the survey is very pertinent to our future." Similarly, another airport reported that "the airport has been able to acquire property needed to develop up to this point. The new ultimate development plan in the most recent

Table 2.1-13. Question 8a Survey Results.

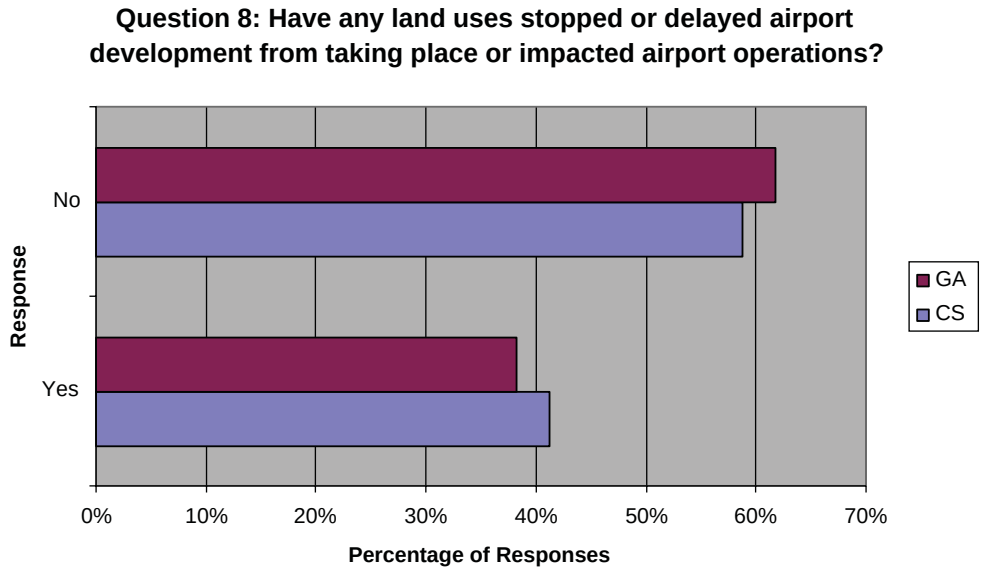


Table 2.1-14. Question 8b Survey Results.

If yes, what type of development or operation was impacted?

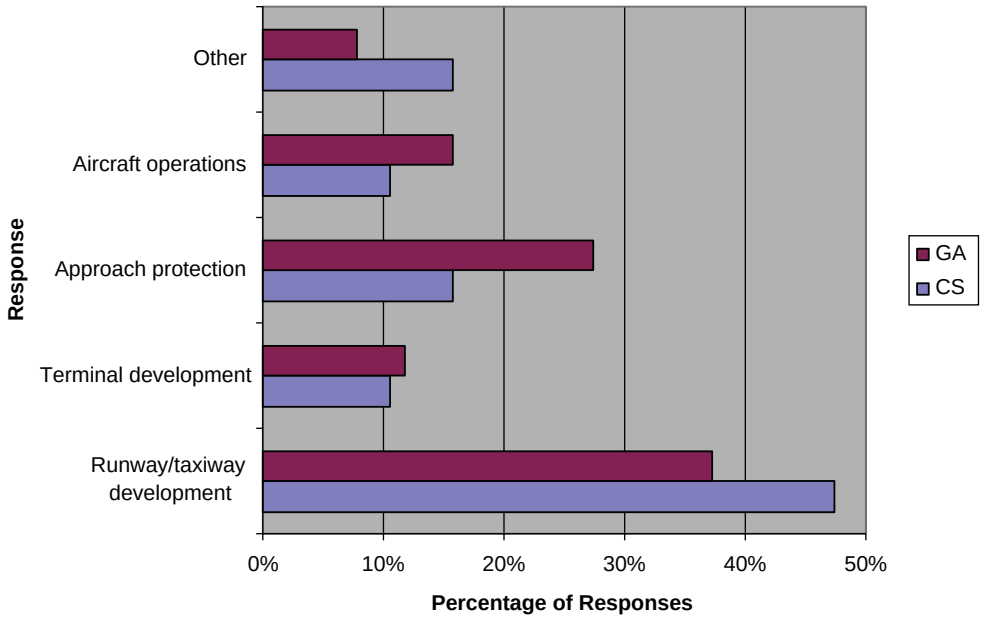


Table 2.1-15. Question 8c Survey Results.

If no, why has airport development not been impacted?

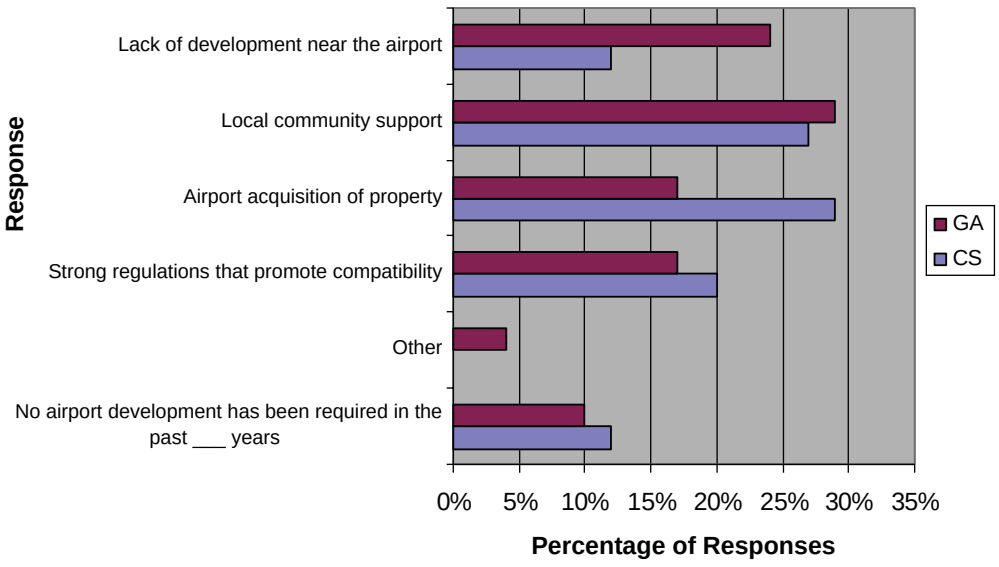
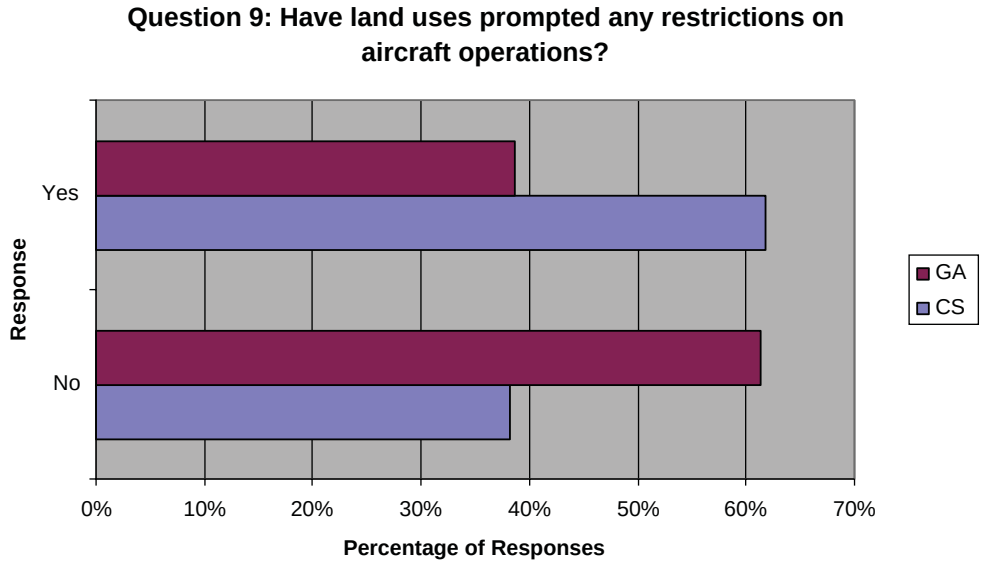


Table 2.1-16. Question 9a Survey Results.

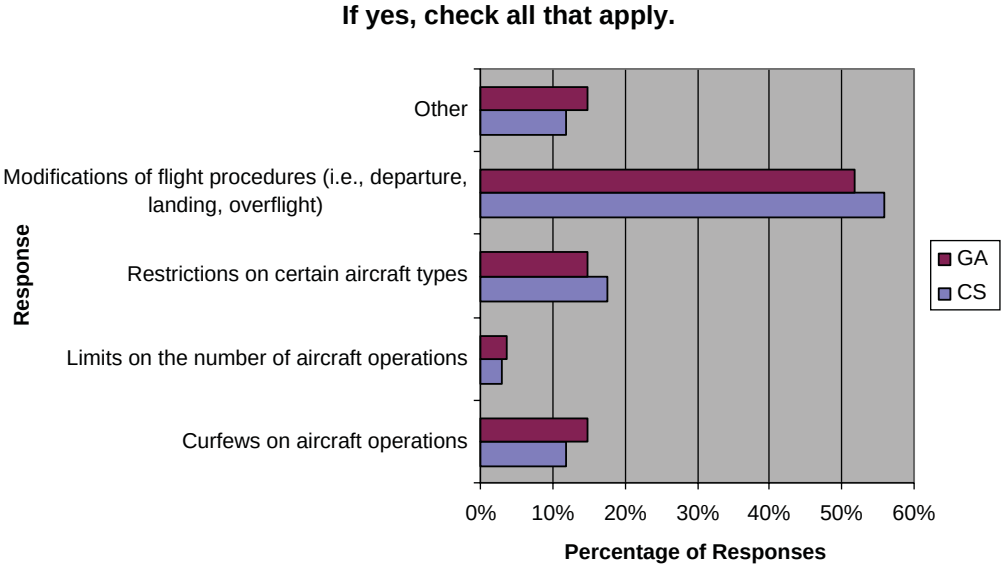


Master Plan, however, will require much more land acquisition." And a third airport commented about the lack of development near their airport, "so far . . . it [development] is coming."

Question 9: Have any Land Uses Prompted any Restrictions on Aircraft Operations?

Question 9 asked respondents whether land use issues have prompted any restrictions on aircraft operations. Sixty-two percent (62%) of commercial service respondents and only 39% of general aviation respondents replied affirmatively to the question. Those who responded affirmatively were also asked to check which restrictions on aircraft operations applied, including curfews on aircraft operations, limits on the number of aircraft operations, restrictions on certain aircraft types, modifications of flight procedures, and/or other restrictions. More than one response was possible, with modifications of flight procedures (i.e., departure, landing, and overflight) being the most frequently cited restriction for both commercial service respondents (56% of responses) and general aviation respondents (52% of responses). Tables 2.1-16 and 2.1-17 illustrate the responses to Question 9.

Table 2.1.-17. Question 9b Survey Results.



Respondents were encouraged to provide comments specific to their experiences and enumerate the types of restrictions they have imposed. These comments reflect the frequency of the "modifications on flight procedures" answer to Question 9, and specify the use of restrictions to mitigate noise. For instance, one commercial service airport responded that "the airport participates in a "fly quiet" voluntary program as part of approved recommendations in current Part 150. The use of preferential runways during evening hours with minor flight departure turn-out procedures is also utilized." A second commercial airport commented, "We have a noise rule on one of our runways which prohibits aircraft which exceed 90 db. It thus restricts certain types of aircraft which exceed that limit. We have a preferential runway use for nighttime operations." Other responses include numerous noise abatement measures such as changes to IFR routing and nighttime runway closure; voluntary noise abatement procedures; operational procedures as approved in FAR Part 150; and nonstandard flight patterns and the use a preferential runway program.

Question 10: Has Your Airport Been Involved in any Litigation Related to Land Use Compatibility Issues?

Question 10 asked respondents if their airport has been involved in any litigation related to land use compatibility issues. Fifty-three percent (53%) of commercial service respondents and 17% of general aviation respondents responded affirmatively. These respondents were then asked to identify which types of land use compatibility issues resulted in litigation, including land uses with high concentrations of people, noise-sensitive land uses, height/tall structures, visual obstructions, wildlife attractants, and/or other land use compatibility issues. More than one response was allowed. For both commercial service and general aviation respondents, noise-sensitive land uses were the most frequently cited land use issue resulting in litigation, comprising 64% of commercial service responses and 56% of general aviation responses. (Tables 2.1-18 and 2.1-19)

Comments specific to the litigation the airports have experienced was also solicited. The majority of comments reflected the frequency of noise-oriented litigation and the significance of mitigating noise-sensitive land uses. For instance, several airports reported that "preexisting residential land uses sued over airport noise. Departure procedures were adopted to avoid overflights." One general aviation airport reported that after their runway was extended based on master plan recommendations, a single residential property, which was originally outside the 65 DNL, complained and sued because of noise issues. This general aviation airport lost the lawsuit. In another case, litigation was filed against a commercial service airport because a residential

Table 2.1-18. Question 10a Survey Results.

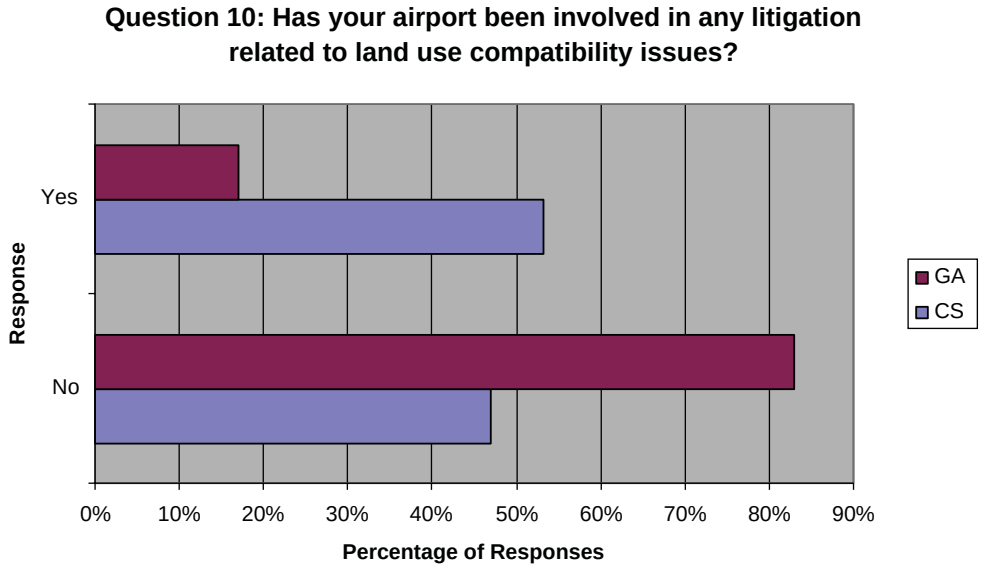
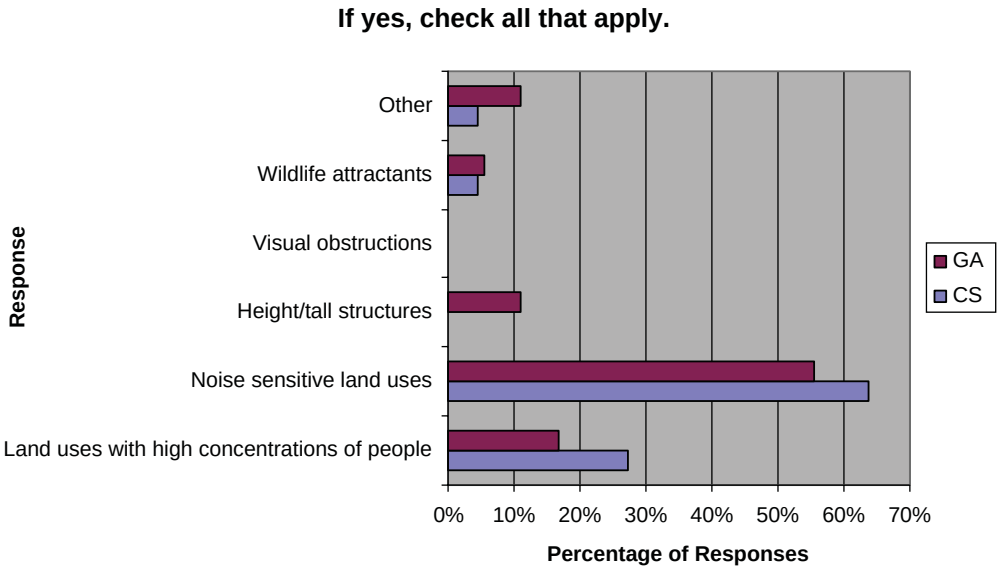


Table 2.1.-19. Question 10b Survey Results.



subdivision within the Airport Noise Zone was denied permission to build. In this case, the airport won and the residential development was never constructed. Another commercial service airport has experienced inverse condemnation noise lawsuits by individual homeowners, all of which the airport has won and no restrictions have been imposed.

Question 11: How is Your Airport Informed of Development Proposals or Decisions in the Surrounding Communities that Could Affect Land Use Compatibility?

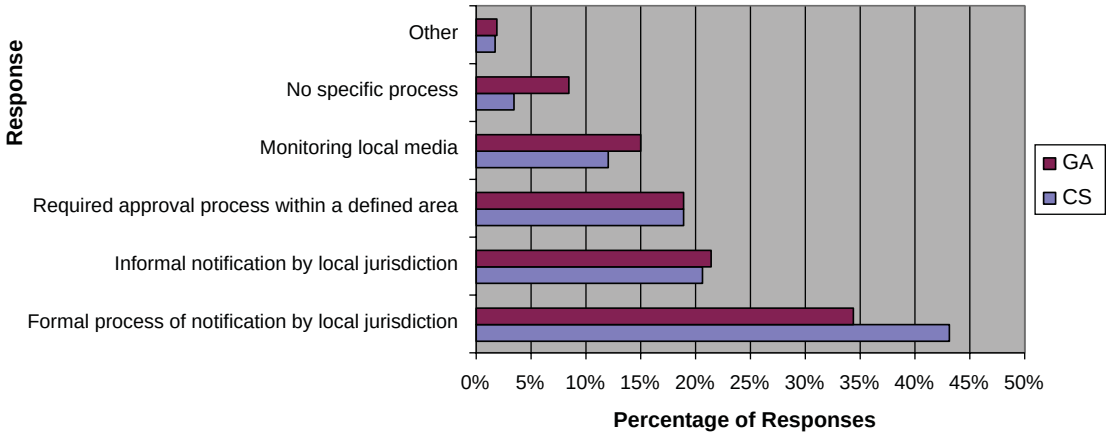
Because communication between multiple jurisdictions is necessary for successful land use compatibility planning in the areas surrounding airports, Question 11 asked respondents how their airport is informed of development proposals or decisions in the surrounding communities that could affect land use compatibility. More than one response was possible, and respondents could choose a formal process of notification by local jurisdiction, informal notification by local jurisdiction, required approval process within a defined area, monitoring local media, no specific process, and/or other. For both commercial service and general aviation airports, "formal process of notification by local jurisdiction" was the most frequently cited method of keeping informed about development proposals and decisions. This response constituted 43% of commercial service responses and 34% of general aviation responses. Table 2.1-20 illustrates the responses to Question 11.

Question 12: Are There Open Lines of Communication between Surrounding Municipalities, the Public, and the Airport Regarding Land Use Compatibility Issues?

In addition, Question 12 asked respondents whether there are open lines of communication between surrounding municipalities, the public, and their airport regarding land use compatibility issues. Ninety-seven percent (97%) of commercial service respondents and 80% of general aviation respondents replied affirmatively. These respondents were then asked what types of communication methods they use. More than one response was acceptable, including informal communication between agency staff, dedicated meetings/workshops, representation on boards within the local community, web sites, newsletters, press releases, standing community liaison group, and/or other types of communication. The most frequently cited communication for commercial service airports was informal communication between agency staff (28%) and dedicated meetings/workshops (19%). Similarly, the most frequently cited general aviation responses

Table 2.1-20. Question 11 Survey Results.

Question 11: How is your airport informed of development proposals or decisions in the surrounding communities that could affect land use compatibility?



included informal communication between agency staff (31%), representation on boards within the local community (18%) and dedicated meetings/workshops (17%). Tables 2.1-21 and 2.1-22 illustrate these findings.

Respondents who replied that there are not open lines of communication between surrounding municipalities, the public, and the airport were asked what limits their communication. Possible answers, of which they could give more than one, included multiple political jurisdictions, community distrust or opposition to airport activity, community distrust or opposition to airport development, community distrust of airport, opposition by local elected officials to airport activity or development, distrust by local elected officials of the airport, reluctance to share information, concerns of potential litigation, and/or other. Commercial services respondents most frequently cited multiple political jurisdictions (29%) and reluctance to share information (29%) as

Table 2.1-21. Question 12a Survey Results.

Question 12: Are there open lines of communication between surrounding municipalities, the public, and the airport regarding land use compatibility issues?

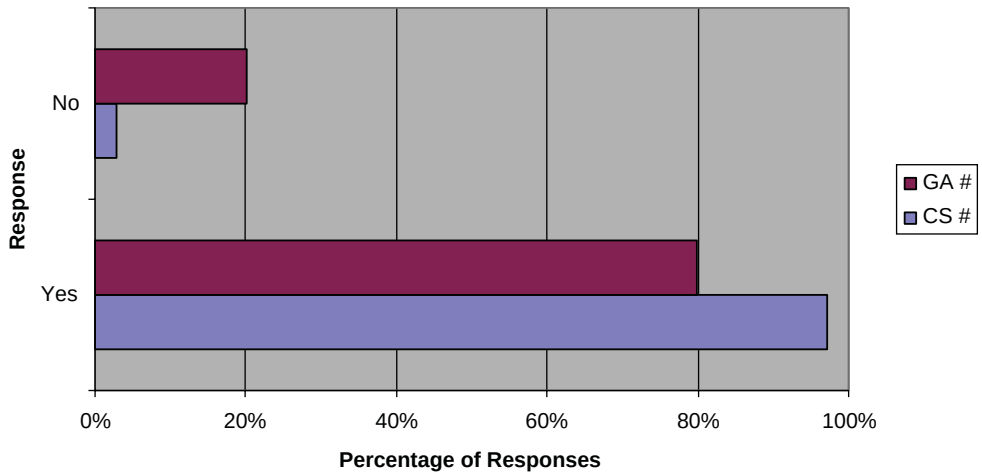
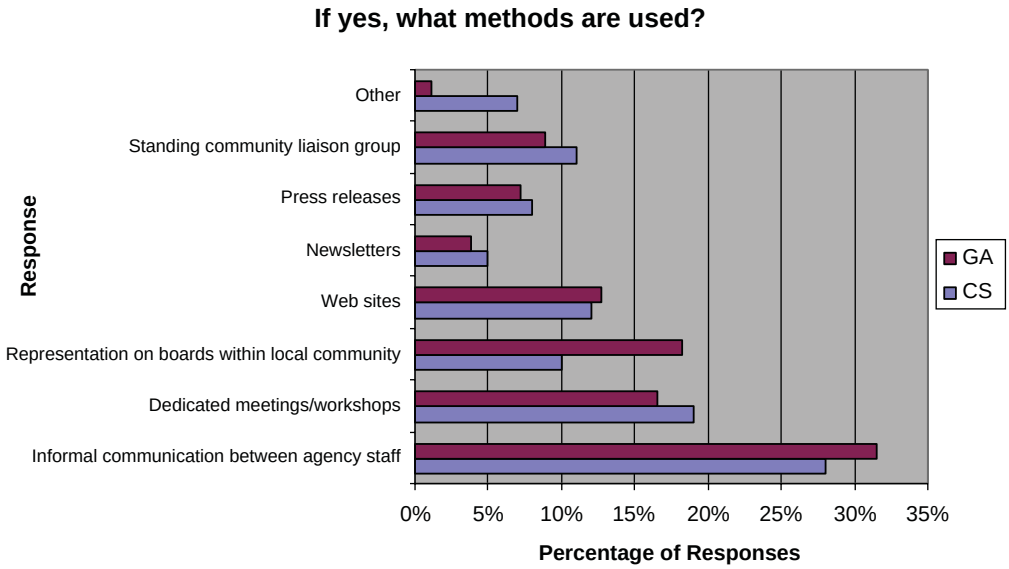


Table 2.1-22. Question 12b Survey Results.



limiting communication between municipalities, the public, and the airport. General aviation respondents most frequently cited multiple political jurisdictions (26%) and opposition by local officials to airport activity or development (15%). These findings are illustrated in Table 2.1-23.

Question 13: Does Your State Aviation Agency Provide Support or Direction to Establish Compatible Land Use Planning, what Methods are Used?

Guidance and support from state and federal aviation agencies is necessary for successful planning that minimizes or prevents incompatible land use in the areas surrounding airports. Therefore, Question 13 asked respondents whether their state aviation agency provides support or direction to establish compatible land use planning. Only 15% of commercial service respondents and 7% of general aviation respondents replied "yes." These respondents were then asked the follow up question of what methods are used. More than one response was possible, including policies and regulations related to land use, guidance documents, for-

Table 2.1-23. Question 12c Survey Results.

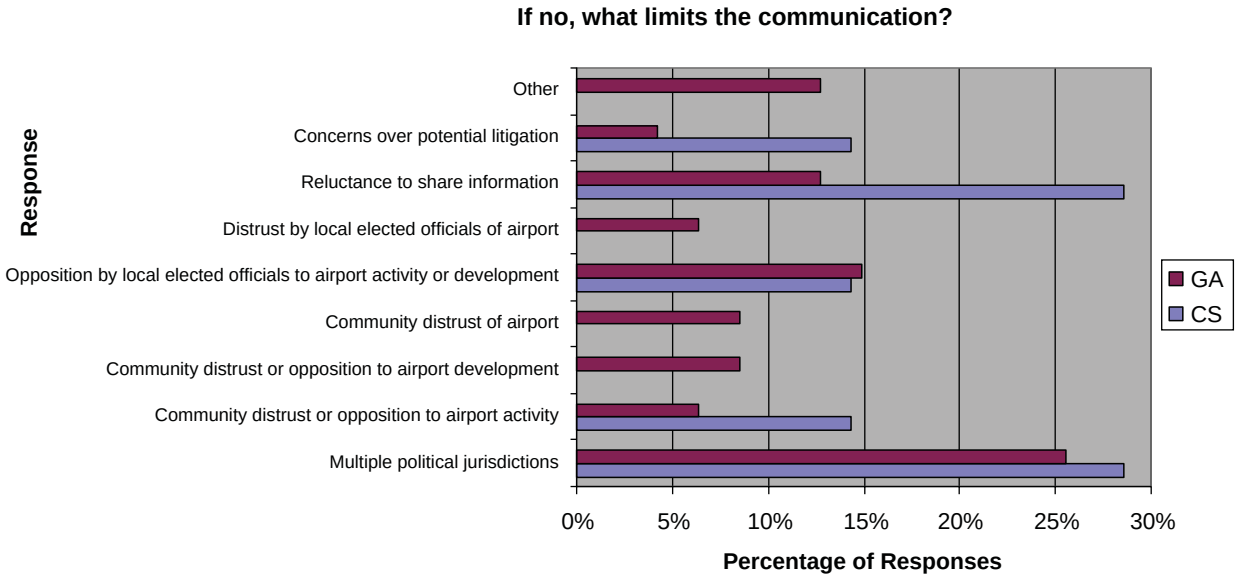
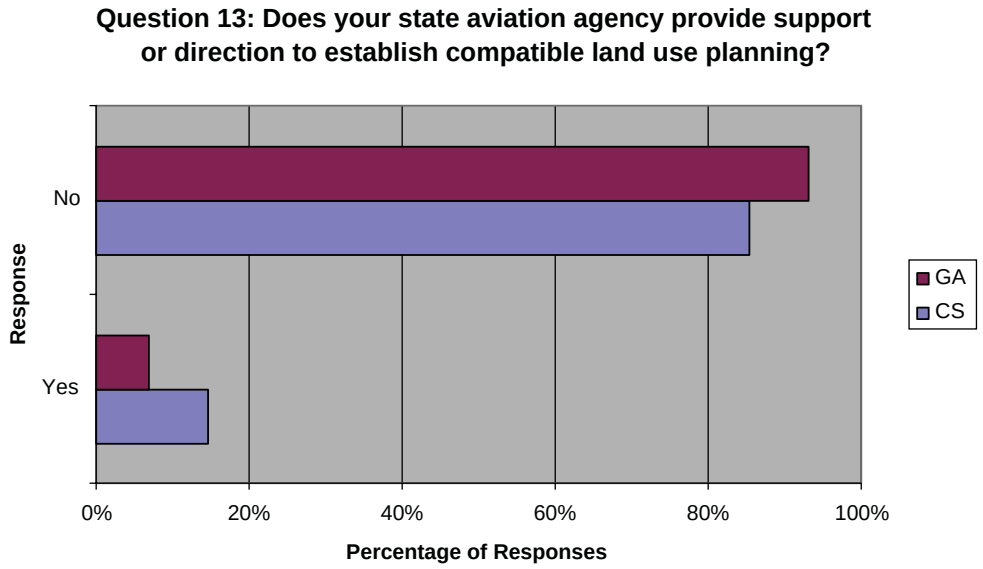


Table 2.1-24. Question 13a Survey Results.



mal requirement for local regulations or development review, funding opportunities for land use compatibility planning and programs, and/or general support of land use decisions. Commercial service respondents most frequently cited policies and regulations related to land use (29%) and guidance documents (27%), while general aviation respondents most frequently cited guidance documents (28%), polices and regulations related to land use (24%), and general support of land use decisions (24%). These finding are illustrated in Tables 2.1-24 and 2.1-25.

Question 14: Do the Various FAA Offices Provide Enough General Guidance and Support to Prevent Incompatible Land Use?

Additionally, Question 14 asked respondents whether the various FAA offices provide their airports with enough general guidance and support to prevent incompatible land use. Fifty-six percent (56%) of commercial service and 40% of general aviation respondents replied affirmatively. (Table 2.1-26)

Table 2.1-25. Question 13b Survey Results.

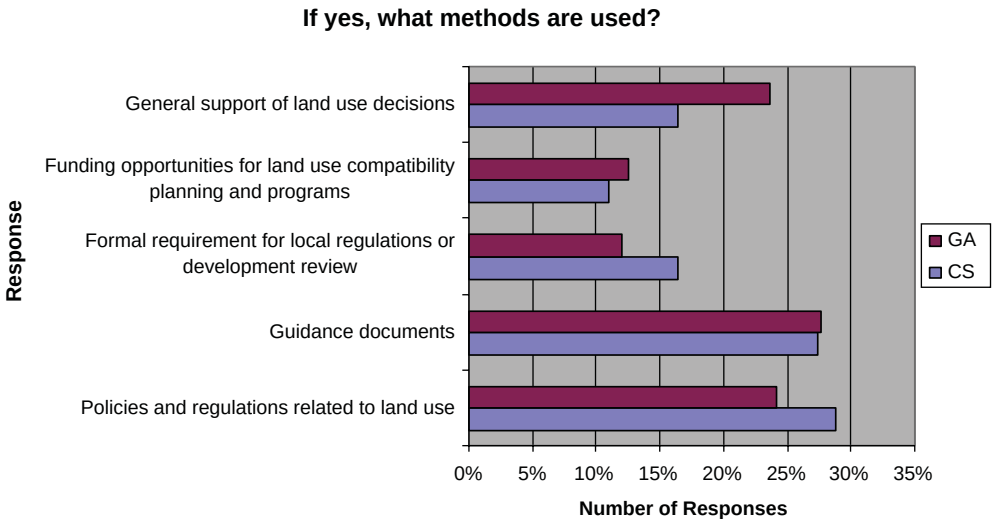
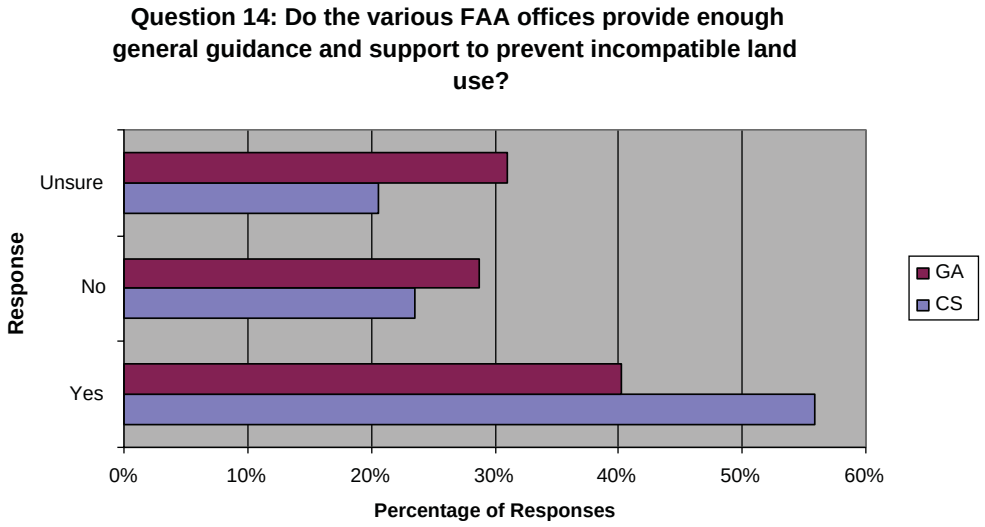


Table 2.1-26. Question 14 Survey Results.



Question 15: Does the FAA Provide Enough Guidance and Support to Prevent Incompatible Land Uses through the Following Actions?

In a follow up question to number 14, the final question of the survey asked respondents whether the FAA provides enough guidance and support to prevent incompatible land uses through the following actions. Respondents could identify more than one method of FAA guidance and support, including general support of land use decisions, guidance documents (Advisory Circulars and Orders), policies related to land use, funding opportunities, master planning efforts, records of decisions for environmental actions, airspace review (FAR Part 77, FAA Form 7460), wildlife hazard assessments, FAR Part 150 Noise Studies and noise compatibility programs. Of those respondents who replied yes to the question of sufficient FAA guidance and support, airspace review (13% of commercial service responses and 15% of general aviation responses), guidance documents (14% of commercial service responses and 14% of general aviation responses), and master planning efforts (12% of commercial service responses and 14% of general aviation responses) were the most frequently cited method of FAA guidance and support.

Of commercial service respondents who replied that the FAA does not provide sufficient guidance, general support of land use decisions (16% of responses) and policies related to land use (16% of responses) were the most frequently cited methods of insufficiency, while general aviation respondents more frequently cited funding opportunities (20% of responses) and general support of land use decisions (18% of responses). Commercial service respondents who replied that they were unsure of the sufficiency of FAA guidance and support, most frequently cited records of decisions for environmental actions (17% of responses), policies related to land use (14% of responses), and funding opportunities (14% of responses) as the methods of which they were unsure the FAA provided enough guidance and support. General aviation respondents most frequently cited records of decisions for environmental actions (17% of responses), wildlife hazard assessments (15% of responses), and FAR Part 150 Noise Studies and noise compatibility programs (15% of responses) as the methods of which they were unsure the FAA provided enough guidance and support. Tables 2.1-27–2.1-29 illustrate the responses to Question 15.

Table 2.1-27. Question 15 Survey Results – Yes.

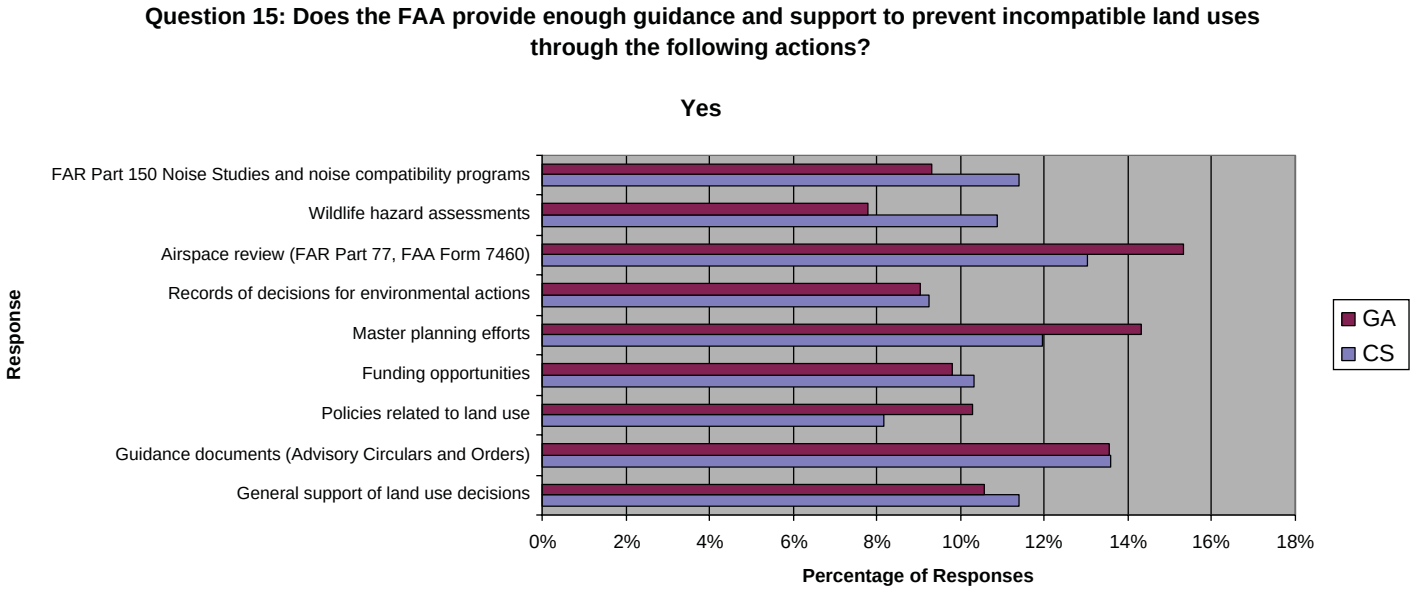


Table 2.1-28. Question 15 Survey Results – No.

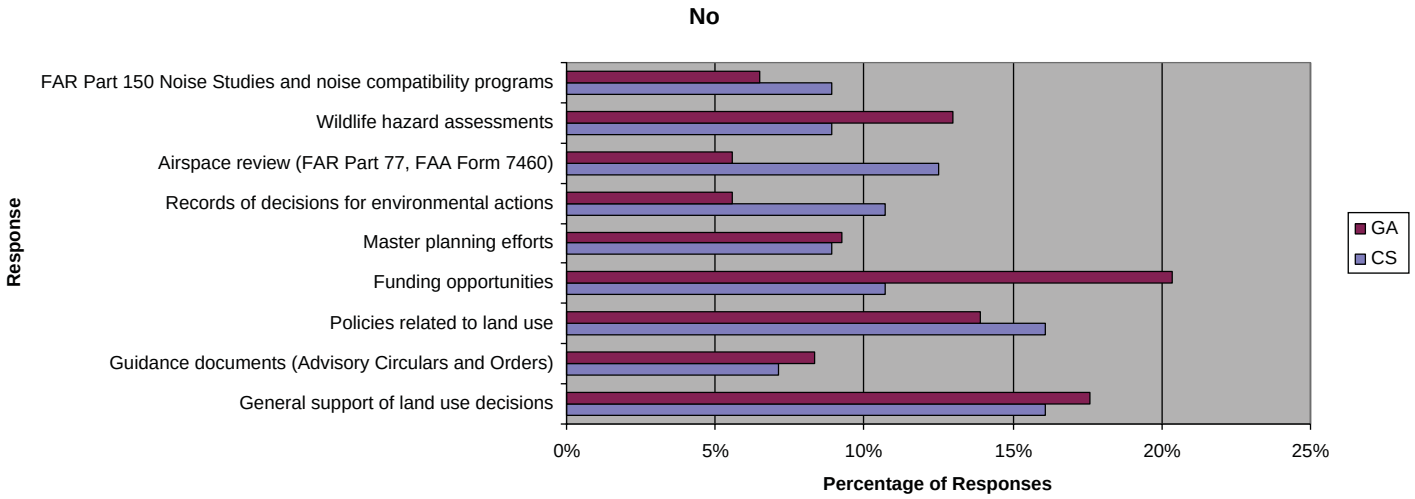
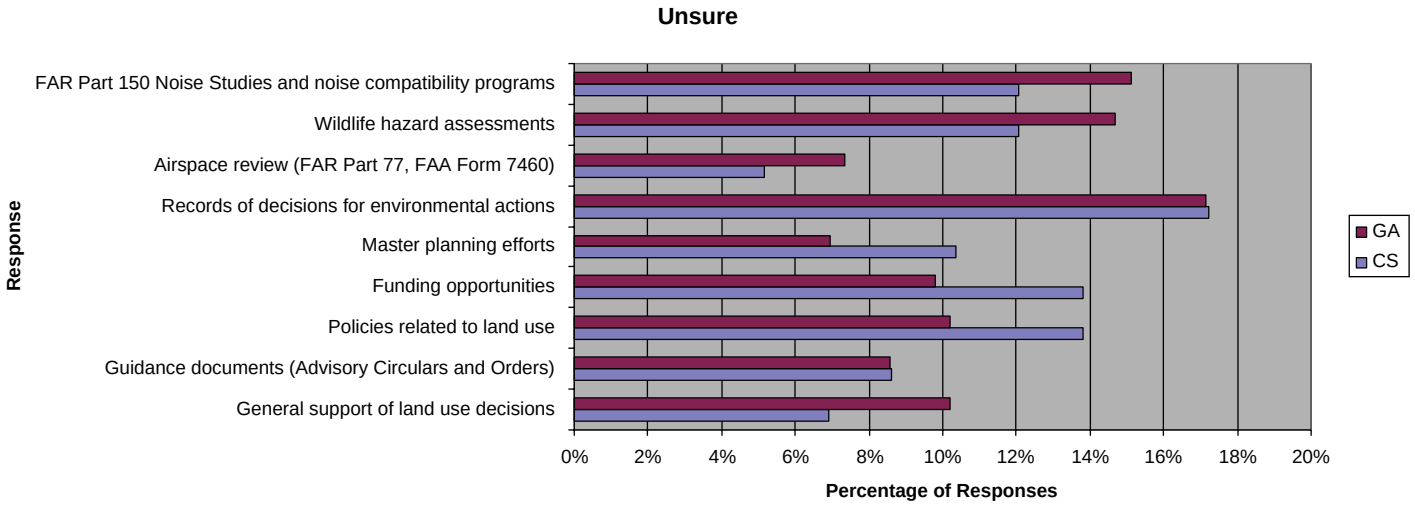


Table 2.1-29. Question 15 Survey Results – Unsure.



Buckley Air Force Base, Aurora, Colorado

Introduction/Airport Overview

Buckley became an active-duty Air Force Base (AFB) on October 2, 2000. For 40 years prior to that date, the facility was an Air National Guard Base. On that date, the base was handed over from the Colorado Air National Guard to Air Force Space Command. The 460th Space Wing is responsible for providing space-based missile warning data to Cheyenne Mountain Air Station, Colorado, and Peterson Air Force Base in Colorado Springs, Colorado. Radomes are distinctive landmarks in the compound and look like giant white golf balls (Figure 2.2-1). They are actually weatherproof enclosures that protect huge satellite-commanding/data-receiving antennas.

Buckley is located in Aurora Colorado, near Denver (Figure 2.2-2). This location, near the center of the U.S., provides an ideal refueling stop for military aircraft training across the country. In addition to base-assigned aircraft, Buckley services up to 6,000 transient military aircraft per year, of which approximately 2,000 remain at least one night on base. Every type of aircraft in the Department of Defense (DoD) inventory, from every service and command, visit Buckley Air Force Base (AFB) during a typical year. At the present time, Buckley supports more than 90,100 people throughout the Front Range community, which includes 2,700 active duty members from all services, 4,200 National Guard personnel and reservists, 3,000 civilians, 2,700 contractors, 22,000 retirees and dependents, and an estimated 55,000 veterans.

The base contributes an estimated $1.09 billion annually to the local economy and is 3,250 acres, or about six square miles. The airfield complex has one runway that is 11,000 feet long by 150 feet wide. An east-west runway was closed in the 1990s in order to eliminate potential conflicts with air traffic departing Denver International Airport (DIA). Flying operations are active and all base facilities are occupied and in use. Since the return of the facility to the Air Force in 2000, the base has seen substantial new construction and modernization. There are more than 30 construction projects underway or proposed, which include mission related and quality of living projects with an estimated total cost of $210 million. The mission related construction accounts for approximately $152 million and includes a new medical supply storage facility and an expanded Freight Transfer Facility that will house and secure cargo. The military flies into the base on a weekly basis and once on the ground, the aircraft are generally used to store in-transit cargo. The base also relies on government contractors

Figure 2.2-1. Radome.

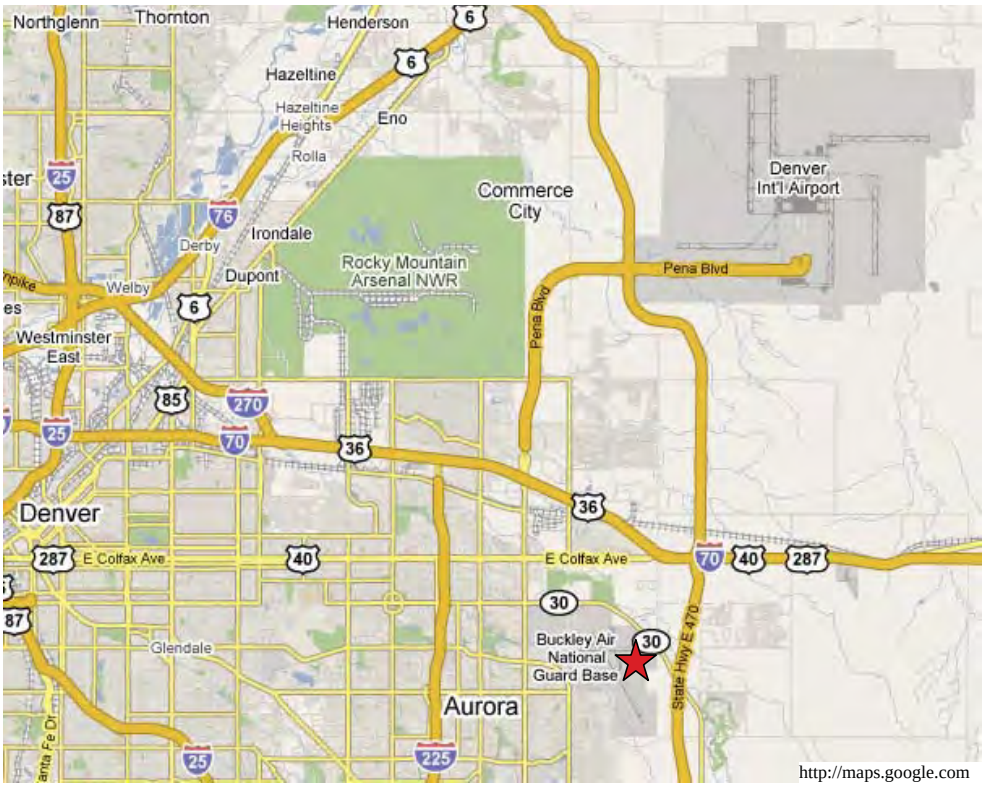


Figure 2.2-2. Location map of Buckley Air National Guard in Aurora, Colorado.

to temporarily store cargo when the amount delivered exceeds aircraft capacity. However, the amount of cargo that is stored, consolidated, and distributed now surpasses the capability of the government contractors. The quality of living projects include roughly $63 million in construction costs that include dormitories for enlisted airmen, a commissary, a base exchange, a fitness center, and a number of family housing units. Some of the housing units have been completed while others are still being constructed.

Figure 2.2-3. Historical view of Buckley Field.

History of the Airbase

In 1941, the United States was involved in the war in Europe, which resulted in plans to enlarge Lowry Army Air Field. A 5,740-acre site was selected and purchased by the city and county of Denver and donated to the Department of the Army. The name Buckley Field was chosen in honor of 1st Lt. John Harold Buckley, a World War I flier from Longmont, Colorado. Construction of the $7.5 million base facilities began in May 1942 and included streets, runways, more than 700 structures, a communication system, water and wastewater utilities, an electrical plant, a coal-fired steam heating plant, and 16,800 feet of railroad track, some of which can be seen in Figure 2.2-3. When the Army Air Corps Technical School opened, it offered B-17 and B-24 bombardier and armor training.

During the war years, Buckley expanded to meet training needs. In its peak year of operation (1943), 32,000 troops received training, including nearly 10,000 new inductees who went through basic training. When the war ended, Buckley became an auxiliary field for Lowry, which in turn transferred it to the Colorado Air National Guard in 1946. The Department of the Navy took charge in 1947, renaming the installation Naval Air Station-Denver, Colorado. During this postwar era, five veteran villages were built on Buckley to help ease the housing shortage created by the war.

In 1959, the Navy decommissioned the Naval Air Station and it once again became property of the Air Force, which licensed it to the state of Colorado. On April 18, 1960, the installation became the first stand-alone Air National Guard Base in the nation. On October 2, 2000, Buckley became an active-duty Air Force Base again.

Buckley has developed additional uses on the base since its transfer to the Air Force. In response to 9/11, the DoD has increased security measures at military installations, some of which relate to land use and include recommendations for greater buffers between military and non-military uses at the border of bases, as well as more access control in the form of fencing and zones clear of vegetation along base boundaries.

In 2005, the Federal Defense Base Closure and Realignment Commission (BRAC) predicted only 13 additional civilian jobs and 81 military jobs would be located at the base in Aurora. However, recent reports suggest a different picture. As threats to America's security have changed, global surveillance and missile warning networks at Buckley have become increasingly important. In 2008, the Air Force predicted that an additional 800 people will be assigned to Buckley by 2011. This includes the relocation of approximately 600 local workers from the Air Force Air Reserve Personnel Center in Aurora to Buckley, as well as additional enlisted, private, and contractor jobs. Three additional F-16s are expected to be assigned to the base as well.

The Air Force described Buckley as "transforming from a minimally developed installation for weekend influxes of Reserve and Guard personnel into a fully developed, active-duty AFB" in a recent environmental assessment. Buckley personnel indicate that the Air Force is considering possible acquisition from willing sellers of lands to the east of the existing base. The primary intent is for base expansion and to allow for an increase in potential missions. The base planners have explored whether the Readiness and Environmental Protection Initiative (REPI) could be used to help protect and buffer the base. U.S. Senator Ken Salazar of Colorado is an advocate of REPI. The REPI program provides funds for acquisition of lands that can serve the dual purposes of military installation buffers and environmental protection. Under the program, the military purchases land only when it can be transferred to a third-party organization for permanent maintenance and conservation. Buckley has begun conversations with a local branch of the Trust for Public Lands about using REPI. At this writing, land around Buckley had not yet been identified that qualifies for the program's conservation criteria.

Governance

Buckley has been controlled by various agencies of the DoD for 67 years. Over the decades, the facility has at times been under the command of the Department of the Army, the Colorado Air National Guard, the Department of the Navy, and the Department of the Air Force, which currently occupies the property. A single planner is employed by the facility and is involved with on-base planning activities and also coordinates with local jurisdictions to review development proposals that are referred to the base.

As shown in Figure 2.2-2, the base is located in Aurora, Colorado, just east of Denver. The majority of the off-base land that surrounds Buckley is under the jurisdiction of the city of Aurora. Pockets of land are under the jurisdiction of Arapahoe County. The city of Aurora hired a full time noise coordinator who reviews development proposals in the vicinity of all three airports for compliance with all airport land use compatibility regulations (noise, safety, and airspace).

Colorado does not have statewide airport land use compatibility requirements for local governments, such as those that have been adopted in Minnesota or California. However, the Colorado General Assembly passed a law in 2005 that requires local governments to notify a military installation if any rezoning or subdivision of land is proposed within two miles of the installation.

Discussion of Compatibility Issues and Responses

The most recent land use compatibility study at Buckley is the 1998 Air Installation Compatible Use Zones Study (AICUZ). The 1998 AICUZ indicates a limited number of incompatible land uses that fall within noise impact districts or safety zones as defined by the DoD. The assessment is summarized in this section, while land use recommendations are discussed later. The AICUZ notes that, "Aerial photographs of the base taken in the early 1970s show nearly no [sic] development near the base. In the years since, extensive suburban, commercial, and industrial development has increased in areas surrounding the base . . ." Developments that have been built in the safety zone of the former east-west runway are now considered an incompatible land use. The east-west runway was closed in the early 1990s when DIA opened and replaced the former Stapleton airport. At this time, all Buckley flights were directed to the north-south runway. The runway closure was done to eliminate potential airspace conflicts with DIA and the exclusive use of the north-south runway resulted in shifted noise impacts. Noise incompatibilities associated with the east-west operations were resolved, while some properties were exposed to greater noise impacts from the north-south runway. However, the higher impact levels are less than 65 DNL and therefore no new noise incompatibilities were created. Despite substantial development encroachment around the base by 1998, the AICUZ indicates that incompatible land uses, as defined by DoD guidance, are not extensive around Buckley.

The city of Aurora and Adams County have adopted airport zoning regulations prior to 1998. Since the adoption of the 1998 AICUZ, both have updated the zoning codes to be consistent with the AICUZ recommendations and DoD land use compatibility guidelines. Detailed descriptions of these regulations, which are well crafted to prevent future land use incompatibility, are discussed later. Aurora has denied or modified many land use development proposals since that time to conform to the adopted regulations.

Safety

The standard Air Force safety zones include the Clear Zone (CZ), Accident Potential Zone I (APZ I), and Accident Potential Zone II (APZ II). The AICUZ mapped these three safety zones based on typical flight tracks at Buckley, as shown in Figure 2.2-4.

The AICUZ identifies that there are no incompatible land uses in the Clear Zone and that the base owns all land within this zone. No incompatible land uses were identified in the southern APZs, while two were identified in the northern APZs. These incompatible land uses include a golf club house with facilities to assemble groups of persons within APZ I and a mobile home park outside the base in APZ II that exceeds the recommended residential development density. The fan portion of the APZ to the southeast of the runway was not included in the prior AICUZ

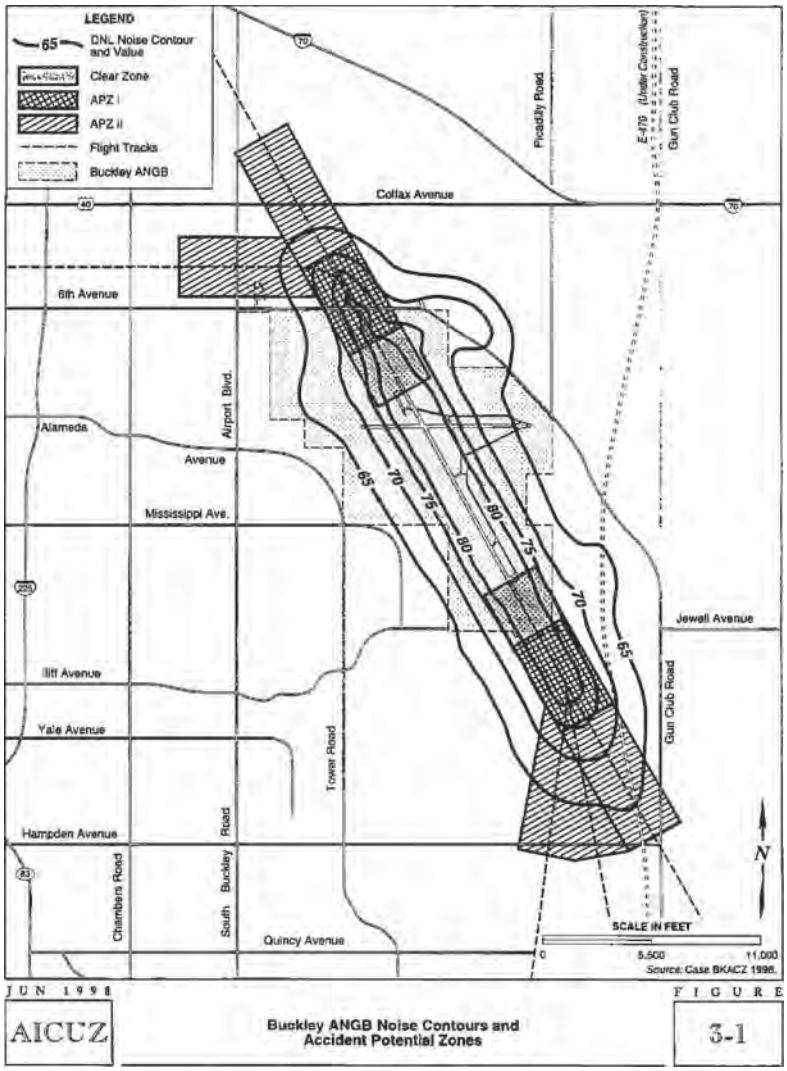


Figure 2.2-4. Air Force safety zones at Buckley.

(1985) and thus was not reflected in land use zoning regulations prior to 1998. Buckley staff indicates that the fan was added to the APZ II based on the fact that many of the operations at Buckley involve cargo planes. Large cargo aircraft have heavy loads, which tend to result in a wide debris field, if involved in an aircraft accident. Hence the fan zone protects a wider area than the standard APZ II for a facility with fewer cargo operations.[1]

In 1994, the city of Aurora approved a preliminary plat for a residential development called Quincy Highlands in an area that eventually became part of the APZ II fan. This approved development is not identified as an incompatible land use in the 1998 AICUZ because it had not been built yet. In December 1998, the city updated its zoning regulations to recognize the 1998 APZs. In 2001, a subsequent developer sought to finalize the approved preliminary plat from 1994. The city conditioned the approval of the final plat on modifications to bring it into conformance with the then-current zoning regulations that restrict residential development in the APZ II to one

[1] A 2002 document from the City of Aurora indicates that the city understood that the modification of the APZ II in the 1998 AICUZ was, "caused by a change in flight patterns at Buckley air [sic] National Guard Base."

unit per acre. The developer then sued Aurora based on the prior approval. Eventually, the city and developer reached a settlement. In essence, the settlement agreement:

- Reduces the total number of allowed residential units, only slightly;
- Shifts the pattern of zoning and land uses within the overall development area;
- Allows some residential development in the outer fringes of the APZ II; and
- Restricts all future development on areas that are closest to the runway centerline.

Although the resolution was perhaps imperfect in the sense that residential uses were built at higher than one unit per acre within the APZ II boundary line, it was a substantial compatibility improvement over the preliminary approval. Ultimately, it is an important success in coordinating the parallel and sometimes conflicting tracks of ongoing land use approvals and changing conditions of airport operations that can result in land use incompatibility.

City and base staff indicate that developers regularly propose incompatible uses in the Buckley safety zones. The proposals are modified to conform to existing adopted city regulations or they are denied. For example, a landscaping business use was approved only after it was modified based on safety and airspace hazards. The city required the site plan to specify that buildings were to be kept away from the runway centerline and lighting height and illumination were not to create confusion with the runway.

Land uses may be approved years before they are built, which can present a challenge for land use compatibility. If the base operations change in a way that create new or larger impact areas, such as the change that led to the larger APZ II, the city may face legal limitations regarding the ability to change prior approvals to respond to the new needs at the base. Thus, the inherent uncertainty of future military airport impacts can at times be complicated for all parties.

Airspace

No tall structures or other airspace hazards were identified in the 1998 AICUZ. The city of Aurora and the base indicated that airspace protection has been less of a land use compatibility challenge around Buckley to date than safety and noise. The city strictly enforces the recommended surfaces, which have proven adequate thus far to avoid new airspace incompatibilities.

Noise

Four noise impact zones are defined by DNL in the AICUZ, as shown in Figure 2.2-4. Noise incompatible uses identified in the AICUZ are off-base residential uses in the 65 and 70 DNL noise impact areas. Up to 250 people live in the 65-69 DNL contour and fewer than 50 live within the 70-74 DNL contour. No off-base residential uses are within a noise impact area with greater than 75 DNL. No other noise sensitive uses were indicated as being located in incompatible noise impact areas. The AICUZ does not indicate whether the residences in the noise impact areas have been insulated to reduce interior noise levels.

Despite the limited number of noise incompatible uses, noise compatibility remains a concern for both the city and the base. In Aurora and Adams County, typical ambient noise is about DNL 45. The single event noise of the aircraft that operate from Buckley can be perceptually loud. Base and city staff acknowledge that an average DNL of 65 includes noise events that are not always well received in the relatively quiet surrounding communities and have worked to further reduce noise impacts and land use conflicts.

Buckley has undertaken a number of efforts to improve compatibility with surrounding uses. As discussed above, the base closed the east-west runway to accommodate DIA. The closure eliminated safety zones and resolved then-existing safety and noise incompatibilities associated

with the east-west runway. The base has altered operations to reduce noise impacts on- and off-base, which include the restriction of normal engine run-up hours and construction of an $800 million "hush house." Nighttime flights have been limited to reduce impacts on residential uses outside the DNL 65 contour and flight tracks have been adjusted to shift overflights to less populated areas. If these less populated areas become developed, Buckley staff expressed concern that there will be nowhere left to divert overflights when new residents raise noise complaints.

The city of Aurora has gone well beyond the specific definition of noise zones and use restrictions in the AICUZ. The city does not allow rezoning for new residential uses in the DNL 60 contour and requires noise mitigation in the 55 and 60 DLN contours. However, rezoning for residential development continues to be proposed within these contours by developers who hope to convince the city council of the merit of their proposal and get a discretionary approval. These proposals are referred to Buckley and its staff planner responds with comments. Base staff reports that city staff recommendations have almost uniformly supported the base recommendations, as have the majority of discretionary decisions by elected bodies. Still, the inability of the city to revoke prior approvals when the base changes its AICUZ recommendations has resulted in some increases in incompatible uses since 1998.

Base and city staff interviewed for this case study agreed that the DoD guidance for noise compatibility up to the DNL 65 contour was excellent, but they would like to have further guidance about noise compatibility outside the 65 contour, for example in the 55 and 60 DNL. Noise impacts below the 65 DNL have so far caused changes to operations at Buckley that have not endangered the mission. However, there is concern that further encroachment could limit the ability to expand the base or maintain the mission. Based on current trends, it is plausible that the Air Force may wish to expand operations at Buckley in the future and potentially in a way that would increase noise impacts. Buckley has altered its approaches to pass over relatively unpopulated areas, but that area is very limited. When Aurora faces development proposals for new residential uses under this existing, relatively unpopulated area, the city has no support in DoD guidance on which to base its land use decisions. The city and base both indicate that further policy guidance from DoD would be helpful to ensure that political resolve to deny development proposals remains firm and consistent.

Existing Studies, Planning, and Regulations

Air Installation Compatible Use Zone Study

As stated previously, the most recent land use planning document completed for Buckley is the AICUZ dated June 1998. The study updates the 1985 AICUZ. The military began to study land use compatibility and accident potential in the 1970s, which resulted in a directive that each facility prepare an AICUZ. The Colorado Air National Guard developed the 1998 AICUZ for Buckley with assistance from the city of Aurora Planning Department. An AICUZ must be updated whenever operations at a base change so as to result in an overall average noise increase of 2 decibels or more. The base planner indicated that the 1998 AICUZ was recertified by the Air Force during 2005-2007, with the finding that the noise impact had not increased so as to trigger a new AICUZ. Furthermore, the planner stated that at this time, future operations at Buckley are not anticipated to change in a way that would trigger a new AICUZ, thus the 1998 document remains current.

The AICUZ identifies land use compatibility issues as follows: structure height, noise impact, and accident potential. The plan does not address other potential airspace hazards such as bird strike or visual impediments such as plumes of steam or smoke. The AICUZ inventories current operations and impacts, and makes recommendations for land use compatibility. The AICUZ

considers two feasible future changes to missions that would increase land use impacts and compatibility, which include an increase in base assigned aircraft and an increase in nighttime flying. Either scenario would increase noise impact and increase the area of noise contours; other impacts are not expected.

The 1998 AICUZ establishes land use recommendations for three safety zones and four noise districts, as shown in Figure 2.2-4. The heart of the AICUZ document is a table that lists the seven zones/districts across the horizontal axis and land uses down the vertical axis. The table indicates which land uses are appropriate in a particular zone, which are incompatible, and which are compatible under certain conditions, such as maximum density or noise mitigation construction. The specific conditions for compatibility are included in the table as notes. A sample page from the table is shown in Figure 2.2-5 on the following page.

The implementation chapter of the AICUZ outlines responsibilities for the air base and local communities for land use compatibility. The local community recommendations are very specific about regulatory actions needed to implement the AICUZ. They are as follows:

- Continue to incorporate AICUZ policies and guidelines into the comprehensive plans of the City of Aurora. Use overlay maps of the AICUZ noise contours and Air National Guard (ANG) land use guidelines to evaluate existing and future land use proposals.
- Modify existing zoning ordinances to support the compatible land uses outlined in this study.
- Ensure that the height and obstruction ordinances reflect current ANG and FAR Part 77 requirements.
- Modify building codes to ensure that new construction within the AICUZ area has the recommended noise level reductions incorporated into the design and construction of facilities.
- Continue to inform Buckley ANGB of planning and zoning actions that have the potential to affect base operations.
- Develop a working group represented by city, county, and base planners to discuss AICUZ concerns and major development proposals that could affect airfield operations.
- Sponsor Buckley ANGB and Community Information Seminars.

Buckley has not prepared a Joint Land Use Plan (JLUS), which is a land use plan for the area surrounding the base that may be undertaken cooperatively between a military installation and a surrounding community. Cost for a JLUS is shared between the DoD and the local jurisdiction(s). According to the base planner, Buckley has never prepared a JLUS because the surrounding jurisdictions' regulations are already so protective of the base, there is simply no need to spend JLUS program funds at Buckley.

Local Land Use Plans

City of Aurora planning documents are very supportive of airfield compatible land use planning and implementation around Buckley. The 1998 AICUZ indicates that the previous city comprehensive plan and zoning were generally supportive of the base and land use compatibility needs, but required specific revisions to help implement the AICUZ recommendations. The current plans accomplish that objective.

The 2003 Comprehensive Plan includes a stand-alone section on Buckley AFB as part of the "Strategic Areas" chapter. The chapter summarizes the characteristics and economic importance of the base, and identifies issues and needs for the area in the future. The overall plan summarizes existing policy for the area around the bases and states land use policy that guides current and future regulations and development review decisions. The strategies portion of

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
26	Paper & allied products; manufacturing	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
27	Printing, publishing, and allied industries	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
28	Chemicals and allied products; manufacturing	N	N	N[2]	Y	Y[12]	Y[13]	Y[14]
29	Petroleum refining and related industries	N	N	N	Y	Y[12]	Y[13]	Y[14]
30	Manufacturing							
31	Rubber and misc. plastic products, manufacturing	N	N[2]	N[2]	Y	Y[12]	Y[13]	Y[14]
32	Stone, clay and glass products manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
33	Primary metal industries	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
34	Fabricated metal products; manufacturing	N	N[2]	Y	Y	Y[12]	Y[13]	Y[14]
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks manufacturing	N	N	N[2]	Y	A	B	N
39	Miscellaneous manufacturing	N	Y[2]	Y[2]	Y	Y[12]	Y[13]	Y[14]
40	Transportation, communications and utilities							
41	Railroad, rapid rail transit and street railroad transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
42	Motor vehicle transportation	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
43	Aircraft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
44	Marine craft transportation	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
45	Highway & street right-of-way	N[3]	Y	Y	Y	Y[12]	Y[13]	Y[14]
46	Automobile parking	N[3]	Y[4]	Y	Y	Y[12]	Y[13]	Y[14]
47	Communications	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
48	Utilities	N[3]	Y[4]	Y	Y	Y	Y[13]	Y[13]
49	Other transportation communications and utilities	N[3]	Y[4]	Y	Y	A[15]	B[15]	N
50	Trade							
51	Wholesale trade	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
52	Retail trade-building materials, hardware and farm equipment	N	Y[2]	Y	Y	Y[12]	Y[13]	Y[14]
53	Retail trade-general merchandise	N	N[2]	Y[2]	Y	A	B	N
54	Retail trade-food	N	N[2]	Y[2]	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N	Y[2]	Y[2]	Y	A	B	N
56	Retail trade-apparel and accessories	N	N[2]	Y[2]	Y	A	B	N

Buckley ANGB Final AICUZ Study
June 1998
3-5

Figure 2.2-5. Example of a table from the 1998 AICUZ.

the plan gives clear guidance on future land use and development review decisions including the following:

1. Continue to work closely with Buckley on the cooperative planning process for the BAFB 2020 Master Plan.
2. Continue to strictly enforce land use restrictions in the BAFB airport influence district to ensure that air operations can safely continue.
3. Evaluate the potential impact of base development to the new city park on the western boundary of the base and to Airport Boulevard.
4. Work closely with Buckley on planning the housing privatization project on Airport Boulevard.
5. Continue to use the E-470 Corridor, Buckley Research and Development subarea designation for areas east of BAFB.

Zoning Regulations

The city of Aurora includes the airport influence areas of four airports within its boundaries, as shown in Figure 2.2-6. Aurora has adopted zoning standards for each airport, including Buckley. The Buckley provisions address the safety zones and noise districts in the AICUZ, as well as three additional zones that include:

1. Special Noise Impact (SNI) district, contained between DNL 60 and DNL 65 noise contour lines.
2. Noise Impact (NI) district, contained between DNL 55 and DNL 60 noise contour lines.
3. Broadly defined airport influence area (AIA) district.

These zones are visible on Figure 2.2-6. Specific zoning regulations are set forth for each area. The regulations for the CZ, APZ I, and APZ II follow the AICUZ recommendations precisely, as do the restrictions in noise impact areas greater than 65 DNL.

The Aurora regulations in the SNI, NI, and AIA districts exceed the AICUZ specific recommendations. The regulations in these districts mirror regulations that the city has imposed in similar areas that correspond to other airports and include:

- SNI district - new residential uses are allowed only in areas zoned for residential use and only after a hearing by city council to approve the development.
- All new residential uses in the SNI and NI districts require noise mitigation reduction measures.
- AIA district - Aurora requires compliance with FAR part 77 surfaces for military aircraft, an avigation easement for all new subdivisions, and recorded real estate notice for the initial sale of any property.

Arapahoe County has jurisdiction of some lands in the airport influence area to the south and west of Buckley AFB, including portions of the southern APZI and APZ II. The Arapahoe County Public Airport Authority controls the general aviation Centennial Airport (KAPA). The County jurisdiction also includes lands affected by two other airports (DIA and Front Range general aviation airport). Like Aurora, Arapahoe County's airport zoning regulations address multiple airports' impact areas. Although different in form from the Aurora's regulations, the Arapahoe County zoning regulations for the Buckley area of influence adhere closely to the AICUZ recommendations. The county zoning regulations include a number of generally applicable provisions that apply to all airport noise and influence areas, and some provisions that are specific to each airport facility.

Arapahoe County regulations that are generally applicable to all airport influence areas are:

- Height restrictions through specific reference to the Part 77 surfaces.
- Prohibition of any structures that would create electrical interference, cause glare, impair visibility, make it difficult for pilots to distinguish airport lighting, or "otherwise endanger the landing, take-off, or maneuvering of aircraft at an airport or in the vicinity of the airport."

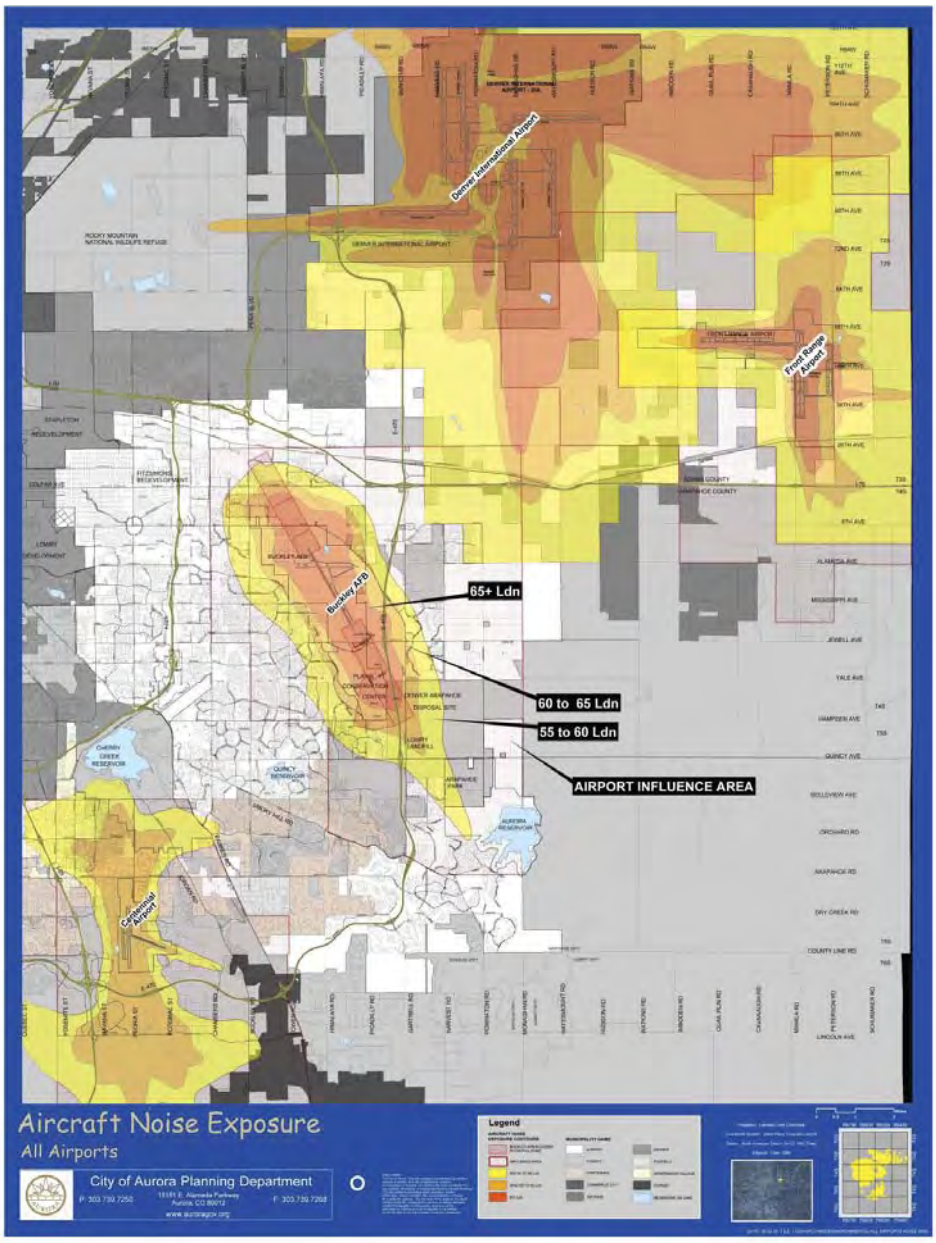


Figure 2.2-6. Airport influence areas for the city of Aurora.

- An avigation easement for any new land use plan, subdivision plat, or building permit in any airport influence area (except on building permits for unplatted property greater than 35 acres, which do not require adherence to zoning regulations).
- Referral of all development proposals to the airport operator for comment.
- Noise mitigation construction for all new residential uses, including a recorded note on the plat.
- Noise disclosure at the time of sale or lease of all properties.

Arapahoe County regulations that are generally applicable to all airports' DNL 65 Noise Zone noise impact areas include:

- No new residential uses are allowed, and other noise sensitive uses are allowed only with noise construction mitigation.

- Changes to property zoning that would allow new residential uses, childcare, or educational uses are discouraged. Such uses require noise construction mitigation.

Provisions specific to Buckley in the Arapahoe County regulations restrict land use types and density in the APZ I and APZ II as indicated in the AICUZ, and in an area called the Traffic Pattern Area (TPA). The TPA corresponds to the area beneath closed flight training patterns at the base. In this area, the County restricts noise sensitive uses and limits building coverage to a maximum of 25% of the lot.

The local jurisdiction regulations are more protective, over a wider land area, than requested by the airport's land use planning document (1998 AICUZ). Base staff indicated that Buckley had considered the local regulations in the 55 DNL and 60 DNL contours as "life-saving" to the continuation of operations and the mission of the base.

Community Involvement

Buckley, the city of Aurora, and Arapahoe County coordinate with one another on airport compatible land use planning efforts, of which the latest effort around Buckley is the 1998 AICUZ. The City and County were involved with the creation of the AICUZ and provided zoning and parcel data for the document. The city's 2003 Comprehensive Plan further indicates involvement in a master plan update for Buckley. On a continuing basis, both the city and County refer development proposals in the airport influence area to Buckley AFB planners. At times, the base has been a strong voice in opposition of some of the proposed developments that have been decided by the Aurora City Council. Generally, the council has decided in accordance with Buckley's desires, such as the denial of the controversial Murphy Creek North residential development that was proposed in the DNL 65 and 60 contours about three-quarters of a mile away from the runway. Few nongovernmental groups have coalesced as adversaries or advocates to land use compatibility planning around Buckley. The biggest group of adversaries in the community includes homebuilders who bring forward residential development proposals in noise-impacted areas. Although no formal group is a regular advocate for Buckley, it appears that those in the community with military ties support land use protections for Buckley. When the Murphy Creek North development was proposed, an ex-military member wrote a piece for the local paper to praise Buckley and urge the city council to deny the proposal. Representatives of the Chamber of Commerce have also spoken up in support of protecting Buckley during controversial land use decision processes.

Economic Impact

According to a Department of the Air Force Fact Sheet, Buckley currently supports more than 90,100 people throughout greater Denver region. Base payroll totaled more than $624 million in 2008. The Air Force estimates Buckley indirectly created more than 6,000 jobs and spent $37 million on service contracts in 2007. The base contributes an estimated $1.09 billion annually to the local economy.

Closure of Buckley would be an enormous loss to the local economy. Buckley is a facility with unique capabilities, which suggests that closure is unlikely. However, if land use incompatibilities were to occur in a manner that threatened the mission and operations of the facility, it may be possible that all or some of its capabilities could be relocated, perhaps to Peterson Air Force Base in nearby Colorado Springs. Both Lowry AFB and Fitzsimmons Army Base, previously in Aurora, have been closed in recent years as the military has consolidated its facilities, due in part

to the fact that both had experienced substantial encroachment of incompatible land uses over the years. The economic impact on the city of Aurora would be much greater if Buckley closed because when Lowry and Fitzsimmons closed, some of the capability, personnel, and jobs were transferred to Buckley and thus retained in the community. With strong airport compatibility regulations in both Aurora and Adams County, the likelihood that land use compatibility will threaten Buckley is remote.

Conclusion/Analysis

As one of the largest employers in Aurora, the base is an enormously important economic force, and it is not surprising that local jurisdictions comply with the recommendations of Buckley's AICUZ. Although city officials raised questions about how the noise contours were calculated when the AICUZ was initially released, ultimately both the city of Aurora and Arapahoe County adopted strong airport compatibility zoning regulations. Both the city of Aurora and Arapahoe County have gone beyond the AICUZ recommendations in notable ways. Their regulations address not only noise and tall structures, but also include safety protections in the form of land use controls in accident zones and general provisions that restrict uses causing glare, smoke, electromagnetic interference, and similar obstruction within the entire airport influence area. Implementation of the regulations has also been strong. The city has turned down a number of land use proposals through the years that were incompatible due to noise and safety issues and have also strictly enforced airspace protection regulations.

Local experience with closure of military and civilian airports in the region, and noise and safety compatibility concerns at local nonmilitary facilities may support local regulations that are stricter than the AICUZ. Fitzsimmons and Lowry military facilities in Aurora and Stapleton Airport in Denver have all closed since 1990, which resulted in significant negative economic impacts. The idea of an airport going away, which many communities do not take seriously, seems a possible reality in these jurisdictions.

Arapahoe County's willingness to protect against incompatible land use at Buckley may also be due partly to first-hand experience with the struggle to achieve and maintain land use compatibility around its civilian air facility. The Arapahoe County Public Airport Authority (ACPAA) owns Centennial Airport (KAPA, which is also a case study in this report.) The County has publicly expressed frustration when other jurisdictions adopt policies or allow land uses around KAPA that are not consistent with ACPAA's recommended land use compatibility guidelines. These recommendations exceed FAA guidelines in some aspect, such as restriction on noise sensitive use in the 55 and 60 DNL, or the requirement of avigation easements and real estate disclosure for all property in the airport influence area. In this context, the County may have been seen as hypocritical had it not adopted restrictions around Buckley similar to ACPAA's recommendations around KAPA.

Noise and safety compatibility concerns at civilian airports have caused local jurisdictions to discourage residential uses in the 60 and 55 DNL and to require noise insulation, real estate disclosures, and avigation easements in their airport influence areas. The city and County have applied similar principles to the 60 DNL contour and airport influence district around Buckley, going beyond the AICUZ recommendations. Military aircraft tend to be larger than most commercial aircraft, therefore event noise is often louder. Buckley staff indicates that local willingness to adopt regulations outside the DNL 65 contour, an average noise level to achieve land use compatibility, has been important to protect the base mission.

The base and city staff note that, despite strong local regulations, developers regularly propose incompatible land uses. Airspace protection and safety zone restrictions have been relatively

straightforward to enforce, as have noise compatibility restrictions that follow the DoD guidelines. However, when the local regulations exceed DoD guidance, as with the 55-64 DNL contours, it becomes difficult to convince some developers and local officials that exceptions should not be made to rezone land for new residential uses. The base and local city staff indicate that enhanced guidance from DoD about noise compatibility outside the 65 DNL contour would be beneficial.

If the base mission or operations change in a way that impacts land use, the city faces the task to meet these new needs. The city has shown a great willingness to use its regulatory resources to protect the base, but does not have the ability to undue past actions. The coordination of future land use and base operations may be a challenge, but with continued development pressure in the area and the importance of the facilities at Buckley, it is a challenge that will require ongoing attention.

Baltimore/Washington International Thurgood Marshall Airport, Baltimore, Maryland

Introduction/Airport Overview

Baltimore/Washington International Thurgood Marshall Airport (BWI) was constructed after World War II and dedicated in 1950 by President Truman as Friendship International Airport. The State of Maryland purchased the airport in 1972 and in 1973 a plan to upgrade and improve the airport was initiated by Maryland Secretary of Transportation Harry Hughes. The airport was renamed Baltimore/Washington International Airport. The airport is located southwest of Baltimore, and northeast of Washington D.C., in a fairly developed area, as shown in Figure 2.3-1.

In 2005, BWI had approximately 310,000 operations. The distribution is shown in Table 2.3-1.

Discussion of Compatibility Issues and Responses

When discussing existing and future compatibility issues, three basic areas were discussed in an effort to assess current concerns, including safety, airspace, and noise related issues.

In the early 1970s Maryland established the "Airport Zoning Permit" as part of the Transportation Article, Annotated Code of Maryland (COMAR) Title 11.03.06. The purpose of the Airport Zoning Permit is to identify land uses, obstructions, and wildlife attractants that are incompatible with airport operations at BWI and Martin State Airports (MTN). This law gave the Maryland Aviation Administration (MAA), which was then the State Aviation Administration, the responsibility and authority to review developments for noise incompatibilities, structures that penetrate airspace surfaces (FAR Part 77 surfaces), or wildlife attractants that might endanger flight operations.

The Maryland legislature passed and the governor signed the Environmental Noise Act of 1974. This law assigned responsibility for the regulation of noise and establishment of standards to the Department of the Environment, and required each State agency to prescribe sound level limits or regulate noise in coordination with the Department of the Environment. As a response, in 1975 MAA established regulations under Title 11.03.03 of COMAR, Airport Noise Control Program, which set noise and land use compatibility requirements and procedures for identifying an "Airport Noise Zone" (ANZ) around state run airports. Within the ANZ, residential and other noise sensitive land uses were prohibited. For example under residential uses, no new residential development is permitted in areas where aircraft noise exceeds 65 dB Day-Night Average Sound Level (DNL). Denials of development within the ANZ can be appealed through the Board of Airport Zoning Appeals (BAZA), Section 5-822 of the Transportation Article.

In accordance with these laws, BWI has established a Noise Abatement Plan (NAP) to minimize or reduce noise incompatible land uses around the airport. It is based on the current ANZ, which is updated regularly. In many ways, the development of the ANZ and associated

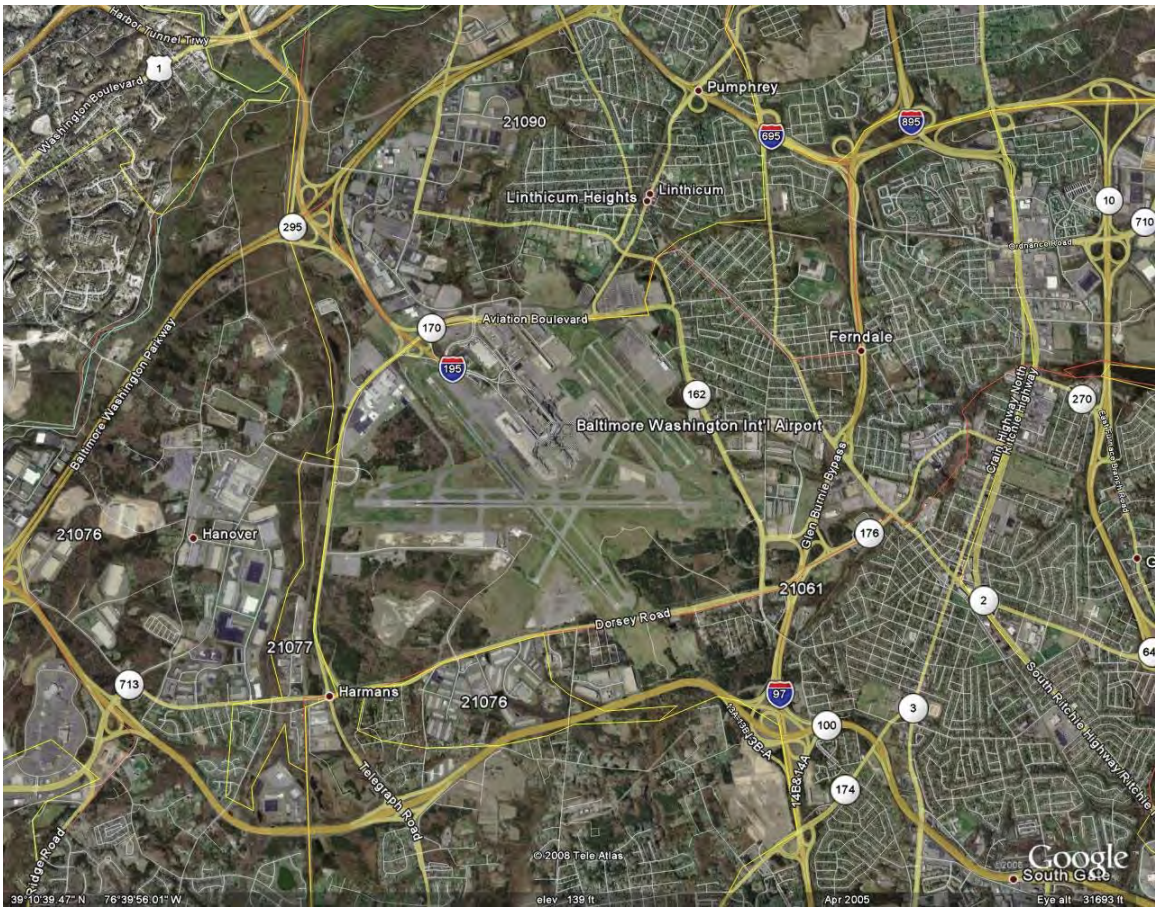


Figure 2.3-1. General location of BWI.

NAP is much like the FAR Part 150 process. In fact, the Part 150 process was modeled after this Maryland approach, with the Part 150 Noise Exposure Map similar to the ANZ, and the Part 150 Noise Compatibility Program like the NAP.

A comparison of the most recently proposed (2007) and the current (1998) Airport Noise Zones is shown in Figure 2.3-2 on the following page. The 2007 contours expand to the southeast due to increased operations, increased night percentage of operations, and relocated runway end. To the west, the contours contract due to the phase-out of the louder Stage 2 aircraft in 2000. Table 2.3-2 shows the acreage, housing units, and population contained within the 1998 and the proposed 2007 Airport Noise Zones.

In general, the MAA controls the land use within the contours of the ANZ and within a 4-mile radius for height, vegetation, and storm water management (SWM). Any development within this area requires an airport zoning permit approved by the MAA. Noncompatible development is not permitted within the ANZ. This determination can be appealed, but approvals require evidence of the property being soundproofed to an interior noise level of 45 DNL, as wells as an avigation easement. The MAA Planning office has worked with the local county government to incorporate the BWI landscaping and storm water management guidelines in to the overall development standards for properties near the Airport.

Table 2.3-1. Distribution of BWI 2005 operations.

Operation	Percentage (%)
Air Carrier Cargo	1.8
Air Carrier Passenger	69.6
Air Taxi Cargo	2.9
Air Taxi Charter	0.4
Air Taxi Passenger	9.5
Air Taxi (Fractional Ownership)	2.4
Air Taxi Other	0.6
General Aviation	12.6
Military	0.3

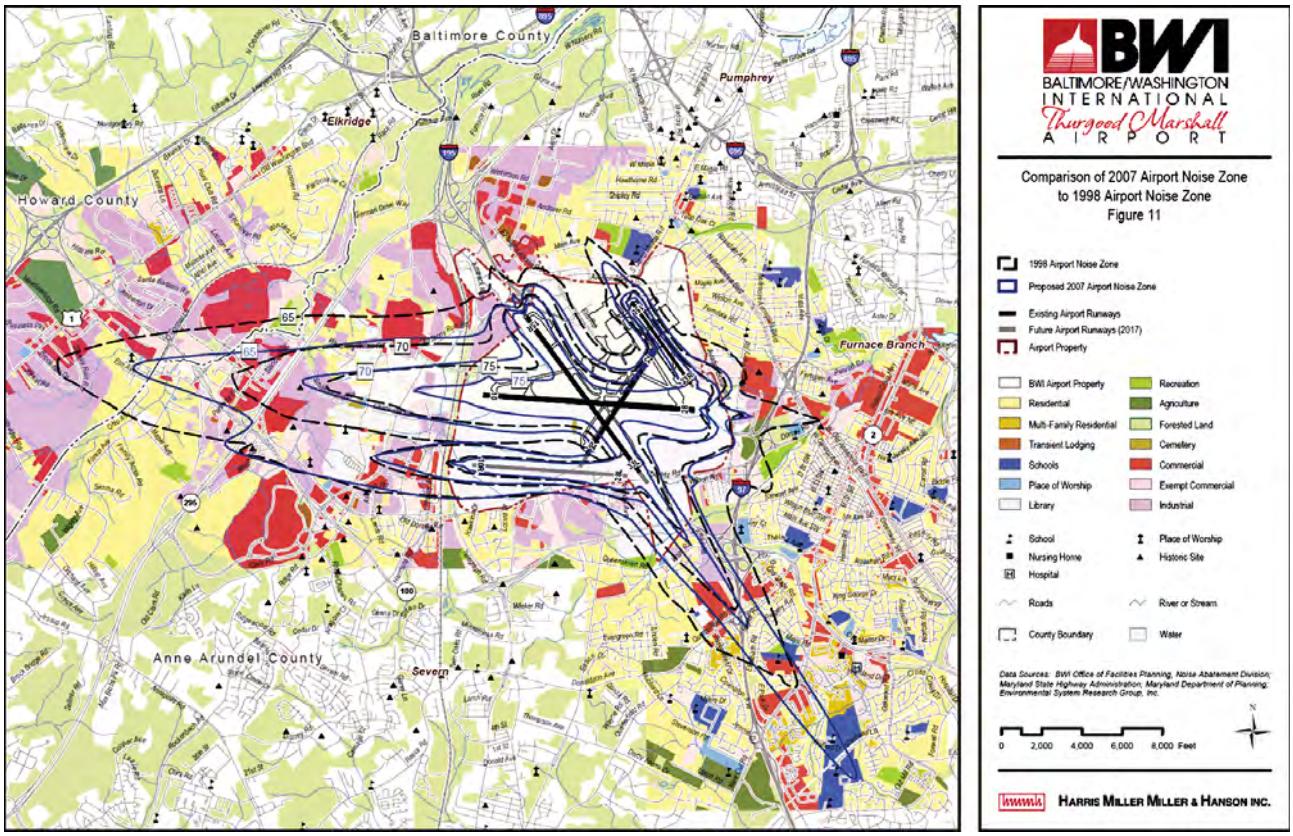


Figure 2.3-2. Comparison of the current and proposed ANZ.

Litigation - Challenge to Denial of Development within the ANZ

Several years ago, the MAA denied development of a large residential subdivision of approximately 20 houses located within the ANZ. The denial was appealed, but the Board of Airport Zoning Appeals upheld the denial. The denial was challenged in court by the developer, but was again upheld.

Gardner, *et al.* v. State of Maryland (1991) – The MAA was sued for noise taking. A judgment for the plaintiff was rendered, but the fine paid by MAA was relatively small.

Existing Studies, Planning, and Regulations

BWI's NAP

BWI has an extensive NAP, which the airport and other MAA staff have developed over several decades through extensive cooperative efforts with citizens and users. The FAA Part 150 Noise Compatibility Program, NCP, represents the portion of the NAP that has received FAA approval and therefore can be considered for federal grants. While operational measures receive the most public attention, the program is well rounded and includes complementary

Table 2.3-2. Comparison the 1998 and proposed 2007 AZs.

Airport Noise Zone	Acreage	Housing Units	Population
Current 1998	7,065	1,229	3,213
Proposed 2007	5,172	1,406	3,429
Changes	(1,893)	177	216

compatible land use measures and "continuing program" measures that focus on program implementation, communication, monitoring, and updating. The cooperative airport, citizen, and user effort has been, and will continue to be, the key to the success of the noise abatement program. (See Community Involvement.) Citizens provide critical input related to the identification of needs and program effectiveness.

The NAP is divided into two areas that deal with noise abatement elements and land use elements. Specific elements are outlined in Table 2.3-3 below. Elements marked with an asterisk (*) are described in more detail after the table.

Table 2.3-3. BWI NAP elements.

Noise Abatement Elements	Details
Aircraft Noise Abatement Departure Procedures*	• Noise abatement flight tracks on all runways • Limited use of Runway 4
Aircraft Noise Abatement Arrival Procedures*	• VFR noise abatement arrival procedures
Preferential Runway Use System*	• West operations are preferred for noise abatement. • Runway 10/28 is the preferred runway for noise abatement between the hours of 2300 and 0500 local time. • Limitation on use of Runway 33R from 2300 to 0500, local time. • Practice landings and approaches by jet and turboprop aircraft are prohibited on all runways from 2300 to 0700, local time. • Noise Rule for Runway 15L/33R*
Continued Restricted Use of Runway 4/22	• Runway 4/22 shall be closed to multi-engine aircraft from 2200 to 0700 local time.
Control of Ground Based Noise Sources*	• Powerback Restrictions* • Engine Maintenance Run-up Restrictions* • Tree Buffer along East Airport Boundary*
Cooperative Airline and Airport Program	• Encourage Stage 3 phase-out; now complete.
Continued Monitoring*	• Noise Hotline* • Quarterly Report* • Airport Noise and Operations Monitoring System* • Annual Review*
Land Use Elements	**Details**
Control of Incompatible Development*	• Airport Noise Zone (ANZ) • Board of Airport Zoning Appeals (BAZA) • Noise Zone Notification in Real Estate Transactions*
Noise Assistance Programs*	• Voluntary Land Acquisition Program* • Homeowners Assistance Program* • School Soundproofing Program* • Ridgewood Mobile Home Park

**Aircraft Noise Abatement Departure Procedures*

These flight tracks keep aircraft, as much as feasible, from flying over noise sensitive residential developments. For departures, flight tracks include turns that commence only after reaching specified distances from the Airport.

**Aircraft Noise Abatement Arrival Procedures*

Arrivals include procedures for minimum distances for final approach, minimum approach slopes, and maintaining specified altitude until reaching specified distance from the BWI VOR, as well as visual procedures following an interstate.

**Preferential Runway Use System*

Noise Rule for Runway 15L/33R The shorter commuter runway is available for use only by aircraft that produce less than a specified sound level, which is determined by reference to cer-

tificated levels published in FAA Advisory Circular 36-1H, *Noise Levels for U.S. Certificated and Foreign Aircraft.*

**Control of Ground Based Noise Sources*

Powerback Restrictions The MAA and FAA must approve all aircraft reverse thrust powerback operations in advance. This procedure will be approved by the MAA for specified gates, and only if the procedure, through demonstration, is in compliance with a maximum noise level test. All powerback operations are prohibited from 2200 to 0700, local time. Authorization to conduct powerback procedures will be terminated by the MAA should any environmental or safety hazards become evident. (Tenant Directive 203.1)

Engine Maintenance Run-up Restrictions Run-ups are authorized from 0600 to 2200, local time only, at approved airfield locations and under procedures prescribed by the MAA. Prior permission must be obtained from the BWI Airport Operations Center for any run-ups conducted between 2200 to 0600, local time. Permission during this time period shall be denied unless it can be shown that failure to conduct the run-up will delay departure of a scheduled passenger flight. (Tenant Directive 501.1)

Tree Buffer along East Airport Boundary The MAA planted 622 trees on the eastern boundary of BWI along Aviation Boulevard (formerly Hammonds Ferry Road). When mature, the buffer will provide some attenuation of ground noise sources, as well as a visual barrier between Airport facilities and operations and the adjacent community.

**Continued Monitoring*

Noise Hotline The Division of Aviation Noise and Abatement maintains a 24-hour noise hotline. Residents may call the hotline to identify a noise concern. During normal weekday business hours, a staff person will discuss concerns directly with citizens. During nonbusiness hours, an answering machine is programmed to record necessary information concerning a complaint and the calls are reviewed the following workday. A member of the MAA staff investigates complaints and follows up with a response to the caller if necessary.

Quarterly Report The report presents noise related data for each quarter of the year and can include monthly noise levels recorded by the Airport's remote monitoring sites, numbers of daytime and nighttime flight operations, runway use, complaint data, and flight corridor use.

Airport Noise and Operations Monitoring System The system consists of 19 fixed noise monitors that are located adjacent to aircraft flight paths throughout nearby communities, as well as four portable monitors. The monitors provide real time data on aircraft noise levels. Sites for the permanent monitors were selected with community input and, over time, several monitors have been relocated to meet community concerns and needs. The MAA plans to modernize this system in the coming year.

Annual Review An evaluation is conducted annually by the MAA to review the effectiveness of noise abatement programs at BWI. The review summarizes key data included in the quarterly noise monitoring reports, as well as an analysis of noise contours that represent conditions during the calendar year and are developed by computer modeling. The annual review also compares actual measured noise levels to those predicted by the modeling.

**Control of Incompatible Development*

Noise Zone Notification in Real Estate Transactions A notification process by owners and/or realtors that is intended to inform prospective buyers and renters of a property's location within the ANZ. The Maryland State Real Estate Commission has established an educational program with the Anne Arundel County and Howard County Boards of Realtors to provide notification as part of standard real estate transactions within the ANZ.

**Noise Assistance Programs (NAP)*

Voluntary Land Acquisition Program In 1985, the MAA began a voluntary program to acquire residential properties with cumulative noise levels of 75 DNL and greater. The NAP was expanded in 1988 to acquire properties in communities that are exposed to cumulative noise levels of 70-75 DNL, provided the area has been zoned by local government to transition from residential to a noise compatible use. The MAA proposes to modify the Voluntary Residential Property Acquisition Program to expand eligibility to the 65 DNL contour, as defined by the FAR Part 150 Noise Exposure Maps (NEMs). Large residential properties are excluded from the program if the owner(s) has reasonable opportunity for non-residential resale without state or federal assistance. Property owners are paid full market value for their property at its highest and best use and provided relocation assistance in accordance with the Uniform Relocation Assistance and Real Property Acquisition Policies Act of 1970. To date, the MAA has acquired 203 properties at a cost of $28.5 million.

Homeowners Assistance Program In 1988, the MAA began the Homeowners Assistance Program to offer financial assistance to homeowners residing in communities that are exposed to cumulative noise of 70-75 DNL and who are not eligible for the Voluntary Residential Property Acquisition Program. The MAA proposes to modify the Program to expand eligibility to the 65 DNL contour as defined by the FAR Part 150 NEMs. The Homeowners Assistance Program offers a choice of two options to eligible homeowners as described below:

Resale Assurance Financial assistance is provided to eligible homeowners wishing to move from the ANZ. The selected properties are appraised as if they are located outside the ANZ. The homeowner enters into a contract with the MAA, committing the MAA to pay the difference between the actual selling price of the property and its appraised value if it were outside the ANZ; and pay certain closing costs on a replacement house. Prospective purchasers must be advised of the property's location within the ANZ and their ineligibility for participation in noise assistance programs. The MAA has provided assistance to 85 homeowners in this program.

Soundproofing The MAA will assist eligible homeowners with making modifications to their houses, with a goal of reducing interior noise levels to an average of 45 DNL. The type and extent of the improvements are dependent upon the noise reduction capabilities of the existing structure. Fresh air ventilation and air conditioning are installed to allow windows to remain closed. The homeowner enters into a contract with the MAA, committing the MAA to: 1) pay for the agreed upon noise reduction modifications; and 2) monitor the construction and assure its quality. The MAA has provided assistance to 296 homeowners in this program.

State law requires that participants in the program grant the state an avigation easement, which permits aircraft operations, noise, and other effects of flight over and on a property and provides notification to future owners of cumulative aircraft noise levels. Homeowners are also ineligible for participation in other assistance programs and the easement is binding upon future owners of the property. Copies of the easement may be obtained from the MAA Real Estate Division.

School Soundproofing Program This program provides soundproofing for eligible schools to reduce undesirable interior noise levels. Four schools in the ANZ have received soundproofing through this program at a cost of $9.3 million. These schools are Corkran Middle School, Arthur Slade Regional School, Glen Burnie Park, and Oakwood Elementary Schools.

Height Restrictions

As with noise, MAA reviews all development proposals for height. COMAR establishes a four-mile radius of the airport and all development plans within this area must be submitted to MAA for review. If a structure is higher than specific airspace surfaces, the Airport Zoning Permit is

denied. Appeals may be made to BAZA. MAA uses FAA FAR Part 77 to determine whether structures are too high. If a permit is denied and an appeal made, MAA provides supporting materials to BAZA for its decision-making.

Community Involvement

The MAA has long emphasized public outreach as an important part of its mission. In 1983, the MAA established the BWI Neighbors Committee in response to neighbor concerns about aircraft noise and future airport growth and development. The Committee has representatives from 11 communities and serves as a liaison between the Airport and the surrounding communities to ensure continuing and timely discussion of mutual Airport and community interests. These interests include:

- Highway access and local traffic;
- Land Use;
- Long-range plans;
- Noise;
- Operational changes; and
- Parking.

The Neighbors Committee meets two to three times a year at the MAA offices in Linthicum. The meetings are open to the public and advertised in the local area papers. Prior to meetings, the Aviation Noise and Abatement Office will send out meeting notification and an agenda to all Committee members. Copies also go to local elected officials, local county planning representatives, additional community representatives, and individuals from the community who request to be on the mailing list.

The MAA also has a Community Enhancement Committee, which provides transportation related grants to communities that are located within the Airport Noise Zone or two miles beyond the outermost contour. A small group of "Community Ambassadors," who are MAA staff, attend meetings in the area communities.

When the MAA conducts an Airport Noise Zone Update and/or a Part 150 study, an Advisory Committee is established. The Advisory Committee is mainly composed of the BWI Neighbors Committee members, but also airport users, fixed based operators, pilots, elected officials, and local, state, and federal officials. All members provide input and make recommendations to the staff and consultants. The Committee members help disseminate information on studies to the community and aviation industry, as wells as solicit input from these groups.

All Advisory Committee meetings that occurred during the ANZ update included at least a portion of the session in an open workshop format to permit one-on-one dialogue with all interested parties. All Advisory Committee meetings were advertised using email.

Economic Impact – Assistance from the FAA

The FAA's Part 150 Program has certainly benefitted the MAA and BWI with grants for noise monitoring, property acquisition, and sound insulation. The MAA has worked with the FAA to refine the Integrated Noise Model, which is the FAA's computer program for modeling aircraft noise, when it did not accurately predict sound levels around the start-of-takeoff. Further, after the MAA conducted a study of low frequency noise, which included sound levels, vibration

levels, and homeowner judgments of the noise, the FAA agreed to provide additional funding in order to install the extra sound insulation required to reduce the low frequency noise in near-by homes.[1]

Discussions

The following paragraphs represent a synthesis of the preceding material with issues raised through discussions with BWI staff members.

Value of State Level Regulations

There is no doubt about the importance of having this program mandated by the state legislature and codified in the Annotated Code of Maryland. In essence, these laws give some authority to the airport operator (the state - MAA) over local land use. The MAA still needs to maintain good relationships with the surrounding jurisdictions, but the law adds weight to the Airport's need to be kept informed about development plans and a process for denial of permits.

A small airport that expects to support increasing operations or that may wish to protect its airspace for possible future procedures, such as precision approaches, could benefit from state level legislative mandates by gaining cooperation from surrounding jurisdictions to identify and modify or prevent potential noncompatible development proposals. Additionally, airports may not have the staff or resources to stay abreast of either development proposals or airspace obstruction requirements. Additional funding may be the only way to be adequately informed to take actions that prevent loss of future airport potential.

Development Outside the ANZ

Despite what must be considered one of the most comprehensive noise and land use compatibility programs in the United States, there remain some issues. For example, there are several very large multifamily, semi detached and single-family communities developing a few miles from the Airport. The developments are outside the Airport Noise Zone and therefore MAA has no control over the development. In 1999 when the projects were in the planning stages, MAA notified the county and the developers that the residents would be subjected to aircraft noise and recommended that soundproofing techniques be incorporated in the construction standards. There are now residents in these homes and BWI is receiving complaints. MAA can only advise the residents that the developers were informed of the noise issues. The MAA has since sent follow-up letters to the developers indicating that residents are complaining and again recommending that soundproofing be included in the construction. One obvious conclusion is that compatibility criteria extending below 65 DNL should be considered.

Support from the FAA

Support from FAA has been inconsistent. In one case, the FAA agreed that a proposed structure penetrated Part 77 surfaces. However, when the development was denied and then appealed to BAZA, the FAA was unable to provide support for the MAA denial and BAZA approved the development.

[1] For a more detailed discussion of this study and low frequency noise, see the Annotated Bibliography developed as part of ACRP Project 3-03.

In another situation, one FAA office said a particular property could be constructed because it did not penetrate the 34:1 surface and another office said MAA was required to meet a 50:1 standard. The property was approved. If the FAA decides to enforce a 50:1 surface, the MAA may have to purchase and raze a new $800,000 property.

Disclosures / Resale Assurance / Avigation Easements

The MAA requires avigation easements when houses are soundproofed by MAA or when MAA pays the difference between the assessed value of a house (as if it were not in the ANZ) and the price for which the house was sold. The general consensus at MAA is that the resale assurance is inappropriate. It gives the former owner money, provides the new owner with no soundproofing and no recourse because the avigation easement stays with the house.

Disclosures have been tried, but the only one that the realtors would accept is a general statement in the purchase and sale contract that includes noise along with the other consumer warnings about lead paint, flood plain, etc. The disclosure is general and essentially warns that if the property is near an airport, the buyer should review an airport noise zone map if one is available.

Additionally, when someone purchases a house that is a longer drive from the airport, they generally do not expect to hear aircraft noise. However, many noise complaints result when the house is only a mile or two by air and under arrival corridors.

Conclusion/Analysis

BWI has been successful with their use of state level laws that enabled the NAP program. For their continued growth, it is important to continue interactions with surrounding jurisdictions and communities. While complaints continue, they are mainly from areas that are within geographic areas at levels below the 65 DNL noise threshold, consequently, little more can be done for these residents.

Centennial Airport, Englewood, Colorado

Introduction/Airport Overview[1]

Centennial Airport (KAPA), located 18 miles south of downtown Denver, is the third busiest general aviation airport in the nation and is among the top 25 of all airports (Figure 2.4-1). It serves as a reliever airport for Denver International Airport (DIA). Located near the Denver Technological Center, one of the Denver region's largest employment areas, KAPA is an important hub for commerce and trade, serving a number of Fortune 500 companies. KAPA is also used by Flight for Life and other medical flights, law enforcement, news media, flight schools, flying clubs, air charter services, aircraft sales services, and aircraft maintenance services. KAPA has no scheduled commercial flights.

Figure 2.4-1. Centennial Airport.

1998 was a record year at KAPA, with over 466,000 aircraft operations. In 2005, KAPA accommodated 344,619 aircraft operations. Although the Airport and customs office are open on a 24-hour basis, most of the traffic is concentrated in the daytime hours. KAPA has three runways: two parallel runways, one measuring 10,002 feet in length and the other 7,000 feet; and one cross-wind runway with a length of 4,800 feet. Almost 90 percent of the air traffic uses the north/south runways. A number of smaller aircraft use the east/west crosswind runway as a means to keep separation from the larger jet traffic. There is one instrument landing system (ILS) approach, from the south. The airport staff reported having had some limited discussions about adding an ILS approach for the cross-wind runway, but has not determined any timeline for that upgrade.

History of the Airport

Early in the 1960s, George Wallace, the vice president of the Denver Technological Center (DTC), convinced business owners and elected officials with Arapahoe County to build an airport on the outskirts of the Denver metro area to the southeast, near DTC. In March 1963, the county announced that they would build what was billed as the "finest general aviation airport in the West." The airport opened with one runway on May 13, 1967 and has grown steadily since that time. The crosswind runway and first air traffic control tower were added in 1973.

[1] Major sources of data and information for this section include the websites of Centennial Airport, Arapahoe County, and the city of Aurora.

Operational activity quickly exceeded 100,000 landing and take-offs. In 1975, the county decided to establish a separate Arapahoe County Public Airport Authority, with its own board of commissioners, in order to simplify bond financing. In 1977, a new parallel runway was completed, as wells as an extension of the primary runway and taxiway improvements. In honor of Colorado's official designation as the Centennial State, the airport was renamed Centennial Airport on July 13, 1984.

As Stapleton Airport in Denver became more congested over time, many private jets relocated to KAPA for convenience and to avoid potential scheduling conflicts with commercial carriers. By 1988, Centennial Airport was selling more fuel to general aviation aircraft than Stapleton. In 1995, Stapleton Airport closed and Denver International Airport (DIA) opened 18 miles east of Denver. DIA does not allow general aviation flights, which forced all general aviation traffic from Stapleton to either Front Range Airport or KAPA. By this time, KAPA was no longer on the outskirts of the metro area. The surrounding communities had expanded as nonresidential and residential growth occurred. The communities annexed lands from Arapahoe County in the vicinity of the Airport. Some of the residential development encroached upon the Airport safety zones, including the inner and outer approach and turning safety zones. KAPA experienced an increase in operations during the 1980s and 90s and shortly after, noise and safety concerns, and complaints increased from the surrounding communities. The Arapahoe County Public Airport Authority first published and adopted land use guidelines to address noise and safety compatibility in March of 1998, as shown in Figure 2.4-2.

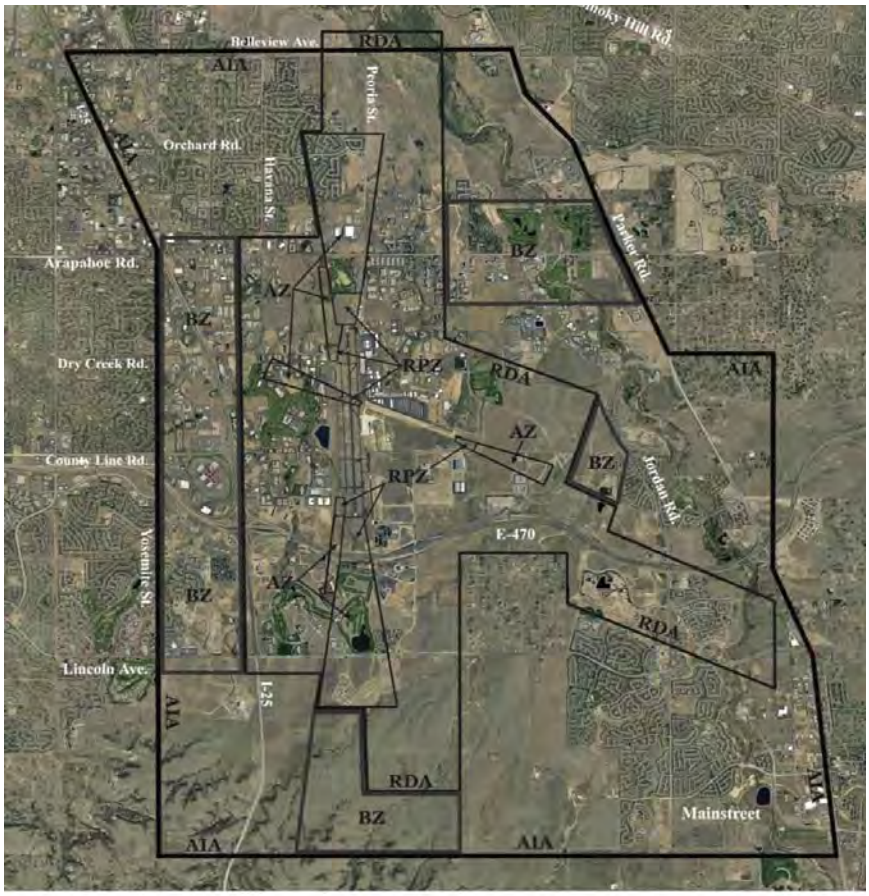
KAPA was the center of a controversy in the 1990s when the Airport refused to allow scheduled carrier service on small aircraft. The Airport and local jurisdictions were in agreement that scheduled air service was undesirable and they did not want to allow a service that would have take-off and landing priority over the existing customer base of private jets. KAPA also did not want to take on the expense of adding terminal and baggage services to meet the anticipated demands and expectations of scheduled passengers. The surrounding jurisdictions supported the Airport and feared a scheduled service would ultimately increase noise impacts. DIA was also opposed to scheduled commercial service at KAPA, as it was planned to accommodate all the scheduled commercial air service capacity in the region.

The FAA, however, ruled that the refusal to allow scheduled service discriminated against a class of air carriers and therefore violated the terms of grant assurances previously signed by KAPA. The U.S. Supreme Court ruled in favor of the FAA, and the FAA withheld grant funds from KAPA for more than four years. It took an act of Congress to resolve the issue in favor of KAPA. A provision attached to the 2002 Omnibus Bill of the U.S. Congress allowed general aviation reliever airports that are located within 25 nautical miles of a major airport and exceed a threshold number of operations to opt out of scheduled air carrier service. The bill, written in general terms, is only applicable to KAPA among all general aviation airports nationwide.

Governance

Centennial Airport is governed by the Arapahoe County Public Airport Authority (ACPAA), a separate political entity from Arapahoe County. The three county commissioners serve on the ACPAA Board, which has five voting members including the commissioners and two additional residents of Arapahoe County and three non-voting members, who are the county commissioners of adjacent Douglas County. The ACPAA has the authority to issue bonds, acquire property including under condemnation, charge fees, lease land, construct and maintain facilities, enter into contracts with the state or federal government, and regulate use of the airport.

A large number of jurisdictions control land within the greater airport vicinity. The airport straddles the county line between Arapahoe and Douglas Counties, two major urban counties.



AIA: AIRPORT INFLUENCE AREA: Refer all plats and development plans to the Airport Authority for review. Comply with FAR Part 77. Require Avigation Easement by landowner and Public Disclosure to prospective buyers and tenants. Residential and other noise sensitive development requires a 7-day noise test and development is prohibited/not recommended in areas at DNL 65 or above.

RDA: RESTRICTED DEVELOPMENT AREA: Prohibit new residential and other noise sensitive development. Building height must comply with FAR Part 77 surface criteria, existing or future, whichever is more restrictive.

BZ: BUFFER ZONE: Recommend no new residential or other noise sensitive development. Governmental entity with zoning and building permit authority to develop specific restrictions.

AZ: APPROACH ZONE: Prohibit new residential and other noise sensitive development. Building height must comply with FAR Part 77 surface criteria, existing or future, whichever is more restrictive.

RPZ: RUNWAY PROTECTION ZONE: No structures permitted.

N

CENTENNIAL AIRPORT LAND USE GUIDELINES MARCH 12, 1998

Figure 2.4-2. Centennial Airport land use guidelines.

Within each of these counties are a number of municipalities, as well as substantial amounts of unincorporated developed and vacant property. These include the City of Centennial, Greenwood Village, Parker, Lone Tree, Cherry Hills, Foxfield, Highlands Ranch, and others. Unincorporated lands have been and can potentially be annexed into a number of these jurisdictions.

The state of Colorado has little regulatory guidance on airport land use compatibility planning. The Colorado Revised Statutes include provisions that allow local jurisdictions to place special restrictions on lands in the vicinity of airports as one of a number of "areas of special state interest." No specific guidance on what should be addressed is included in the law. The Colorado Department of Transportation Aeronautics Division produces a report once every five years that reports on the economic impacts of airports in Colorado. The airport planners reported a good working relationship with the Aeronautics Division staff on other matters, but indicated that they did not feel that the state agency provided useful guidance on airport land use planning issues.

Discussion of Compatibility Issues and Responses

During the initial survey, the Airport manager reported "minor" compatibility concerns related to tall structures, visual obstructions, and land uses that attract wildlife; "moderate" compatibility concerns regarding concentrations of people and noise sensitive land uses other than residential; and "extensive" compatibility concerns regarding residential developments.

The survey response elaborates that:

> We currently have significant residential encroachment with 20 households within the 70 DNL, 110 within the 65 DNL, and 1,070 within the 60 DNL. There is also a large amount of residential development that has been approved but not yet developed on the south side of the airport.

Some of these residential uses are also incompatible with safety guidelines because they are located in the safety zones. Many of these were developed in the 1980s and early 1990s at the same time that KAPA operations were expanding rapidly and before the ACPAA land use guidelines were produced. However, some new residential uses were developed in the last decade.

Noise

Overall, most of the land use compatibility concerns expressed at KAPA, across the range of interviewees, focused on noise conflicts that result from residential uses that have been or are planned to be built in proximity to the Airport. As noted, there are 20 homes in the 65 and 70 DNL contours. KAPA has mitigated all incompatible land uses within the 65 DNL contour identified through the FAA approved Noise Exposure Map (NEM) produced in 2000 during Part 150 Study with sound insulation programs. In addition to residential uses, noise sensitive uses include three schools with the first located inside the 60 DNL contour, the second located on the 60 DNL contour line, and the third located between the 55 and 60 DNL contour. The NEM is shown on the following page in Figure 2.4-3. KAPA began the Part 150 Study in 1997. Ten years in the making, the study was complete and began circulation for comment in early 2008. The study projects that with no mitigation measures, residential units in the 65 and 70 DNL contours will increase by approximately five-fold and will more than double in the 60 DNL contour. The study includes numerous recommendations for noise mitigation, of which only one addresses land-use decision making (marked by an asterisk *). The recommendations include:

- Ban Stage 1 aircraft.
- Ban Stage 2 jet aircraft under 75,000 pounds at night.
- Implement 010 degree departure heading for business jets at night.
- Test 24-hour flight tracks between 350 and 010 degree headings.
- Eliminate preferential runway use procedure.
- Implement 170 degree departure to 4 DME or 8,000 MSL (+/- 20 degrees).
- Amend community plans and zoning ordinances.*
- Update and establish environmental/noise abatement liaison/office.
- Install noise monitoring system and develop noise monitoring program.
- Development and implementation of Fly Quiet program.
- Operations review and Part 150 updates.
- Establish follow-up roundtable/committee.

KAPA has adopted Voluntary Noise Abatement Guidelines that are published on the Airport website and made available to airport tenants. The procedural guidelines are listed as follows:

- Traffic pattern altitude of 6,800 ft MSL.
- Inbound and outbound traffic, minimum altitude 7,300 ft MSL.

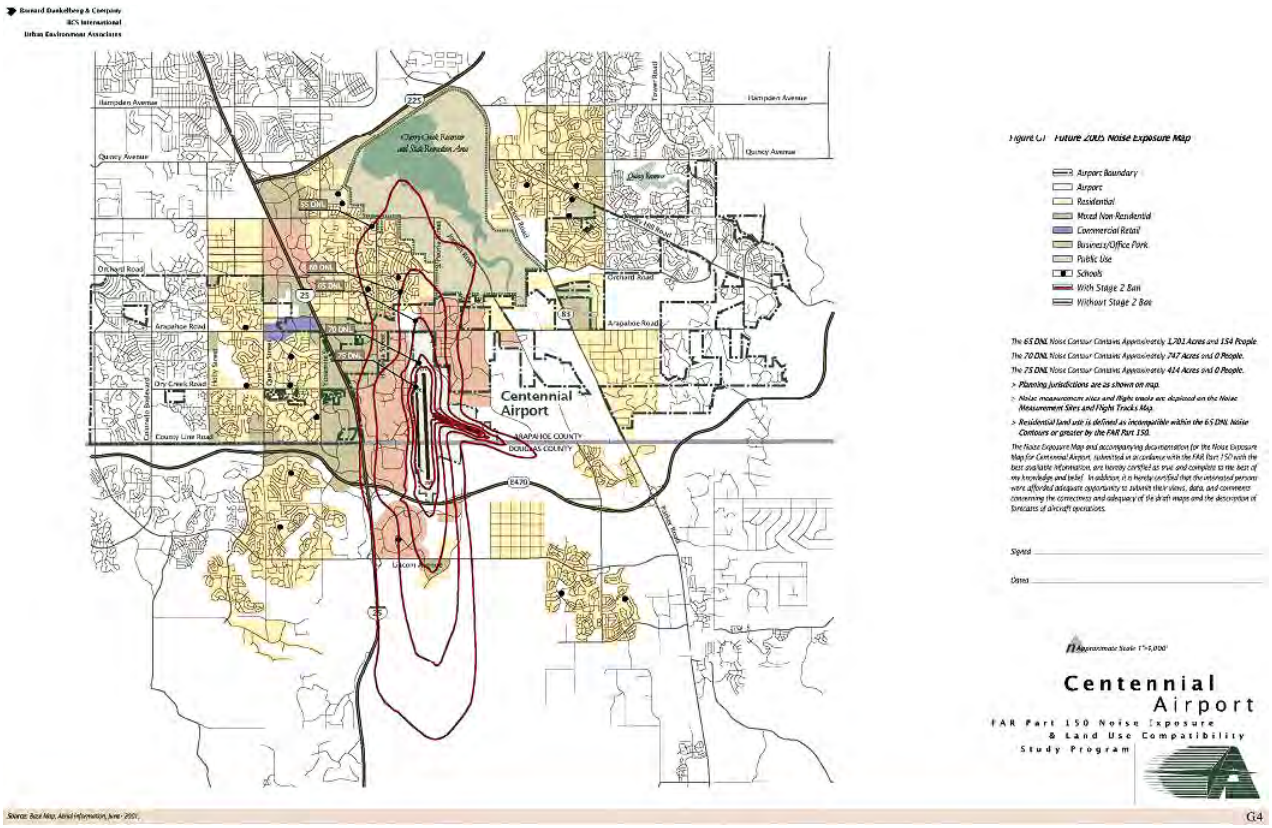


Figure 2.4-3. KAPA NEM.

- Avoid noise sensitive areas around the Airport, which are located:
  - 1.5 miles to the north/northwest and to the southwest.
  - 1.0 mile to the southeast and to the east.
- Helicopter operators please contact tower for preferred noise abatement routes.
- Stage 2 aircraft over 70,000 lbs not allowed.
- Stage 2 aircraft preferred operating hours are 7:00 a.m. to 10:00 p.m.
- Please follow NBAA noise abatement procedures when applicable.

Additional General Voluntary Noise Abatement Guidelines are encouraged as follows:

- Avoid high RPM settings.
- Consider Runway 17L or 35R for jet operations.
- Make power setting changes slowly.
- Maintain synchronized propellers and engines.
- Minimize use of reverse thrust.
- Use best rate of climb and thrust reduction techniques.
- Use the National Business Aircraft Association's Fly Quiet procedures.

Arapahoe County has restricted new residential uses within the 60 DNL contour through its zoning ordinance. Additionally, the ACPAA published land use guidelines, shown in Figure 2.4-3, that restrict noise sensitive uses from areas that square off and extend beyond the 60 DNL contour, in anticipation of future increase in airport operations that could expand the noise contours outward. However, many of the surrounding jurisdictions do not follow these guidelines. Also many noise complaints come from within lower valued DNL contours, likely due in part to the relatively low ambient noise that is prevalent in many of the affected areas.

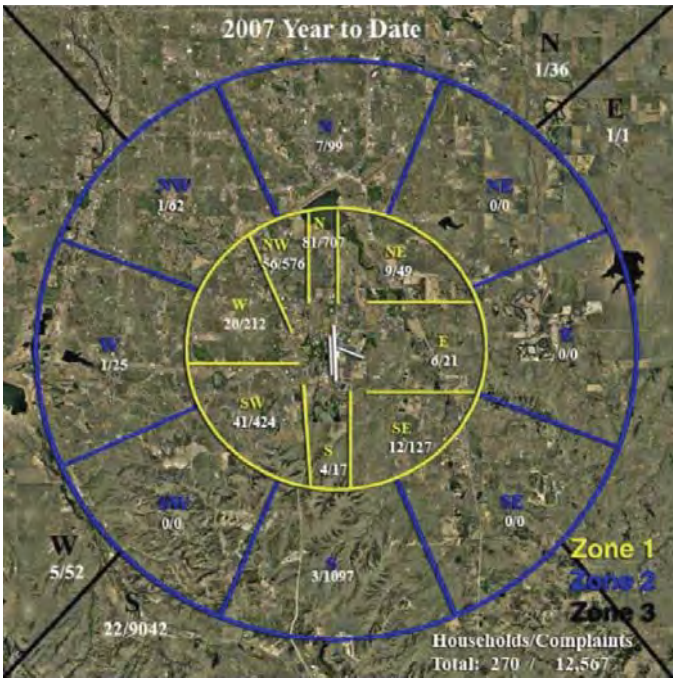


Figure 2.4-4. Residential noise complaints around KAPA.

As noted above, residential uses in the airport vicinity and noise from operations have increased in tandem over the past decades. KAPA and the ACPAA have funded sound attenuation for all residential uses in the 65 DNL contour. Some residents continue to be bothered by aircraft noise. In fact, the noise hotline at KAPA registered some 12,567 noise complaints from 270 households in 2007, as shown in Figure 2.4-4. However, it should be noted that 77 percent of the complaints came from just five households, with the single top household registering 33 percent of complaints, or more than 11 calls per day, 365 days per year.

Despite the fact that local governments in the vicinity have at times been among the voices decrying the effect of airport noise on residents, many continue to entertain proposals in areas with noise impacts that are similar to the areas where complaints are generated, including in the 60 DNL noise contour. Recently, the KAPA and the ACPAA teamed to aggressively block a land development proposal that was being considered for annexation by the city of Centennial. The development was proposed as a mixed-use project that would have included residential components within the Restricted Development Zone of the ACPAA Land Use Guidelines. Together, the Airport and ACPAA spent nearly $9 million to purchase land and development rights in order to block the project.

In addition to overflight impacts in low ambient noise areas, conditions of topography can affect how area residents experience the noise impacts of KAPA. For example, Sapphire Point is a recently developed neighborhood in Douglas County that is 13 miles away from the airport and well outside of the 65 DNL contour; yet residents have been a major source of new noise complaints. The development is built on the centerline of the approach to the airport and ILS outer marker, on hilly topography that is 1,000 to 1,500 feet higher than the airport. The higher topography means that aircraft are closer overhead in Sapphire Point than in many neighborhoods that are much closer to the runways.

Douglas County does not recognize the Airport's noise contours or ACPAA's land use guidelines. Instead, they hired a third party consultant to establish noise contours that are tighter and closer to the runway ends, which are to be used for land use planning. The County has approved residential development within the Airport's 65 DNL, but it is just outside the Douglas County 65 DNL. Douglas County approved a very large subdivision plat for more than 1,500 homes south of the north-south runways in the Airport Influence Area. After the subdivision was platted by Douglas County, it was annexed by the city of Lone Tree.

Safety

There are a number of residential uses built within the safety zones, more specifically in the approach zones. Some new residential uses were developed recently and include multi-family development annexed and approved within the last 10 years in Greenwood Village, which is in the outer portion of the approach zone north of the Airport. Another was the mixed-density Meridian neighborhood approved by Douglas County in the approach zone south of the airport (Douglas County recognizes a smaller approach zone that extends 7,250 feet off the runway end,

rather than the 10,000 feet that FAA guidance recommends). Housing in Meridian is arranged in a horseshoe pattern around the end of the approach zone that Douglas County recognizes (7,250 feet) and includes an avigation easement over the portion of the property that lies in the approach zone.

Douglas County also approved a very large mixed-use subdivision called Ridgegate located immediately south of the Airport, in a horseshoe pattern around the runway end. Ridgegate is planned to include up to 10,000 residential units, including several thousand multi-family and attached single-family residential units in the Airport Influence Area, portions of which are in the restricted development zone, buffer zone, and even in the approach zone as defined per the ACPAA land use guidelines. This area was subsequently annexed by the city of Lone Tree and is now partially built. A Douglas County planner stated that the county has purposefully permitted development at Meridian and Ridgegate that is designed to keep only the approach corridor for the existing runway free of incompatible uses, in order to channel flights to a single corridor and to block other possible overflight tracks.

There have been a number of aircraft accidents at KAPA on- and off-airport, including at least five that resulted in fatalities to occupants of the aircraft. Several of these occurred just outside the safety zones. Although KAPA has received some negative press due to a number of accidents, the rate of accidents per operations is within the typical range for general aviation airports. Community interest in airport safety issues appears limited to the immediate aftermath of an accident, with little or no public demand for local jurisdictions to respect the safety zones when new developments are proposed.

Other safety concerns at KAPA include wildlife and tall structures. The airport has a wildlife fence to keep large animals out of the runway area. There is also a pond located on the boundary of the airport property. The pond is part of the Inverness corporate campus. The approval of the development included provisions that require the office complex to manage the pond with wildlife deterrent measures, such as seasonal fencing of potential shoreline nesting areas. The airport staff reports no serious wildlife compatibility issues at present, nor any structures that penetrate the Part 77 surfaces. However, the staff did indicate some concern about the height of future non-residential and mixed-use development planned in the vicinity of the Airport.

Arapahoe County and city of Centennial have adopted zoning regulations that enforce land use restrictions in the safety zones, but other jurisdictions either do not have such restrictions, or, as in the case of Douglas County, have adopted smaller zones and more lenient provisions.

Existing Studies, Planning, and Regulations

Zoning Regulations

Arapahoe County zoning follows the ACPAA Land Use Guidelines and has specific zoning provisions to address airport related safety, height, and noise concerns. The county's airport zoning regulations apply equally to KAPA, DIA, and Front Range general aviation airport. They include similar regulations that apply to Buckley Air Force Base, all of which have an impact on the county to some degree. The county zoning delineates both "airport influence zones" based on master planning and "airport noise impact zones" based on FAA and DoD noise modeling practices (Figure 2.4-2 shows the airport influence zone, AIA, boundary for KAPA). Avigation easements are required within each zone for any new land use plan, subdivision plat, or building permit, except building permits on unplatted property greater than 35 acres do not carry an avigation easement requirement.

Arapahoe County zoning regulations address airspace protection through specific reference to the Part 77 surfaces and through general provisions that restrict any use from an airport influence district that would create electrical interference, cause glare, impair visibility, make it difficult for pilots to distinguish airport lighting, or "otherwise endanger the landing, take-off, or maneuvering of aircraft at an airport or in the vicinity of the airport." Arapahoe County zoning restricts development in the safety zones, identified on the ACPAA Land Use Guidelines map as the "Approach Zone" and "Runway Protection Zone." In the Approach Zone, no structures are permitted, "in an area 200 feet wide by 2,500 feet long along the centerline extended." In the Runway Protection Zone, no nonaeronautical structures are permitted. In the Restricted Development Area, daycare uses within an office campus may be allowed "when sited within the building in a manner that mitigates the risk of injury from potential airplane crashes."

Arapahoe County zoning requires avigation easements as indicated above, as well as an airport noise disclosure at the time of sale or lease of any property in the airport influence area. The noise compatibility zoning regulations restrict land uses as follows:

- Prohibits new residential and other noise-sensitive development in the 65 DNL;
- Prohibits residential development and requires sound mitigation construction techniques for all other noise-sensitive uses in the 60 DNL and/or the ACPAA Buffer Zone and Restricted Development Area, except that daycare uses within an office campus may be allowed in the Restricted Development Area; and
- Discourages all residential, educational, or day-care uses in the 55 DNL.

These regulations provide a variance provision that is written to apply in limited situations. The county has allowed variances in certain instances since the ACPAA land use guidelines were written. For example, the county recently approved multifamily residential within a mixed-use, which is a transit-oriented development within the Restricted Development Area (but outside the 55 DNL). The project is subject to noise impacts other than the airport, such as from the future light rail line and the E-470 freeway.

The city of Centennial has adopted the same regulations, verbatim, as Arapahoe County, as a part of its agreement when annexing lands from the county. The zoning regulations recognize the ACPAA land use guidelines, airport protection zones, and the 1999 Noise Exposure Map. Like Arapahoe County, the city zoning regulations provide for a variance to allow residential uses in the 55 DNL contour. Like Arapahoe County, the city has sometimes granted variances allowing development that does not strictly comply with the ACPAA land use guidelines in the Restricted Development Area. The city of Centennial recently adopted a resolution setting forth additional criteria to guide decisions about whether to grant such a variance because the Airport and Arapahoe County have raised questions and concerns regarding occasions when the city has seen fit to grant such variances.

In contrast to those of Arapahoe County and city of Centennial, Douglas County zoning regulations do not recognize or conform to the ACPAA land use guidelines. However, Douglas County zoning regulations do include noise, height, and safety regulations. The regulations describe two safety zones and two noise zones, and a height restriction overlay zone, as shown in Figure 2.4-5. The two safety zones for Douglas County are named the Runway Safety Zone, which is shorter and smaller than ACPAA's Approach Zone, and the Fan Safety Zone, which describes a quarter-circle to the west of the departure zone of runway 35L and is unrelated to any specific zone described in the ACPAA land use guidelines.

Most land uses are prohibited from Douglas County's Runway Safety Zone, except low intensity uses are allowed that include cemetery, golf course, agriculture, and extractive uses. The same is true in the Fan Safety Zone, except that industrial uses including warehousing and distribution

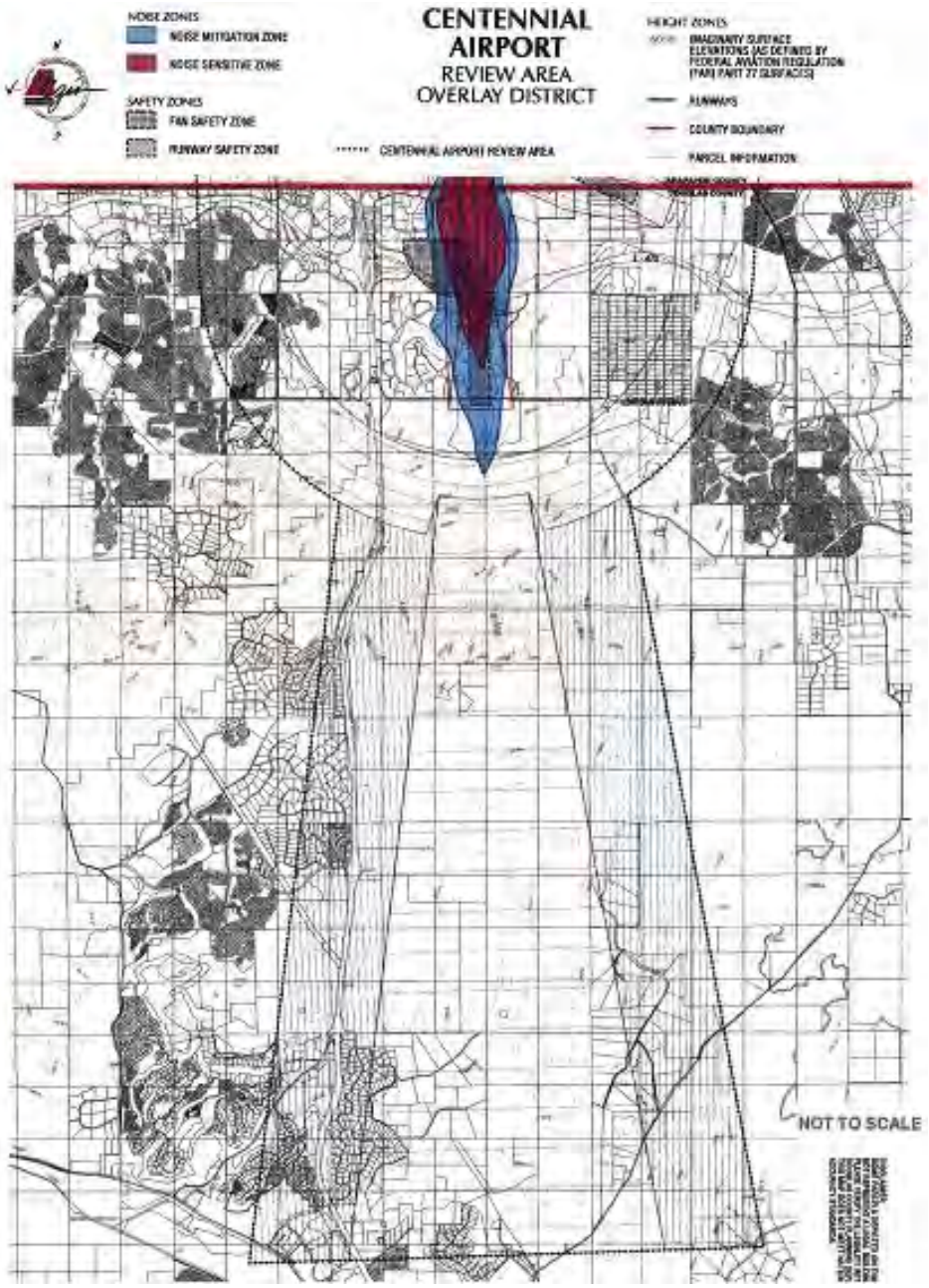


Figure 2.4-5. Centennial Airport review area overlay district map.

are allowed in the area, subject to site and building design to reduce hazard potential. Aboveground storage of highly flammable and hazardous materials is restricted in both safety zones. An avigation easement is required in these zones for plats and site improvement plans.

Airspace protection in Douglas County references the Part 77 surfaces and indicates that a use determined by the FAA to be a hazard may be, but is not prohibited. Further, the regulations discourage uses within 10,000 feet of a runway that attract birds (i.e., sewage plants, open bodies of water, landfills) and indicate that mitigation measures may be required for such uses.

As noted earlier, Douglas County does not recognize the noise contours developed for the Airport's Master Plan or Part 150 study. Douglas County airport noise regulations describe two

zones, the Noise Sensitive Zone and the Noise Mitigation Zone. These zones appear to be similar to, but slightly smaller than, KAPA's most current 70 and 65 DNL contours, respectively.

Planning staff indicates that Douglas County does not recognize the Airport's contours because the County believes the modeling does not reflect the fact that certain types of aircraft are unlikely to come to KAPA because commercial air service is prohibited. Therefore the County used a different model, which generated smaller noise zones due to the lack of larger commercial aircraft. Douglas County prohibits noise sensitive residential, civic assembly, educational, and health care uses in the Noise Sensitive Zone and requires noise mitigation construction techniques for these uses in the Noise Mitigation Zone. Douglas County approved the development of the Meridian neighborhood immediately outside the Noise Mitigation Zone, but within ACPAA's Approach Zone.

Land Use Plans

The ACPAA has adopted Land Use Guidelines for the airport area. Arapahoe County has adopted zoning that conforms to the ACPAA guidelines. The County's comprehensive plan does not contain specific goals or policies that address airport land use compatibility, but does include a map of future land use in the airport vicinity that is compatible with the ACPAA guidelines. Specifically, the map depicts industrial uses in closest proximity to KAPA, with employment-oriented land uses depicted in a broad area that encompasses the remainder of the airport influence area.

The city of Centennial Comprehensive Plan does not directly address the issue of airport land use compatibility planning. However, a Comprehensive Plan Map dated 2004 clearly delineates the 60 DNL contour using the Airport's contour from the Part 150 study and depicts non-residential land uses as intended uses within that contour.

Several years ago, the city of Centennial and Arapahoe County began a Joint Land Use Study for portions of Arapahoe County in the vicinity of KAPA that the city wanted to annex. KAPA airport planners and the ACPAA staff also participated in the development of the study. The study includes existing and future land use maps, as well as design standards for the study area. The intended outcome of the study was to guide quality development that could enhance the image and market potential of the study area. When the study was nearly complete, the city of Centennial announced that they were in negotiations with a developer for a mixed-use development within the study area, as well as within the Airport Influence Area and partially within the ACPAA's Restricted Development Area. The city staff believed that the development was overall consistent with the future land use designations in the study, while the Airport and Arapahoe County disagreed based on the amount and location of certain proposed residential uses. Ultimately, KAPA and the ACPAA purchased land and development rights to block the development. As a result of the disagreement, the county declined to adopt the land use study and instead adopted only the design standards portion of it. The city went on to adopt the study unilaterally.

Airport Master Plan

KAPA updates its master plan approximately every five years. KAPA has no plans for runway expansions, but the Airport has land available for continued additions of hangars and fixed-base operators.

Adjustments to Airport Operations

KAPA has adopted a range of voluntary measures to address airport noise, including noise abatement procedure guidelines. The Airport staff is working with the air traffic control personnel to enforce the voluntary measures.

Community Involvement

Each time the airport master plan is updated, the Airport conducts a public information meeting and input process that includes informational meetings and other opportunities for public comment. For the Part 150 study, in addition to similar public outreach efforts, two groups were specially convened by the ACPAA and include the Technical Advisory Committee, which consists of technical staff from the airport, ACPAA, and local jurisdictions; and the Community Advisory Committee (CAC). The CAC includes a range of interested parties and citizens, including a number of high net worth individuals who use KAPA personally and/or professionally. Local jurisdictions reported that the composition of the CAC helped to keep the positive economic impact of the airport in the forefront of discussions related to noise impacts.

As discussed more fully in the case study for DIA, the Denver Regional Coalition of Governments (DRCOG) has played a role in promoting the regional benefits of airports in metro Denver. In 1988, DRCOG published an economic impact analysis of the metro area airports, touting the benefits in terms of jobs and visitors.

A noteworthy instance of a community partnership between KAPA and local jurisdictions that was spurred at least in part by noise compatibility issues is that Greenwood Village was party to KAPA's legal battle to ban scheduled service. The town, which has residential areas that are heavily affected by airport noise, joined the suit to argue that the ban was intended not to discriminate against a class of air carriers, but in order to address local area needs and desires. This appears to be a somewhat unusual set of factors that brought the local jurisdiction and the airport together on the same side of airport noise-related litigation.

The airport manager reported that the multiplicity of jurisdictions in the Airport Influence Area made it somewhat difficult to engage all of them effectively or get consensus. The airport has had widely varying receptiveness among the jurisdictions to their Part 150 noise study, which has caused the process to take ten years to complete. Many, but not all, of the communities' responses to the draft Part 150 are geared to protecting limited local interests rather than endorsing "greater good" solutions. For example, one recommendation from the study is to adjust the departures tracks in a way that moves flights from passing over residential uses to over dedicated open space. A city nearby responded in opposition to the recommendation because it would move flight tracks slightly closer to some of its neighborhoods.

Airport staff also reported a great variation in whether local jurisdictions refer to them for comment development proposals in the airport influence area, and whether they take the airport's comments about land use compatibility into account and respond with adjustments to development plans that make them more compatible with airport impacts.

Economic Impact

The CDOT Aeronautics division produces a report of economic impacts of all airports in Colorado and is updated every five years. In 2008, KAPA was estimated to have a positive impact of $897.1 million on the local economy. The airport payroll alone is $356.7 million annually, with a total of 10,485 airport jobs.

In recent years, the airport staff has offered tours to newly elected local officials, which introduces them to the on-airport location of leading business aviation department(s) that are otherwise located off-airport. The stated intent is to point out a clear link in the mind of the local official of how the regional airport contributes to the local economy.

During the four years that the FAA withheld grant funding from KAPA based on the airport's ban of scheduled passenger service, the airport lost $1.5 million in grant funding each year. The

airport delayed a number of maintenance projects at the time, and eventually the county gave the airport about $1.5 million from its general fund to address certain maintenance and repair issues. The airport staff did not have an available estimate of increased cost due to deferral of maintenance. As discussed above, the airport's reasons for banning scheduled service are complex. It is not accurate to attribute them or the costs of delay primarily to land use compatibility concerns.

Conclusion/Analysis

Residential development and airport expansion have both increased dramatically over the last few decades, which resulted in noise incompatible uses in the 65 and 70 DNL contours. There are also uses in the safety zones that are not recommended per FAA guidelines and/or the airport owner (ACPAA). While two of the jurisdictions that control lands in the safety zones (Arapahoe County and city of Centennial) have relatively strong and effective safety zone controls in place, many of these areas have been annexed by other jurisdictions or into Douglas County. These jurisdictions either have no airport safety zoning or recognize smaller zones with more lenient use standards and recommendations, such as Douglas County. These discrepancies have continued even as the community has ostensibly become more aware of airport noise, safety conflicts, and compatibility guidelines. At present, all off-airport land in the outer 2,500 feet of the approach zones is platted or built in residential units of varying density.

In addition to safety incompatible uses in the Approach Zones, many parts of the airport vicinity and Airport Influence Area that are not controlled by Arapahoe County or city of Centennial have either weak protections or no formal protection against the encroachment of land uses that create hazards to the KAPA airspace. There is potential for tall structures, as well as land uses that cause glare, interfere with visibility, allow confusing lighting, and similar potential hazards in the airport vicinity.

The community experience of noise from KAPA is consistent with that around DIA and the former Stapleton Airport. The FAA standard that relies on the 65 DNL contour for compatible noise impact is not accepted as reasonable by many local residents who voice numerous complaints. This may be due to relatively low ambient noise levels. All of the noise incompatible uses in the 65 DNL have been insulated to make them compatible. However, there is no strong consensus among the local government jurisdictions about whether to use the federal standard of the 65 DNL or some lower standard, or even about what formula or methodology should be used to derive the noise regulations. This may reflect, in part, the large number of jurisdictions that control some land within the airport influence area and have a widely ranging set of benefits and impacts from KAPA. The noise impacts of the airport continue to be a source of concern to local governments who do not want to see increases in operations at the airport that would create additional noise impacts. In some cases, it appears that local jurisdictions have specifically targeted development on the edge of the airport's current 65 DNL contour in an attempt to restrict future increases in operations at the airport.

Arapahoe County, the city of Aurora, and city of Centennial have all prohibited new residential uses in the 60 DNL contour and restricted them in the 55 DNL contour. Other local jurisdictions have not adopted any standard that would be more stringent than the FAA guideline of 65 DNL. Unfortunately, any "gray area" of interpretation, such as uses that may be appropriate in the outer safety zone, and when residential should be allowed in the 60 and 55 contours, have led to a great deal of finger pointing and divisiveness. Each jurisdiction seems to feel a right or need to make certain, limited exceptions, but even those that have allowed exceptions themselves often criticize when others make their own limited exceptions. In fact, one jurisdiction developed

a map to indicate where residential uses exist in other jurisdictions with the ACPAA's Restricted Development Area in order to justify its own right to grant some variances.

When asked, several of the interviewees indicated that the absence of guidance from either the FAA or the state about addressing airport noise impacts in low ambient conditions has meant that the local jurisdictions are struggling to determine the appropriate approach to avoid future noise incompatibilities around KAPA. Neither the FAA nor the state of Colorado require local jurisdictions to adopt zoning that conforms to minimum standards and there is a great deal of variation in noise, safety, and airspace land use controls around KAPA. This leads to a significant amount of uncertainty regarding the long term ability of the Airport to operate without experiencing major hazards, elevated risk to aircraft and persons on the ground, and noise impacts.

VOLUME 2, CHAPTER 5

Collin County Regional Airport, McKinney, Texas

Introduction/Airport Overview

Collin County Regional Airport (TKI) is publicly owned and operated by the city of McKinney and is located in Collin County, Texas (Figure 2.5-1). The Airport is situated minutes from downtown Dallas and numerous business parks. Regionally, the Airport is located about two miles east of the city of McKinney, 15 miles northeast of the city of Plano, and 20 miles north of the city of Richardson, all of which are considered to be regional benefactors of the airport.

TKI serves as a reliever airport to both the Dallas-Fort Worth International Airport (DFW) and Dallas Love Field (DAL). TKI is also intended to relieve general aviation (GA) air traffic from the heavily congested Dallas-Fort Worth metroplex of aviation facilities.

Source: Collin County Regional Airport website.

Figure 2.5-1. Aerial view of Collin County Regional Airport.

The 10 airports that are included in the Dallas-Fort Worth metroplex are shown in Figure 2.5-2 and include:

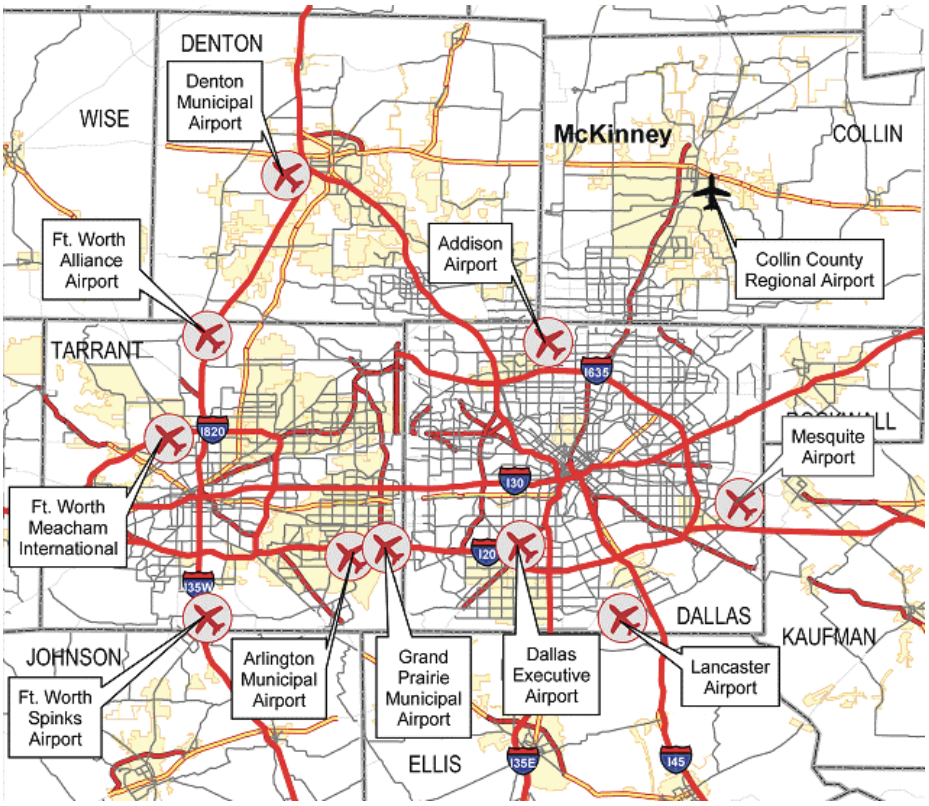
- Addison Airport
- Arlington Municipal Airport
- Dallas Executive Airport
- Denton Municipal Airport
- Fort Worth Alliance Airport
- Fort Worth Meacham International Airport
- Fort Worth Spinks Airport
- Grand Prairie Municipal Airport
- Lancaster Airport
- Mesquite Metro Airport

The Airport experiences a significant amount of use and is home to a number of based aircraft. Tables 2.5-1, 2.5-2, and 2.5-3 on the following pages provide a summary of the primary airport data. The vast majority of aircraft operations involve local and transient general aviation operations. Approximately 65% of the total airport operations involve training operations, while the remaining operations can be classified as business/corporate or personal activity.[1]

History of the Airport

The city of McKinney was founded over 150 years ago. The Airport is considered young, as it was planned in the late 1960s, designed in the mid 1970s, and opened in 1979. When it came into existence, minimal development surrounded the Airport, with the exception of some residential development to the east.

[1] Collin County Regional Airport, Response to Questions, September 18, 2007.



Source: Collin County Regional Airport Master Plan Update, 2004.

Figure 2.5-2. Aviation facilities within the Dallas-Fort Worth metroplex.

Since then, the area has grown rapidly, which makes it difficult for the Airport and City to regulate and maintain compatible land uses in proximity to the Airport. TKI was originally constructed on the outskirts of McKinney. Urban development has spread outward and encompassed vacant, privately-owned land near the Airport, as shown in Figure 2.5-3, which resulted in encroachment issues from incompatible land uses. Some of the land in proximity to the Airport remains vacant; however, significant development to the south in the town of Fairview has occurred over time.[2]

Table 2.5-1. Based aircraft at TKI.

Aircraft	Total
Single-Engine Airplanes	105
Multi-Engine Airplanes	25
Jet Airplanes	10
Helicopters	3
Total Based Aircraft	**143**

Source: *AirportIQ 5010*

Table 2.5-2. Aircraft operations at TKI.

Operation	Total
Local General Aviation	69,945
Transient General Aviation	33,260
Air Taxi	527
Military	7
Commercial	0
Total Aircraft Operations	**103,810**

Operations for a 12-month period ending April 30, 2007.
Source: *AirportIQ 5010*

[2] Interview comments from Brian James, Collin County Deputy Director.

Governance

The Airport is owned and operated by the city of McKinney. The city council sets goals, regulates development, and establishes the annual Capital Improvement Program through the City Code and the annual budget. The council appoints citizens to a seven-person airport board, which was recently restructured to have greater authority in operation and development of the Airport and services it provides.

The Airport receives funding from many different sources. Fuel flowage fees, land lease receipts, and contributions from the City's general fund generate the Airport's operational funding. Capital projects are funded in part through congressionally established programs, such as the FAA Airport Improvement Program (AIP), the city of McKinney Capital Improvement Program, and the McKinney Economic Development Corporation funding. In addition, the Airport receives supplemental funding from other federal agencies and private organizations.[3]

Ken Wiegand, Collin County Regional Airport Director, notes that he feels the FAA has been supportive, specifically with funding options. The FAA has committed to providing approximately $45 million in discretionary funds between 2008 and 2014 for the Airport to address safety issues. The state currently has committed up to $12 million in state apportionment funds (federal dollars) and additional state funds toward the airport improvement projects. Even though the FAA and state are dedicating resources to address issues at the Airport, Wiegand notes that he believes the FAA could do more to support air space issues and design standards and decrease the amount of time needed to receive approval on air space projects through the FAA.[4]

Table 2.5-3. Collin County Regional Airport profile.

Major Features
Airfield ▪ Runway 17/35: 7,001 feet long, 100 feet wide ▪ Runway Lighting: **Property** ▪ Existing: 661 acres ▪ Property **Navigational Aids & Instrument Approach** ▪ Runway 17: VOR-DME, ILS, GPS Approach; PAPI, MALSR ▪ Runway 35: VOR-DME, ILS, GPS Approach; VASI **Building Area** ▪ Development located on west side of Airport ▪ Apron ▪ Aircraft Parking Capacity ▪ Aviation-Related Facilities ▪ Non-Aviation Related Facilities: Conference Facilities
Management and Services
Management ▪ Airport Management and Maintenance: **Fixed Base Operator (FBO) Services** ▪ Aircraft Fuel ▪ Aircraft Parking and Storage ▪ Flight Training, ▪ Maintenance and Aircraft Repair

Source: Collin County Regional Airport Website

Discussion of Compatibility Issues and Responses

When discussing existing and future compatibility issues, three basic areas were discussed in an effort to assess current concerns. These areas include safety, airspace, and noise related issues.

In general, the Airport has not seen an increase of incompatible land use or development around the Airport due to the lack of infrastructure, such as limited road access, municipal water, and sanitary sewer service, in the outlying areas. Due to the vacant land in the Collin County region, the Airport has not experienced a great deal of developmental pressures; however, it appears to be an issue in the near future in the form of industrial and manufacturing development. Many of these businesses have received incentives, including financial assistance, from the McKinney Economic Development Corporation, which has allowed greater control of compatible airport development.[5]

Development currently surrounding the Airport is light industrial; therefore, there are no smoke or steam concerns at this time. Tall structures were addressed and included as a provision as part of the Part 150 Noise Study (discussed further in Section 5.5).[6]

[3] Collin County Regional Airport, Response to Questions, September 18, 2007.
[4] Interview comments from Ken Wiegand, Collin County Regional Airport Director.
[5] Interview comments from Brian James, Collin County Deputy Director.
[6] Interview comments from Ken Wiegand, Collin County Regional Airport Director.

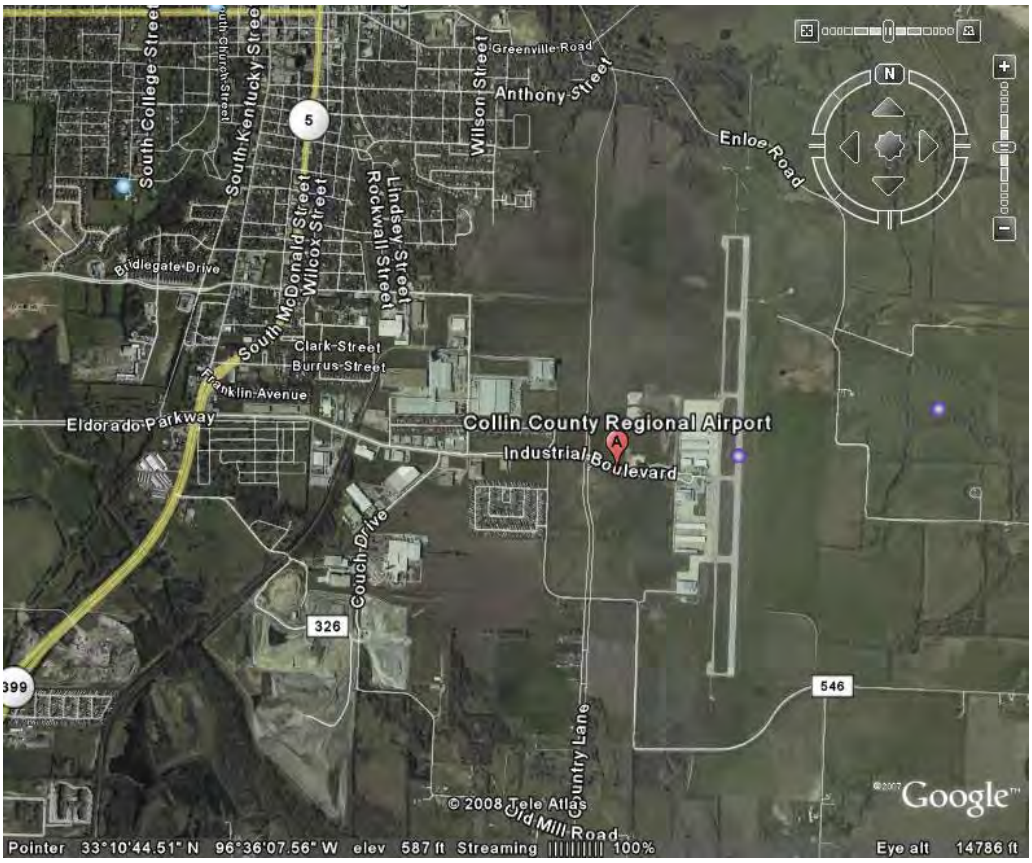


Figure 2.5-3. General location of Collin County Regional Airport.

In an effort to keep the land surrounding the Airport compatible and allow for future airport development, the TKI is currently developing a land acquisition plan. This plan identifies the parcels of property needed for an infrastructure development (runway expansion) that will take place over the next 20 to 30 years. Due to the increasing value and demand for land within the Collin County region, the city will utilize bonds to secure the funding needed to support the land acquisition plan in the near future. The runway expansion project has been approved for discretionary funding over multiple years.

This runway project will allow the Airport to provide adequate separation between the existing runway and taxiway. The runway currently falls under old FAA design standards that required a 300-foot separation between the taxiway and runway. The future runway will be constructed in 2012, utilizing new FAA design standard criteria with a 500-foot separation. In addition, the future runway will be extended to a length of 8,500 feet long by 150 feet wide, which will require land acquisition to the south for the runway protection zones (RPZs) and to the east for object free areas (OFAs).

In addition to the improvements of the existing runway, the plan also considers the Part 77 surfaces to the east, as well as the land acquisition for the future development of a second runway. As the Airport implements the land acquisition plan, the goal remains to operate safely and to foster good public relations. Wiegand notes that if the Airport does its job, it will attract more business and development to the surrounding area, thus reinforcing the economic benefits that airports contribute to their host communities.

Litigation

As part of the land use compatibility assessment, it is often likely that some type of legal action has taken place as the airport owner has tried to preserve the integrity and viability of the airport environs. The Collin County Regional Airport has not had any significant litigation directly related to incompatible land uses. The city of McKinney has been involved in a legal discussion with the Town of Fairview regarding city boundary issues, which has been settled in an agreed judgment. However, three parcels of land, which are located south/southeast of the runway, are still in question as to what jurisdiction they fall under. This opposition between the two municipalities could affect future land use planning decisions.[7]

Additionally, the Town of Fairview has filed several complaints and lawsuits against the city of McKinney and the FAA regarding alleged improper acts in development of the Airport. On June 28, 2005, McKinney officials and the FAA Director of Airport Safety and Standards issued the Director's Determination, which dismissed the complaints. This decision addressed McKinney's rescission of a safety procedure per FAA's request to eliminate the "recommended" nonstandard flight pattern due to possible conflicts with air traffic control system in the Dallas-Fort Worth region. The dismissal of Fairview's claims by Director David L. Bennett represents the resolution of the final claims in 2004. All complaints filed by the Town that allege violation of federal grant assurances have now been dismissed in favor of the City. "Obviously, McKinney's concern for the safety of airport users and nearby communities demonstrates its concern and consideration of local interests," states Director Bennett in the decision.[8]

The Airport has also been involved in lawsuits pertaining to a landfill in proximity to the Airport that accepted waste that attracts wildlife, which poses a hazard to the Airport. In accordance with the lawsuits, the FAA mandated a wildlife management plan, which was adopted and implemented by the Airport. In conjunction with the wildlife management plan, the Airport worked with the landfill owners to stop accepting waste that is attractive to wildlife and to only accept industrial type waste to assist with the wildlife management issues. As a result, the wildlife hazards near the Airport diminished rapidly and are a limited concern for the Airport today. TKI received a letter from the FAA noting that the Airport is now in compliance regarding the landfill litigations.

Aircraft Accidents

Per discussion with Wiegand, it was noted that the Airport has not had any major aircraft accidents that are related to incompatible land uses.

Existing Studies, Planning, and Regulations

The city of McKinney has a long history of planning efforts that are aimed to establish and maintain compatible land uses in the vicinity of the Airport. Much of the land surrounding the Airport has been zoned Airport Industrial, which focuses on compatible airport land uses.

McKinney has encountered obstacles in their effort to maintain land use compatibility. For instance, the town of Fairview does not recognize the Airport in their planning efforts. The town has not planned for compatible land uses surrounding the Airport as they continue the development of suburban single-family developments and other residential infrastructure. In addition, an upscale retirement community was constructed off the end of Runway 17 and is 1.6 miles from the extended runway centerline. The distance between the runway and retirement community

[7] Collin County Regional Airport, Response to Questions, September 18, 2007.
[8] City of McKinney Press Release July 5, 2005.

will be reduced by 1,500 feet when the Airport begins construction on the planned runway extension. Recommendations were made to the Town by the City, which included zoning property closest to the Airport in an airport compatible manner; however, Fairview did not acknowledge any recommendations. Additionally, the Town zoned the property closest to the Airport as mixed use, which allows residential uses. As a result, the Airport receives occasional complaints from residents in the town of Fairview.[9]

A primary challenge and concern for the Airport is the fact that Texas does not require zoning outside of city limits. Therefore, there is no system in place to legally enforce the implementation of airport zoning in the town of Fairview. McKinney has zoned the land in the vicinity of the Airport that lies within their jurisdictional boundary with airport compatible uses. The City notes that they have not taken additional provisions to include possible impacts to the Airport and community from concentrations of people, visual obstructions, or wildlife and bird attractants in the Zoning Regulation.

Although the city does not address additional compatible issues in their zoning regulation, they acknowledge these land use concerns and address them during the review process. For example, landscaping and detention areas in proximity to the Airport are reviewed for potential wildlife hazards typically associated with these types of elements. The City recommends certain types of trees and vegetation that do not attract birds. In addition, regulations require the use of dry detention ponds due to the evaporation in the summer months, which limits the amount of standing water that may attract wildlife and birds. TKI has a wildlife management plan in place to help control wildlife on and near the Airport. The land use control process for McKinney is informal with review and comment from TKI during the development process to identify issues and mitigation measures for a more compatible development.[10]

The state of Texas has adopted a height ordinance with land use restrictions that does not allow the creation of electrical interference, visual obstructions (i.e., glare, smoke, and steam), or lighting configurations that mimic runway lighting or cause difficulties for pilots to distinguish the airport. These restrictions have been beneficial to airports such as Collin County, who are trying to manage incompatible land uses.

To address future land use issues, prior to the commencement of new development near the Airport, applications must be made to the state airport board for approval. Wiegand noted that the Airport reviews all site plans within five miles of the Airport that lie within the city of McKinney to ensure compatibility with the Airport. Through this review process, the Airport has been able to impact two developments proposed within proximity to the Airport.

As McKinney continues to grow, Airport operations also have expanded and incompatibility issues impact more residents. The number of noise complaints has increased, as wells as concern for future airport impacts, including the amount of tolerable noise. According to Brian James, Collin County Deputy Director, there is concern that what noise may be tolerable today may not be tolerable in five, 10, or even 30 years from now.

City of McKinney Comprehensive Plan

Comprehensive planning is essential to develop and maintain compatible land uses near airports. The latest comprehensive plan designed by the City includes an Airport Industrial Module (AIM) that is intended to focus on the economic opportunity associated with aviation. Items discussed in the AIM include the importance of convenient access to the Airport, which allows travelers and goods to be efficiently utilized by surrounding residents and businesses. In addition, the

[9] Interview comments from Ken Wiegand, Collin County Regional Airport Director.
[10] Interview comments from Brian James, Collin County Deputy Director.

convenient location of the Airport provides an incentive for businesses that are looking to locate in the Dallas-Fort Worth area, which ultimately strengthens the economic base of the Airport.

Land uses recognized within the comprehensive plan are intended to encourage development that is compatible with airports, including light industrial/manufacturing, office/warehouse, and office-regional. Airport locational criteria are used to help encourage compatible land uses and include recommendations for siting specific land uses within the vicinity of the Airport. The criteria are defined in the McKinney Zoning Ordinance, which states:

> The goal of the locational criteria is to achieve high-quality employment areas, commercial villages, industrial, and civic centers, while responding to the sensitivity of the natural environment and North Texas ecosystem. The following criteria are included in the AIM:
>
> - Retail and service uses should be organized around the intersection of major roadways. This clustering of service type uses is to provide for convenient access from the Airport as well as office and industrial users.
> - Buffers and screens are important components in industrial development patterns. They are used to minimize the adverse impacts of light, noise, and truck traffic, storage yards, movement of freight, and manufacturing processes. They should be used in the planning for industrial development as needed.
> - Where adjacent to existing residential areas, the anticipated intensity of proposed land uses should be considered in order to provide a more compatible transition between uses.
> - The height of structures and impact of uses (light, smoke, wildlife, etc.) on the safety of airport operations should be considered.[11]

The comprehensive plan designates the land surrounding the Airport as Airport Industrial. This area was incorporated into the Part 150 study, which was conducted at the same time the Airport master plan and the city comprehensive plan were updated, as shown in Figure 2.5-4 on the following page. Wiegand noted that as the Airport Director, he feels the Airport is fairly protected or as protected as it can be. The city of McKinney and the Economic Development Corporation work together to provide growth and development that is beneficial for the community and compatible with the Airport operations.

City of McKinney Airport Zoning

Land use and zoning plans recognized during the comprehensive planning process were developed to protect the Airport from encroachment of incompatible land uses, as well as address the future growth needs of the Airport. The City developed the Collin County Regional Airport Zoning Ordinance, which was adopted in 1979 by McKinney, Fairview, and the Collin County Joint Airport Zoning Board. The Ordinance regulates height as it relates to structures and objects of natural growth. It also regulates land uses within the vicinity of the Airport and is based off of FAR Part 77 Surfaces.[12]

The Airport is currently zoned government land use, while other land uses around the Airport are zoned agriculture and light manufacturing. The state of Texas permits cities to make certain decisions about land use beyond the incorporated limits of a city and into the Extraterritorial Jurisdiction (ETJ). As of 2004, there have been no land use regulations developed for ETJ areas.

14 CFR Part 150 Study Noise Exposure Maps and Compatibility Program

In September of 2005, Environmental Science Associates (ESA) undertook a Part 150 Noise Study for the Airport to address noise and land use compatibility issues related to the Airport.

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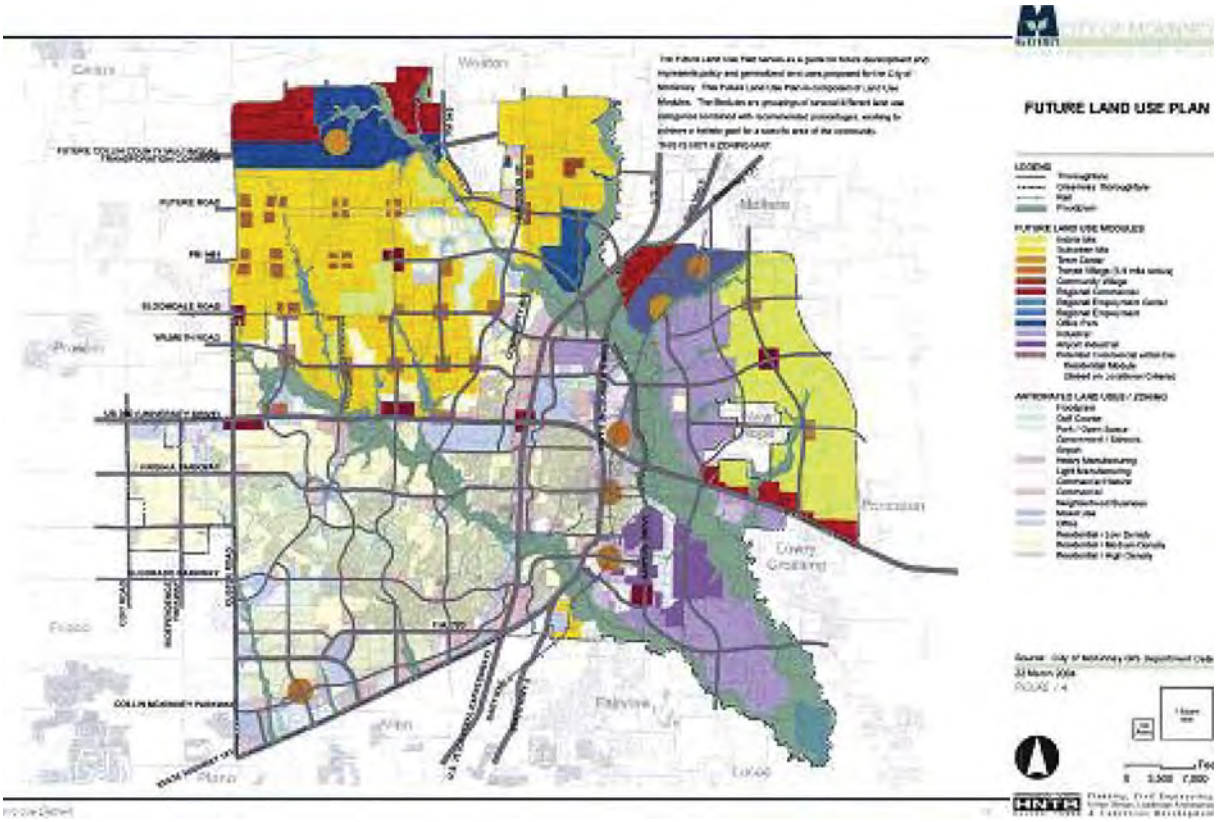
[11] City of McKinney Zoning Ordinance.
[12] City of McKinney Comprehensive Plan.



Source: 14 CFR Part 150 Study Noise Exposure Maps and Noise Compatibility Program

Figure 2.5-4. Comprehensive future land use plan for the City of McKinney.

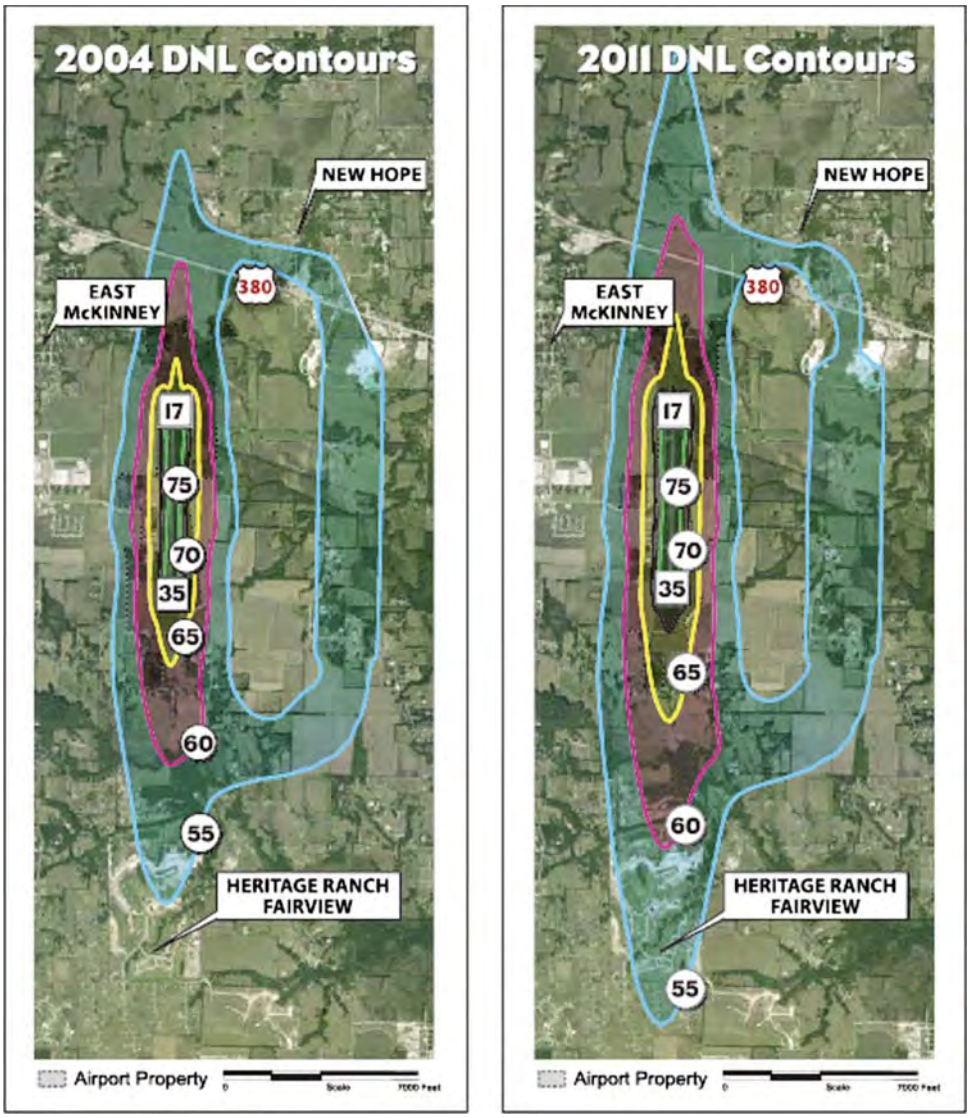
The study focused on two primary issues: (1) the evaluation of future operational noise mitigation measures and (2) the evaluation of existing and future land use compatibility opportunities in the vicinity of the airport.

ESA collected the data necessary to complete an Integrated Noise Model (INM) and generated the 2004 noise contours, which are collectively known as the Airport's Noise Exposure Map (NEM). The NEM is used in configuration with Existing Land Use maps and Future Land Use maps to identify land uses that are compatible or incompatible with aircraft noise within the vicinity of the Airport. The NEM is also utilized to improve noise compatibility within the vicinity of the Airport under current aircraft operating conditions. Ultimately, this study resulted in the development of a Noise Compatibility Plan (NCP).

The noise exposure contours based on the 2004 and future 2011 conditions indicate that the noise exposure deemed by the FAA to be significant (65 DNL or greater) is limited to the Airport property and adjacent undeveloped areas, as shown in Figure 2.5-5. Consequently, the City created operational noise abatement procedures that include aircraft departing procedures, local aircraft training procedures, aircraft maintenance activities, and noise barriers.

The city of McKinney has implemented several initiatives to reduce aircraft noise exposure in the vicinity of the Airport, which include:

- **Education** – Educating realtors about airport development and increases in air traffic. Ask realtors to be mindful of client sensitivity to aircraft overflight as they show houses near the Airport.



Source: 14 CFR Part 150 Study Noise Exposure Maps and Noise Compatibility Program

Figure 2.5-5. The 2004 and projected 2011 noise contours for Collin County Regional Airport.

- **Signage** – Recommend jet flight procedures so that crews adjust their rate of climb immediately after takeoff to achieve maximum altitude before crossing over local residential areas.
- **Hotline** – Establish a noise hotline that has proven reasonably effective to identify flight anomalies. Each complaint and comment is investigated.
- **Regional Noise Committee (RNC)** – The Regional Airport Board serves as the RNC. Members are notified of all Hotline complaints at monthly meetings, which are discussed as necessary.
- **Pilot Pledges** – Distribution of a brochure called *Flying Friendly*, which discusses how a pilot can help reduce aircraft noise concerns (see Appendix A). Pilots are asked to sign a *Pilot Good Neighbor Pledge*, which recognizes their commitment to fly in a reasonable manner.
- **Zoning** – Establish proper zoning to ensure compatible development around the Airport.

The Airport has also established allowable flight attitudes over the town of Fairview and Heritage Ranch, which is an upscale retirement community bisected by the extended runway centerline and is 1.6 miles off the end of the runway. A minimum flight altitude has been set at 1,000 feet above

ground over congested areas. However, the 1,000-foot altitude may be reduced during landing and takeoff procedures from the Airport as conditions warrant. The established altitude minimum is clearly detailed in CFR 14, Part 91 and FAR, Section 91.119 (minimum safe altitudes).[13]

Community Involvement

Community involvement is vital to any airport community, as it promotes communication between the Airport and surrounding residents. The surrounding communities are given opportunities to voice concerns and the Airport can reach out to residents and educate them about airport use. The City hopes to involve and inform stakeholders, such as the Economic Development Corporation, of general guidelines for Airport compatible development in an effort to help them attract business that will not hinder Airport operations. Fortunately, the smaller size of the McKinney allows for more effective personal communication and contact among the various stakeholders, which promotes greater control and mitigation measures for Airport compatible land uses, according to Wiegand.

Wiegand notes that traditionally, the community involvement and communication has been coordinated through fixed base operator (FBO) staff and has been standard practice for many years. The FBO staff is closely connected to the local political arena and other local interest groups, and has done a tremendous amount of marketing and educating for the community regarding airport development and the value the Airport brings to the community.

Additionally, Wiegand noted that the Airport has a very good relationship with the McKinney Planning Department and that the City strictly enforces the codes and promotion of airport compatible developments. He also states that the relationship between the town of Fairview, city of McKinney, and the Airport is improving due to the amount of information the Airport and City has distributed regarding the Airport's future development needs and value they provide to the community.[14]

The city council recognizes the importance of the Airport and makes it a priority to protect and plan for the Airport to the best of their abilities. Some of their efforts include building a fire station near the Airport to serve the Airports needs, identifying the Airport within the comprehensive plan and site plan reviews, planning efforts of the Economic Development Corporation to attract and retain appropriate industries that are compatible with the Airport that serve the community with jobs and economic benefits, and using the capital improvement fund to construct the infrastructure in proximity to the Airport to spur compatible development. The City's effective communication is evident in the city council's willingness to give the Airport priority. James feels that the city council has done an excellent job educating and informing the community about the priority and importance of the Airport. Due to the continued education, the city council board members have similar visions and understanding of the value of the Airport.[15]

In addition to the elected officials, the City makes attempts to involve locals in the development of the Airport. For example, during the Airport Master Plan update and Part 150 noise study, the surrounding cities, Collin County, and residents were all involved from the beginning to create an advisory committee for both studies. Additionally, the City and Airport staff utilize the local homeowner's association meetings to educate and answer any concerns the local residents may have regarding the Airport. The meetings served as a forum to demonstrate the importance and value of the Airport. The staff also spoke with neighboring communities to discuss the planning efforts and educate the residents regarding future growth and development of the Airport.[16]

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[13] Collin County Regional Airport, Response to Questions, September 18, 2007.
[14] Interview comments from Ken Wiegand, Collin County Regional Airport Director.
[15] Interview comments from Brian James, Collin County Deputy Director.
[16] Interview comments from Brian James, Collin County Deputy Director.

Economic Impact

Wiegand and James both acknowledge that the Airport plays a vital role in their communities and are an economic asset to the surrounding area. They noted that airports provide jobs to the local communities and offer options for faster travel. They commented that attracting companies to utilize the Collin County Regional Airport to base their aircraft and provide aviation access for businesses can broaden the City's tax base, create jobs, and support activity and growth. Furthermore, future business expansion and attraction of new businesses may result from the availability of aviation service.

Changes in Aircraft Operational Procedures

After Heritage Ranch was developed south of the Airport, the Airport manager requested an alteration to departure procedures and asked pilots to sharply turn their aircraft on departure to avoid overflight concerns. This operational procedure change was implemented for approximately one year and was then discontinued due to safety reasons that were based on recommendations from the Air Traffic Control Tower (ATCT) Chief.[17] Wiegand noted that it is the responsibility of the FAA/ATCT to alter an aircraft's flight path, not the Airport.

Conclusion/Analysis

The Collin County Regional Airport case study emphasizes the importance of cooperation between multiple governmental entities. Airports encompass not only the physical ground location of airport infrastructure, but also navigable airspace that includes approach and departure areas, along with airport traffic patterns. Typically, these areas are substantially larger than the airport-owned property, and often cross over multiple jurisdictional boundaries, which necessitate cooperation and coordination between those jurisdictions.

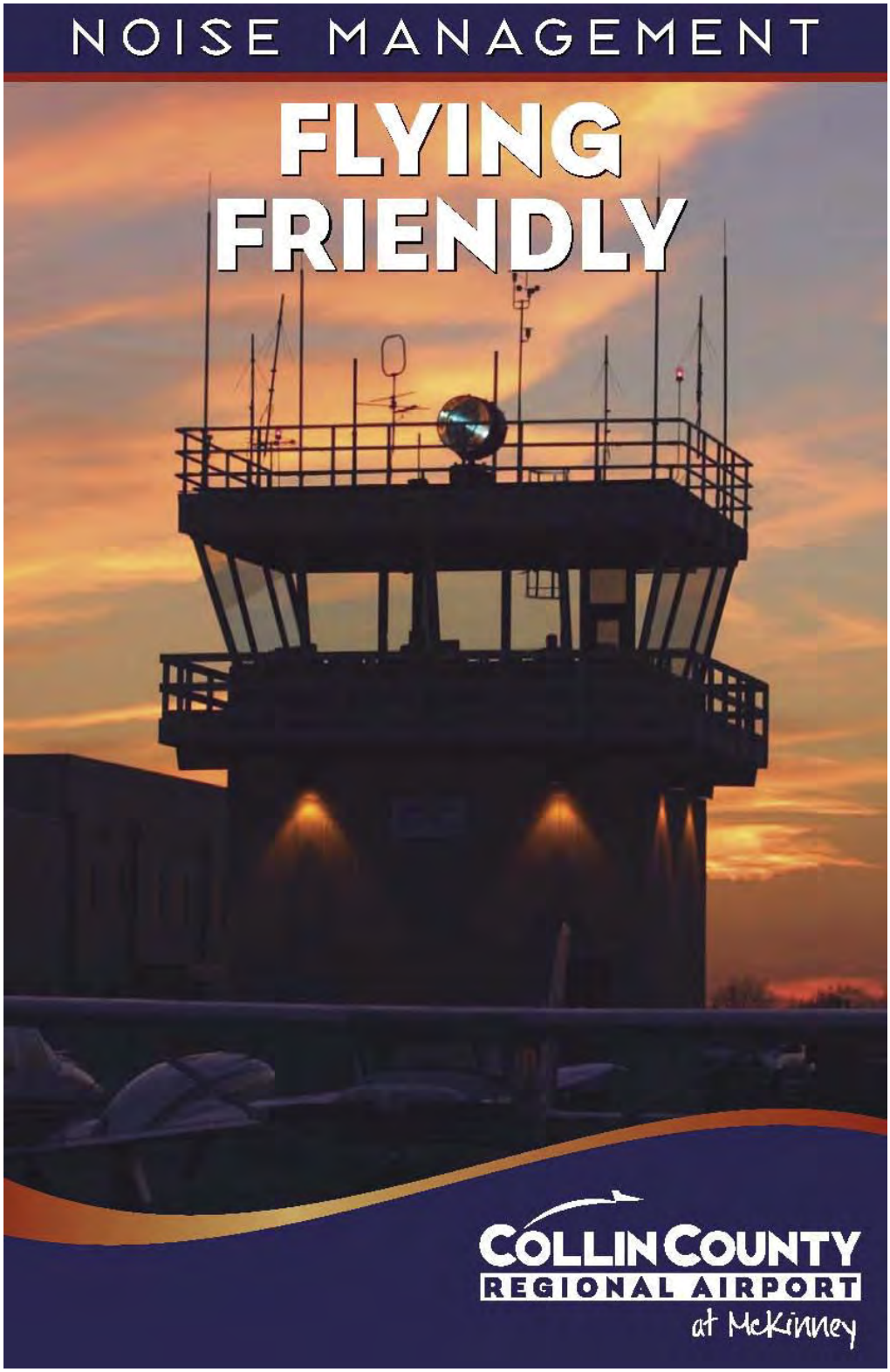
There is little cooperation and coordination between the city of McKinney, who owns the Airport, and the town of Fairview. The town of Fairview has seen the negative effects of developing incompatible land uses, but still decline to prevent or mitigate such uses. The Town development has resulted in concern from area residents who are affected by airport operations and the encroachment and opposition of a runway expansion project. By permitting the construction of incompatible land uses, such as Heritage Ranch which exhibits increased residential densities, the town of Fairview is ultimately seeking to restrict a runway expansion, which will then limit airport operations and alter airport traffic patterns in a manner that is unsafe for surrounding residents. It is essential for airports and local jurisdictions to work together toward an outcome that is favorable for all those involved.

Local governments and airports need to share equally in the risks and benefits involved with compatible land use planning. The burden cannot solely lie on an airport. The lack of state support for planning and zoning efforts can work against an airport. Airports can be penalized, such as withholding funding, for land use incompatibility issues, but cannot require local jurisdictions to adopt and enforce airport land use compatibility zoning.

Fortunately, the lack of infrastructure in the vicinity of the Airport has helped to keep some of the surrounding land undeveloped. However, it is only a matter of time before the surrounding urban environment encroaches upon the perimeter of the Collin County Regional Airport.

[17] Interview comments from Ken Wiegand, Collin County Regional Airport Director.

Appendix A


NOISE MANAGEMENT
FLYING FRIENDLY
COLLIN COUNTY
REGIONAL AIRPORT
at McKinney

Collin County Regional Airport at McKinney: Flying Friendly

Collin County Regional Airport at McKinney is one of the region's most valuable economic development assets and an important part of the area's transportation system.

The airport is home to some of the busiest corporate flight departments and aviation assets in North Texas. Corporate aircraft located at the airport support the missions of North Texas-based corporations that employ hundreds locally and nearly a half-million people worldwide.

Collin County Regional Airport is committed to providing state-of-the-art facilities, outstanding customer service and a safe and secure environment for its tenants. The City of McKinney and airport staff are equally committed to ensuring that the airport continues to be a good neighbor by encouraging pilots to fly friendly over Collin County.

This brochure summarizes noise exposure information for people residing near the airport or within aircraft arrival and departure corridors and for those considering locating in the vicinity of Collin County Regional Airport.

What is noise?

Noise is subjective. People respond differently to various types and levels of sound. For example:

- A person living in an area of relatively low ambient noise levels, will respond to any sound that is more intense than the ambient noise level.
- 80 decibels (dB) of symphonic music may not elicit a response, but 80 dB of lawnmower sounds may induce a reaction of considerable annoyance.
- A crying baby will annoy some, but new parents will be more sympathetic.
- To most people, the occasional sound of a car passing is acceptable because most people drive cars, but put a lot of them together and the sound becomes an annoyance -- noise.

Aircraft Noise Exposure

The annoyance of aircraft flying overhead can extend for miles beyond an airport's property lines. Airports are quickly associated with these overflights, even if in fact they are simply overflights and the aircraft have no intention of operating to or from Collin County Regional Airport. Aircraft operating to or from the airport will have different levels or intensities of sound because:

- As a rule, older aircraft are louder than newer aircraft and departing aircraft are louder than arriving planes because they are at full thrust. More than 90 percent of the jet aircraft based at Collin County Regional Airport meet stringent Federal Aviation Administration (FAA) Stage-III noise emission standards, which are the current highest standards for reducing noise emissions from aircraft engines.
- Aircraft departing for distant destinations are louder than those traveling to closer locations. This is because aircraft with heavier fuel loads are unable to climb as rapidly.
- While the noise level is the same, aircraft departing or arriving at night tend to sound louder than those during daylight hours.

Weather conditions can also affect noise levels.

- Low cloud cover may increase the noise level by reflecting it back to the ground. Very low cloud cover may require planes to use an instrument landing procedure, which can result in completely safe, but lower approach to the airport.
- Pilots may be directed to fly around severe weather - taking them outside of the normal arrival and departure lanes.
- Aircraft sound bounces between cloud cover and the ground, which tends to amplify and contain it.

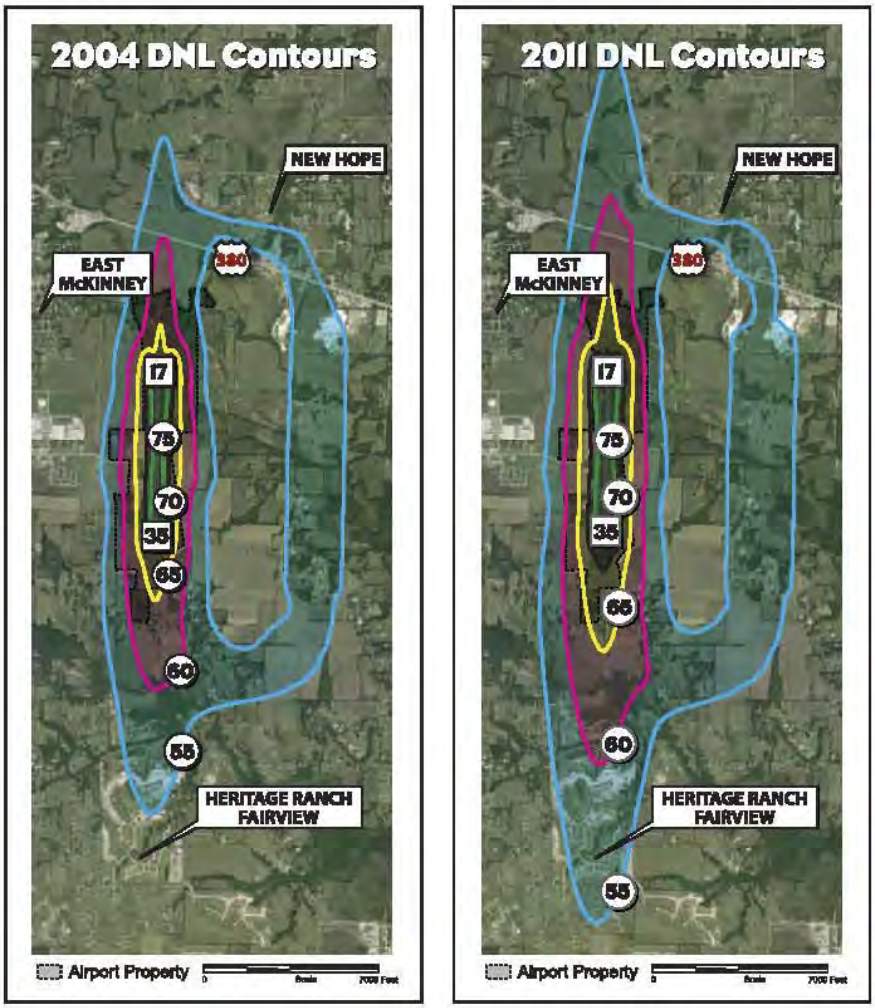
Measuring Sounds

Day Night Sound Level (DNL) is a measure of average noise exposure. The DNL was adopted by the FAA in 1981 and is accepted by the Federal Interagency Committee on Noise for local land use planning.

Did you know? Approximately five percent of people are annoyed by any passing aircraft, regardless of the level of sound it creates. On the other hand, studies show that nearly 80 percent are not annoyed by aircraft noise in the 55 DNL level.

2004 and 2011 Noise Contour Maps

These noise contour maps were produced as a result of a voluntary 14CFR Part 150 "Noise" Study to identify the effect of aircraft in the area surrounding Collin County Regional Airport. *Please note that the patterns shown below depict general flight paths and are not intended to show exact locations of aircraft overflight. Actual flight tracks will vary by number and type of aircraft in the traffic pattern, weather conditions, pilot technique and air traffic control instructions.*



Looking at property near Collin County Regional Airport?

Invest Wisely

A home is likely to be your single largest investment, so you should do your homework.

Review community growth plans and zoning in your area. Ask about development, roads, railroad lines and airports near your proposed home site. If you have questions about Collin County Regional Airport, please contact the airport administrative offices and arrange a visit to discuss airport development plans and review our noise complaint map (972) 562-4214.

Your Realtor

Make sure your realtor has the latest information regarding local development. Airport plans change from time-to-time to keep up with current and future estimated market demand.

Rule of Four

The City of McKinney is a carefully planned, growing community. It has done its best to zone property adjacent to the airport in a manner that is consistent with airport operations and it has shared this information with adjacent communities.

As a good neighbor, airport management recommends that prospective homeowners choose wisely when considering a home site within four miles of Collin County Regional Airport. A site at least four miles from the airport runway is usually far enough away to avoid most arriving and departing air traffic. If you live or plan to buy within four straight-line miles of the airport runway, you should expect to see and hear low-flying aircraft. *Never assume that the airport will not develop or expand.*

North Texas Airspace

The airspace over Collin County is tightly controlled by the federal government and is very active with flights to and from DFW, Love Field, Addison Airport and others. All residents of North Texas communities should anticipate continuous aircraft overflights and aircraft sounds.

Other Considerations

Air traffic controllers and airport management monitor the operations of aircraft to ensure they operate safely and follow federal laws, rules, regulations and guidelines.

The volume of air traffic drops off significantly between 10 p.m. and 6 a.m.

According to federal studies, aircraft noise in and around Collin County Regional Airport is not hazardous or harmful to your health.

Initiatives to Reduce Noise Exposure

While large aircraft flight operations are increasing, noise exposure has actually been ***reduced*** in several areas as a result of:

- Introduction of newer, quieter aircraft.
- Mandatory requirements by the Federal government to phase out noisier aircraft over 75,000 lbs.
- Proactive initiatives of the airport and city including:
  - Pilot and citizen education
  - Recommended flight procedures
  - Noise Hotline to identify anomalies
  - Regional Noise Committee
  - Pilot pledges
  - Proper zoning to protect future residents

Aircraft Noise 24-Hour Hotline: 972-547-7399

The Hotline was established in December 2003. Use the Noise Hotline to report any unusual level of noise or aircraft activity. Please resist the urge to report every aircraft you hear or see. This kind of event reporting does nothing to assist airport management in assessing your situation and resolving real issues that might arise.

This line is monitored daily. All reports that the airport staff determine to be anomalies or unusual are investigated.

For more information visit us online at:
www.collincountyregionalairport.org

Denver International Airport, Denver, Colorado

Introduction/Airport Overview[1]

Denver International Airport (DIA[2]) was the fifth busiest commercial airport in the United States and 11th busiest in the world in 2005 and continues to grow rapidly. DIA handled 589,000 tons of air freight and nearly 50 million passengers in 2007, an increase in passengers of 5.4% over the previous year. Due to its location in the middle of the country, close to half (44% in 2006) of DIA passengers are transfer passengers. DIA has fewer international destinations than most large airports (39 cities in four countries).

In 2006, the average number of flights per day was 1,175. DIA is a hub for both United Airlines and Frontier Airlines. In total, it hosts 14 major airlines, four international airlines, and 13 regional/commuter airlines. The airport has 95 gates in three terminals, 19 of the major passenger airlines and nine cargo airlines provide service at DIA.

DIA currently has four north-south runways and two east-west runways, as shown in Figure 2.6-1, none of which cross one-another. Five runways are 12,000 feet long and 150 feet wide. The airport's sixth and newest runway, 16R/34L, is 16,000 feet long and 200 feet wide, which is wide enough for "jumbo" aircraft such as the A-380. The southern approaches to the four parallel runways are rated Category III-b, allowing auto-landing in the lowest visibility conditions. Three of the four parallel runways meet the minimum FAA requirement for simultaneous landings in instrument flight conditions. Each runway approach is equipped with instrument landing systems. DIA was master-planned to accommodate 12 runways, providing ample room for long-term expansion. Based on projections, DIA expects to add another of the 12 planned runways approximately every five years. The airport owns 54,000 acres in order to accommodate all future expansion and keep incompatible development well away from the new airport.

Figure 2.6-1. Aerial view of DIA.

[1] Major sources of data and information for this case study in addition to stakeholder interviews include DIA's website, www.flydenver.com, and the Metro Denver Economic Development Corporation website, www.metrodenver.org.

[2] The call letters for DIA are DEN, but as this was also true at the former Stapleton, and because the airport is locally known as "DIA" we have used this as the abbreviation for the airport.

History of the Airport

Development of the Airport

DIA opened in 1995, replacing the former Stapleton Airport. DIA is owned and operated by the city of Denver. Stapleton Airport was closed and replaced by DIA due to a range of issues, many of which were related to land-use incompatibility. Problems at Stapleton, which over time had become surrounded by commercial, residential, and industrial development, included safety concerns, flight delays, constraints on expansion, noise impacts, and lack of ability to keep up with growing projected demand for air service.

The two primary runways at Stapleton were inadequate for simultaneous use in bad weather, which regularly lead to long delays. With a strategic position in the middle of the country, delays at Stapleton tended to ripple through the national airport system. Capacity problems made it impossible for Stapleton to respond to several airlines' expressed interest in adding or expanding operations in Denver and airport expansion was constrained by urban development that had surrounded Stapleton over many years. An expansion alternative, which would have reclaimed land from the Rocky Mountain Arsenal to the north, was rejected by the metro community due in part to concerns about contamination issues at this former federal weapons production site. Adams County, which is located adjacent to Denver and the arsenal, brought a lawsuit against Denver to stop Stapleton expansion on to the arsenal.

In the late 1970s, a process initially led by the Denver Regional Council of Governments began to identify possible sites for a new airport. However by the early 1980s, no agreement had been reached. Noise impacts on residential areas surrounding Stapleton had been a continuing problem. Stapleton faced a lawsuit over noise brought by the residents of the Park Hill neighborhood. Communities in the vicinity of the existing Stapleton Airport resisted expansion for fear that it would lead to greater noise impacts, while other communities opposed relocation, fearing that it would simply shift the noise problem to a different set of residential neighborhoods.

In 1985, Adams County and the city and county of Denver signed a Memorandum of Understanding and began to move bilaterally to plan a new airport. Over the next three years, the two parties came to agree on an optimal airport layout, to determine the land area needed to accommodate the layout, map existing land constraints, and finally, select a site 17 miles to the east of downtown Denver, in a portion of Adams County adjacent to Denver. The land area for the agreed-upon layout of DIA is more than 10 times the size of Stapleton, in order to accommodate 12 runways to meet future projected demand, in an optimal configuration for all weather conditions, and to control all safety zones for all runways. In 1988, Adams County and Denver signed an Intergovernmental Agreement (IGA) that allowed Denver to annex lands in Adams County, with voter approval, for the new airport. Such an IGA was necessary because the Colorado Legislature had previously restricted Denver from annexing without approval of the residents of the annexation area.

The 1988 IGA established 100 noise-monitoring points in a grid pattern around the Airport and specified maximum noise levels to be allowed at each grid point. Figure 2.6-2 illustrates the 2007 Noise Report Map and grid pattern. The maximum permitted noise levels were intended to serve as a guarantee to residents that noise levels in every established neighborhood would be reduced through the airport location. If the noise levels are exceeded, then Denver must make fee payments to Adams County and several municipalities in Adams County, including Aurora, Brighton, Thornton, and Commerce City. The allowable noise levels were based on FAA models and predictions for flight traffic and routing at the new airport, as well as the resulting noise anticipated at each grid point.

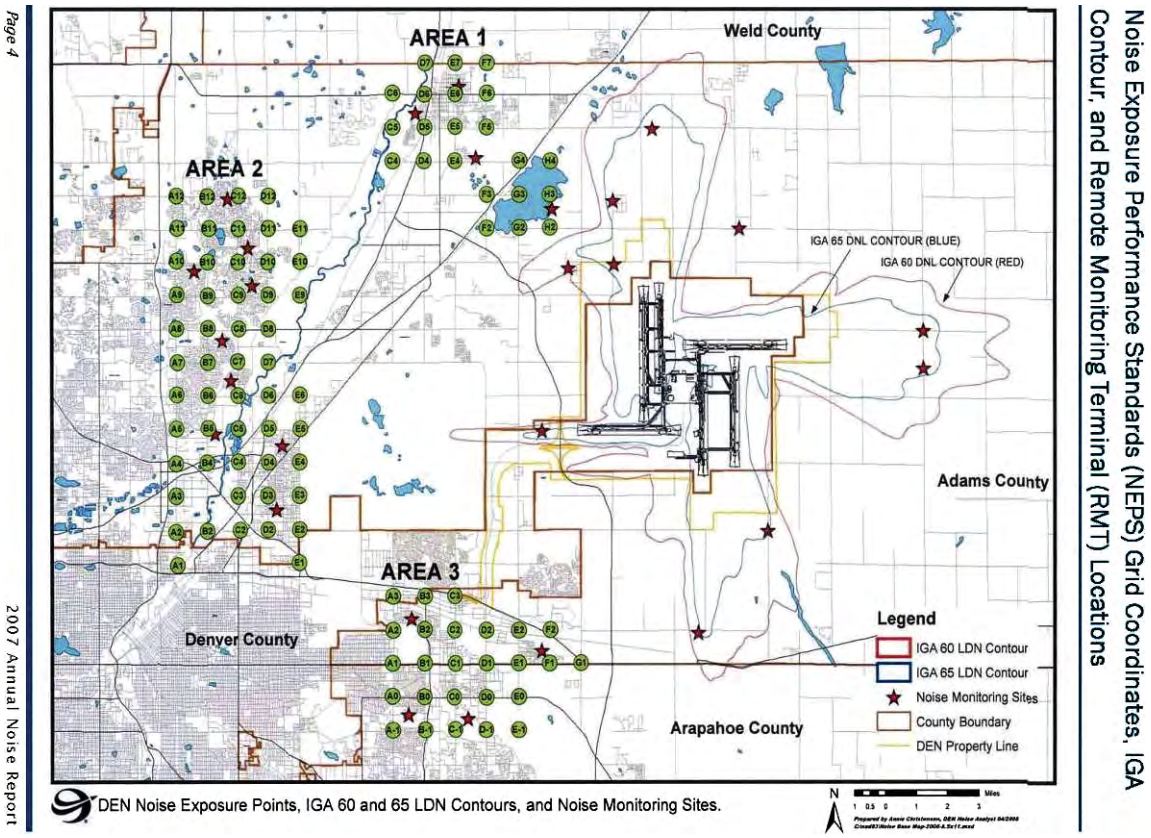


Figure 2.6-2. Noise exposure performance standards for Denver International Airport, 2007.

A number of land use compatibility regulations were also established in the IGA. Adams County and Denver agreed not to allow residential development anywhere within the anticipated full build-out 60 DNL contour of the new airport. The purpose was to ensure that the new airport would not have the same noise conflicts and concerns that had plagued Stapleton and the surrounding communities. In addition, Denver agreed that land uses developed on the airport property would be limited to those that directly serve the airport, to ensure that economic development benefits would occur off-airport to benefit Adams County and municipalities in the county.

Adams County voters approved the annexation in a May 1988 general election. Denver voters confirmed the annexation in a special election as well. Denver, Adams County, and municipalities in Adams County undertook coordinated efforts in land use planning for the area. Planning staff from the jurisdictions met monthly for two years to consider airport planning and impact issues. Ultimately, these efforts resulted in Denver's Gateway Plan and Adam's County's Airport Environs Concept Plan, which bears the names of Adams County and the municipalities of Aurora, Brighton, and Commerce City. The efforts were seen as groundbreaking examples of cooperative planning and include the multi-jurisdictional Emerald Strands Open Space Plan and the Gateway Plan, both of which won statewide planning awards.

In February 1990, continuing safety concerns regarding Stapleton were highlighted when a Cessna cargo flight crashed during a snowstorm about three miles north of the airport. While on an ILS approach to Runway 36, the aircraft encountered icing conditions and subsequently crashed in a field next to a cluster of schools, including several elementary schools. The aircraft was destroyed and the sole occupant, the pilot, was killed. Although the crash occurred after

school hours and no one on the ground was hurt, the event raised community concern about the safety of school locations under the ILS approach.

Airport construction began in November 1989. The new Denver International Airport began operations on February 28, 1995. At the time of construction, DIA was the first new major commercial airport to be built in the United States in 25 years.

Airport Land Use Issues/Concerns

At DIA, there are few, if any, land use incompatibilities as judged by FAA guidance and standards. In terms of safety, there are no incompatible uses in any of the airport impact zones, including the runway protection zones, inner and outer approach/departure zones, inner turning zones, sideline zones, or traffic pattern zone. All the land in these zones is owned by DIA. As noted earlier, land acquisition is an important strategy employed at DIA for protection of land use safety compatibility around the airport. The inclusion of all these lands was a major consideration when Denver and Adams County agreed on the size of the airport footprint to be annexed. There is an extremely low likelihood that safety compatibility land uses will encroach in the safety zones in the future because the Airport owns all this land.

Noise compatibility issues dominate the discussion of land use compatibility with local stakeholders. Those issues on the forefront of local attention center on the terms of the IGA between Denver and Adams County that address noise limits at the grid points, and whether and how to allow new residential uses in the 55 to 59 DNL noise impact areas. Whether these can be deemed incompatible land uses is based on the desire to not repeat the problems and noise conflicts that existed in the communities around Stapleton, and relate to the spirit and letter of the IGA signed by Adams County and Denver in 1988. Currently, the surrounding jurisdictions utilize the 60 DNL for the determination of incompatibility, but the airport staff has been working with these jurisdictions to acknowledge the 55 DNL contour for incompatibility as well. The noise compatibility issue on which the DIA case may shed some light is one of local efforts to address airport noise compatibility in an environment where ambient noise levels are relatively low, and without specific formal guidance from state or federal agencies.

When the Airport began operations, within the first year it exceeded the noise limits established in the IGA at many of the monitoring grid points. The terms of the IGA gave the airport a year to correct the violations, but after a year, the operations continued to exceed noise limits at a number of the grid points. A major reason for this, according to the airport staff, is that the FAA's pre-1988 predictions of the air traffic patterns in the Final Environmental Impact Statement, on which the noise impacts were modeled and noise limits of the IGA were established, are not consistent with the actual FAA routing of air traffic and resulting noise impacts. Specifically, more east-west operations occur than were modeled. Regardless of the cause, the IGA states very clearly that noise violations will result in payments from Denver to Adams County. This has been confirmed through the courts, and Denver has made nearly $41 million in noise mitigation payments to Adams County, which has been distributed among the county and several municipalities in the county.

The Noise Working Group is a technical committee and members include representatives from the Airport, the FAA, and airlines that serve DIA. The group meets, as necessary, to address noise issues related to DIA aircraft operations and to develop methods to minimize the associated impact. By 2006 and also in 2007, the noise violations had been reduced to a single monitoring grid-point.

Overall, most of the concern expressed about land use compatibility at DIA, across the range of interviewees, focused on the potential for noise conflicts that result from new residential uses in proximity to the Airport. The experience around Stapleton showed that many noise com-

plaints came from within contours lower than 65 DNL, perhaps due in part to the relatively low ambient noise that is common in many areas of the Denver metropolitan area. Although regulations adopted by most of the jurisdictions in the area respect the projected future 60 DNL, one jurisdiction (Commerce City) has the ability to annex lands from Adams County and to date has not adopted any airport-related noise or safety regulations.

Governance

The Airport is owned and operated by the city and county of Denver. Under the city charter, the management, operation, and control of DIA is under the city's Department of Aviation. Denver designated the department as an "enterprise" as defined by the Colorado Constitution, and thus the department has the authority to issue its own revenue bonds or other financial obligations in the name of the city. Local tax dollars do not provide operating revenues for the airport. The airport and city planning staffs report a smooth working relationship and good communication on development proposals and activities, with the exception of the High Point development, which is discussed below.

Denver annexed land formerly within Adams County to build the Airport and provide an access corridor to DIA. Adams County retains jurisdiction over much of the remaining land in the airport vicinity. Commerce City and Aurora control or have the ability to annex county land near the Airport. The city of Brighton and Arapahoe County also have jurisdiction over limited lands that fall within DIA's 60 DNL.

The state of Colorado has little regulatory guidance on airport land use compatibility planning. The Colorado Revised Statutes include provisions that allow local jurisdictions to place special restrictions on lands in the vicinity of airports as one of a number of areas of special state interest, but no specifics are included. The Colorado Department of Transportation Aeronautics Division produces a report once every five years on the economic impacts of airports in Colorado. The DIA airport planners reported a good working relationship with the Aeronautics Division staff, but local land use planners indicated that they looked to federal guidance and out-of-state examples, but not any state agency, for guidance on land use planning in the airport vicinity. The state of Colorado Department of Transportation Aeronautic Division is limited by enabling legislation to provide assistance as requested by airport operators and indicate that they receive very few inquiries on airport land use compatibility planning. The state does not have state-wide airport land use compatibility requirements for local governments, such as those that have been adopted in Minnesota or California.

Discussion of Compatibility Issues and Responses

In the initial survey conducted for this research, Denver's airport planner reported no land use incompatibility concerns related to tall structures, but some "moderate" compatibility concerns regarding concentrations of people, land uses that attract wildlife, and residential developments. In addition, land uses causing visual obstructions and noise sensitive land uses other than residential were noted as "minor" compatibility concerns. The survey response elaborates that,

> Currently, the Airport has no large concentrations of people, residences or other noise sensitive land uses located within either the 60 or 65 DNL noise contours (existing and full build out scenarios). However, Denver is concerned with the repeated efforts by developers to push for changes in local jurisdictions' zoning code to allow residential development to occur closer to the Airport . . . Compatible land use regulations and/or zoning have been adopted by Adams County, city of Aurora, and the city & county of Denver. The currently adopted land use guidelines/zoning do not specifically preclude other noise sensitive land uses [beyond residential] . . .

Safety

No major accidents have occurred on- or off-airport at DIA to date. As discussed previously, land acquisition of all of the airport impact zones has effectively controlled the potential for safety incompatible land use development in these zones. When asked in an interview about safety incompatible land uses in the airport vicinity, the airport staff pointed to three specific non-residential uses that are of some degree of concern in terms of safety compatibility, but noted they are not creating problems at the present time. These include a gas-fired plant, a solar array, and a landfill that existed prior to development of the new airport.

The gas-fired plant is located north of the airport in Adams County. Airport planners had feared it could create a plume that might cause visibility or turbulence issues and indicated so to the county in a letter responding to the development proposal. The plant was approved by Adams County in spite of the airport's concerns, and airport planners indicate that to date it had not been a problem. A large solar installation that consists of 10,000 panels on 10 acres, with a two-megawatt capacity is being installed on airport property just outside of the runway protection zone of one of the cross-wind runways, as part of an effort to make the facility more sustainable. The airport planners expressed uncertainty whether the panels might create a column of rising, heated air and thus turbulence in the final approach, but noted that the runway handles fewer operations than others and only during cross-winds conditions that would likely disperse such heat. Finally, the second largest landfill in the state is located about three miles from the airport. Originally, the airport development plan called for acquiring the property and closing the landfill that had been operating for several years before the airport was planned. Due to unrelated cost overruns in construction and the relatively high cost of about $8 million to acquire the landfill, the airport ultimately did not purchase the landfill. Airport planners indicated the landfill was being very well managed by the current operator and had not attracted large numbers of birds. However, they noted that the landfill has several decades of capacity left and should the venture change hands in the future to a less responsive operator, it could possibly begin to attract more birds and become less compatible.

Several stakeholders joined the airport planners to raise noise and safety concerns about schools that may be needed to serve residential development in the airport vicinity. While such schools would be outside safety zones that have elevated statistical accident risk, community concern raised by the 1990 Cessna crash, which was discussed above, suggests that the community may prefer that uses serving vulnerable populations not be located directly under the ILS approaches. To date, none of the local jurisdictions have adopted a policy to restrict such uses in the ILS approaches.

Noise

Noise compatibility issues have been the center of attention among stakeholders at DIA, both because of the terms and violations of the IGA and because noise complaints were a driving factor for moving the airport from the Stapleton location. Overall, the jurisdictions around DIA have adopted a wide range of tools to prevent noise impacts, which include zoning that prohibits new residential in the 60 DNL. The IGA, overlay zoning, and required avigation easements for new plats are all commonly used. DIA and the Metro Denver Economic Development Corporation have, together with local governments, developed a real estate disclosure notice and are reaching out to local realtors to include the brochure in contract documents for real estate sales. Airport planners reported that the voluntary program is working well, despite the fact that there are no requirements for real estate professionals to comply.

Noise challenges around DIA center on the fact the many stakeholders in the community believe that residential uses are negatively affected by airport noise at levels lower than the

national standard of 65 DNL and locally adopted strict standard of 60 DNL. DIA has published actual (Figure 2.6-3) and projected future 60 and 65 DNL noise contours for the full build-out scenario of the Airport, as shown in Figure 2.6-4, which it recommends local jurisdictions use in land use planning to avoid future noise incompatibility. Regional planning in Denver has always been largely voluntary, with each jurisdiction retaining local decision-making authority and veto power over guidance from the regional council of governments. Although the communities have been willing to enact zoning restrictions on residential uses in the 60 DNL contour, they are struggling to define and justify restrictions in the face of resistance beyond that contour from property owners and developers.

The Denver area has experienced enormous growth since the late 1980s when the airport was planned. Over the last decade, the demand for residential units has materialized more quickly in areas much closer to the airport than originally anticipated by the planning documents of the time. When the airport was being planned, the Denver area was just emerging from a deep recession. After the airport was built, growth in the environs mushroomed as the regional economy recovered quickly. Overall, the community has grown outward toward and around the airport faster than expected, while the airport is adding its full planned capacity slightly slower than expected. The actual noise contours are still substantially smaller than the projected noise contours. Local jurisdictions have faced a great deal of pressure to allow residential uses in areas that are not yet affected by airport noise, but are expected to be someday. The strong residential market around the airport, which was largely affordable housing, has changed dramatically in recent years with the downturn in the national housing market and thousands of homes are in foreclosure. Adams County had the highest rate of foreclosures in Colorado in early 2008, and *USA Today* reported that one of the newer neighborhoods, Green Valley, in the vicinity of the airport is among the hardest hit.

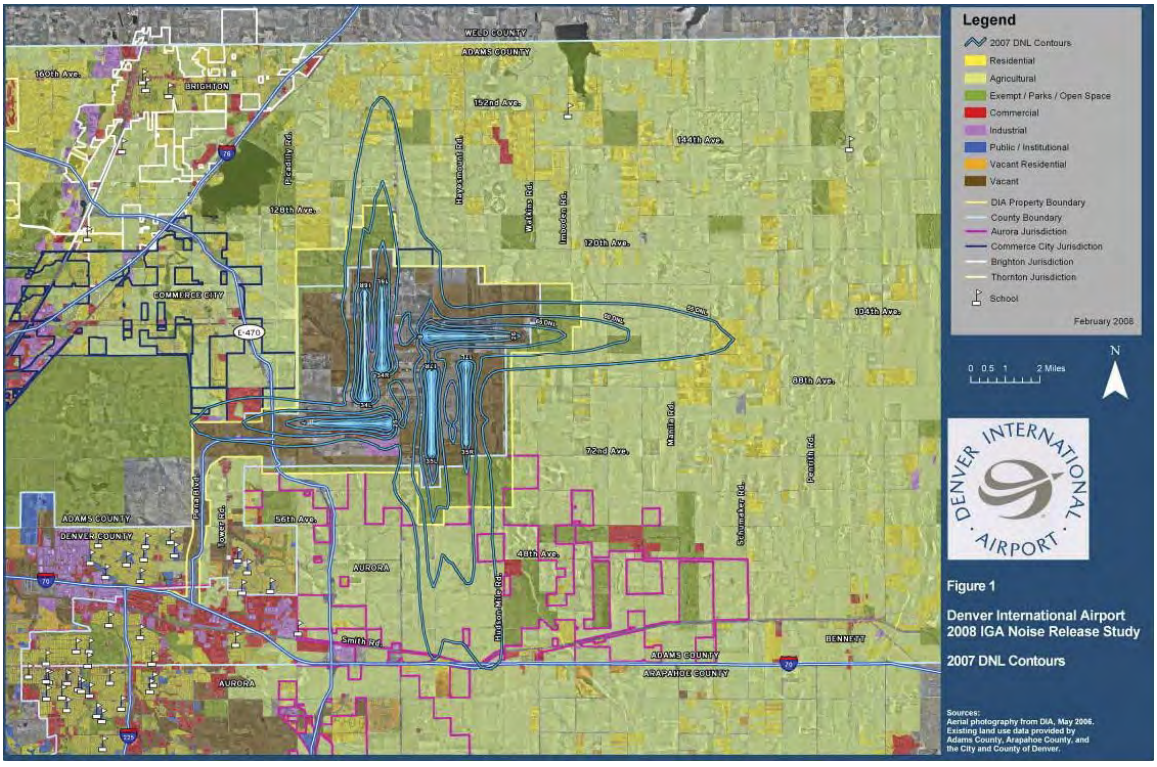


Figure 2.6-3. Actual noise contours for the DIA, 2007.

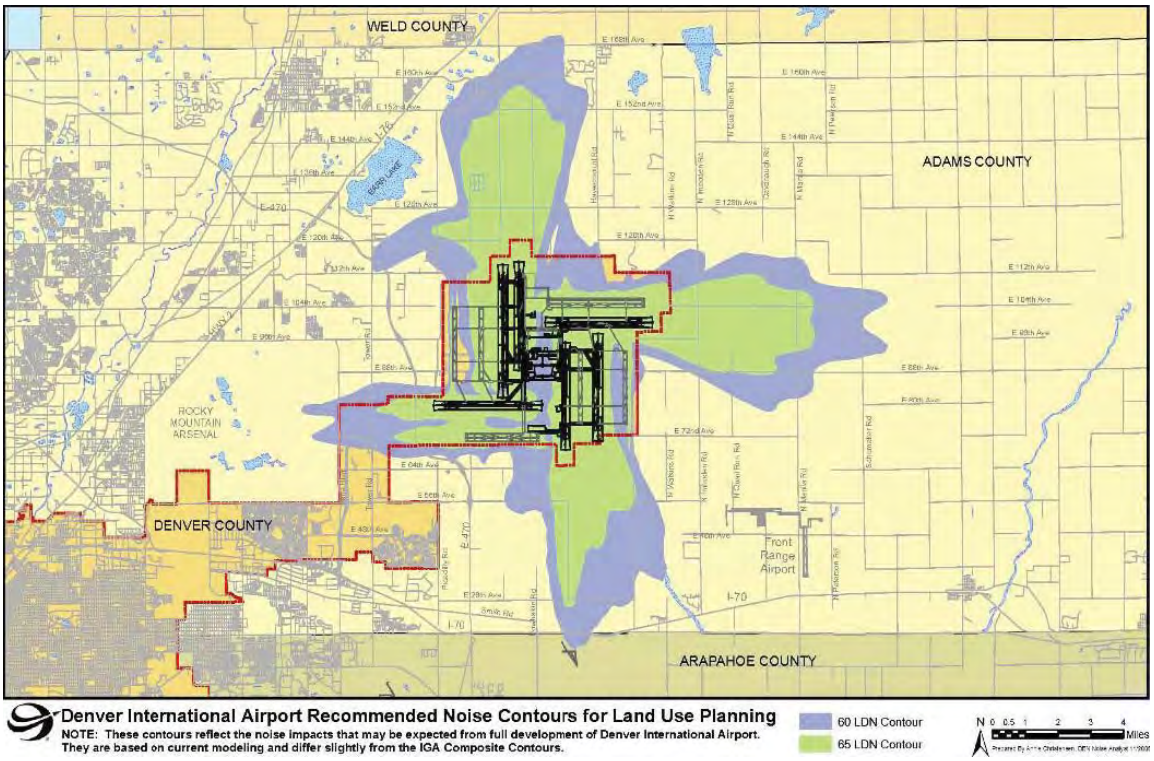


Figure 2.6-4. Predicted noise contours for DIA.

When asked about examples of noise incompatible uses in the airport vicinity today, many interviewees named the High Point development just south of the airport. It is a mixed use, master-planned development that crosses the jurisdictional lines of the cities of Denver and Aurora. Although it is outside the projected future 60 DNL, High Point violates the intent expressed in the early planning documents to curtail residential uses in the projected future 55 DNL contour, as Adams County regulations indicate, and north of 65th Street, as Denver's Gateway Plan indicates. The former mayors of Aurora and Denver met behind the scenes and discussed a mixed-use development in this area and announced their intent to cooperate on the project before consulting city or airport planners.

After the announcement by the mayors to cooperate, planners reviewed the proposal and found that it was not consistent with the Gateway Plan or with conditions placed on the zoning of properties that restrict residential uses and that it pushed up against the 55 and 60 DNL lines. In fact, the airport planners were directed to recalculate the full build-out noise contours in the area, moving away from the "worst-case" scenario that was used for the entire contour to a "most likely outcome" scenario on only the nearest portion of the noise contour, in order to better accommodate the desired development. Eventually, a joint development agreement was signed, allowing a mix of uses in the 55 DNL and requiring avigation easements and noise disclosures on all parcels in the development.

With Denver and Aurora pushing residential closer to the airport than originally planned, there is greater likelihood that other jurisdictions, such as Commerce City, will follow suit. In fact, property owners in Denver's Gateway area that are further away from the airport than High Point are asking the city to remove the zoning conditions that restrict residential use on their properties, under the justification that they want to be treated the same as High Point. The city

of Denver planning department is currently updating the Gateway Plan in an attempt to reconcile these issues and to enhance the range of permitted uses to better reflect market demand.

The development of 35-acre "estates" on land in Adams County within the airport's future 55 or 60 DNL is another use that is seen by some as incompatible for noise. Adams County land use regulations and state law exempt parcels over 35 acres from compliance with subdivision regulations. Thus, 35-acre parcels can be developed with a residence within the 60 DNL contour without going through subdivision review. Because the noise contours at DIA are projected for future build-out but the noise impact is currently more limited, such residences are likely to experience more noise in the future and may become the source of future complaints. The airport planners view these as incompatible residential uses that are being built in the area. The county, while acknowledging that the uses are not ideal, is not considering changing their application of subdivision or zoning regulations to apply to 35-acre parcels. The county does require a recorded, signed disclosure when the property is subdivided, which informs the developer of the airport proximity and projected future airport noise. The disclosure does not have all the legal strength of an avigation easement, but as a recorded document it should turn up in a title check for any subsequent sale.

Existing Studies, Planning, and Regulations

Intergovernmental Agreement

The intergovernmental agreement between Denver and Adams County is the most important document that controls noise compatibility issues. The noise monitoring grid points have forced the Airport to make adjustments and work with the FAA to reduce noise to impacts well below the FAA noise impact standards. In return, the jurisdictions agreed to keep new residential development out of the full build-out, projected 60 DNL. The payments for noise violations required in the IGA have also helped to address potential noise conflicts. By order of a judge, the payments to Adams County were not released until the county and local jurisdictions that received the funds adopted plans for how to spend the funds on noise mitigation efforts. The plans vary by jurisdiction, but have included acquisition of residences and land in the area around the airport to be used for open space, as well as paying for sound attenuation measures for residences in the overflight areas. On several occasions, Denver has requested an amendment of the IGA in recognition of the fact that the FAA controls many decisions and actions that ultimately result in violation of the agreement. However, Adams County has refused to do so, citing the fact that their voters approved the annexation on the assurance that the noise impacts would be as stated in the IGA. The county notes, in an FAA rule adopted after the original IGA, the FAA will not honor new agreements between the airport and local jurisdictions. The existing IGA is currently "grandfathered" and thus insulated from this rule, but Adams County believes it would apply if the existing IGA were to be amended.

While the IGA has been effective to reduce noise impacts, it is very expensive for Denver and the Airport to pay the violation fees. Although the Airport was able to meet all but one of the noise limits in 2006 and 2007, expansion of operations over time to meet the anticipated build-out will pose serious challenges in meeting the terms of the IGA. Furthermore, annexation of lands by cities that were not party to the IGA may lead to new residential uses being approved in areas that were restricted by the terms of the IGA. This would likely lead to new noise conflicts if the Airport expands as planned. However, there is little expectation that noise sensitive uses will be approved in the 65 DNL, representing incompatible uses in the eyes of the FAA.

Zoning Regulations

Many of the local jurisdictions around DIA have adopted zoning tools and regulations that help to protect against incompatible uses, particularly noise incompatibilities. Denver attached conditions to the zoning in the Gateway Plan area and restricted residential uses north of 65th Street, but subsequently removed those conditions on parcels in the High Point development, as shown in Figure 2.6-5. Avigation easements are required in Denver's Gateway Area, north of 56th avenue, including in High Point. Denver also restricts uses built on airport property based on the agreement in the IGA to limit on-airport uses to those that directly serve the airport and air travelers.

Adams County restricts new residential development in the 60 DNL and discourages residential development in the 55 DNL. The county zoning does not apply to parcels larger than 35 acres.

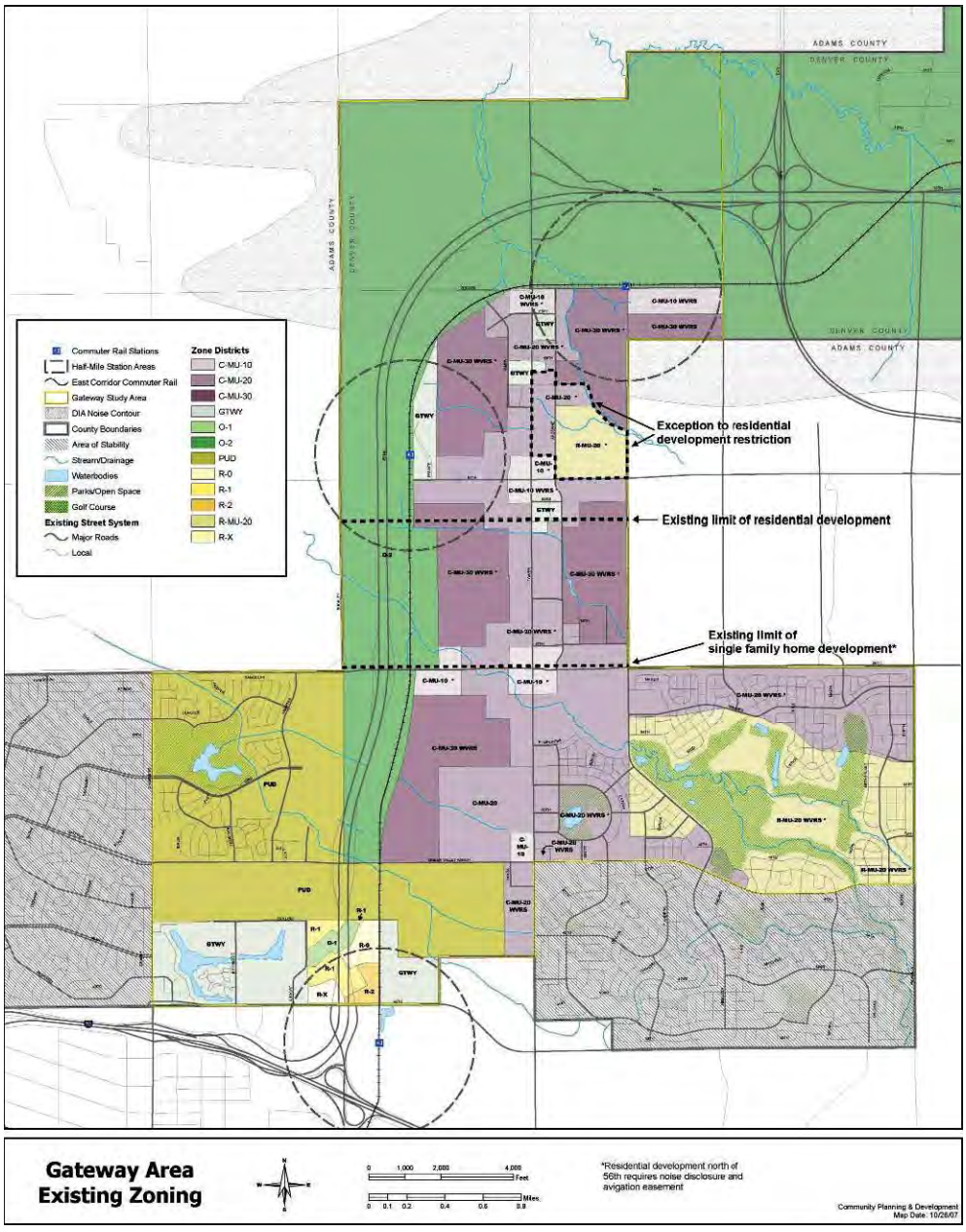


Figure 2.6-5. Zoning map for the Gateway Area.

The County does require recorded, signed disclosure of airport proximity and projected noise upon platting.

The city of Aurora, which includes influence areas of three airports within its boundaries, restricts new residential development in the 60 DNL and discourages residential development in the 55 DNL. Soundproofing is also required for new homes in the 55 and 60 DNL areas. The City requires avigation easements for all new subdivision plats within an airport influence area. The city of Aurora initiated the High Point development, which introduces new residential uses in an area of the noise contour that has been recalibrated to a "most likely" noise impact scenario rather than the "worst case" projection that the parties have used and agreed to in other areas.

The city of Commerce City has not yet annexed land in the 55 and 60 DNL contours, but may do so in the future. Agreements between Adams County and its municipalities have specified which municipalities can annex which lands in the airport vicinity, and some are available to Commerce City. In March 2008, the city council directed planning staff to explore an airport overlay zone and make recommendations for land use regulations in both the 55 and 60 DNL contours. The zone, if adopted, would then apply to any annexed lands within these contours.

Land Use Plans

Land use plans were completed by Denver and Adams County in the area around DIA after the annexation was approved by both communities. In Denver, the original Gateway Plan and implementation regulations designate uses and set forth design patterns and standards to maximize the potential of new development in the area, while minimizing the potential for noise conflicts and noise sensitive uses north of 65th Street. The update to the Gateway Plan generally supports the same concepts, but the approval of High Point is out of sync with the plan, as depicted in Figure 2.6-6.

Adams County's Airport Environs Concept Plan discouraged residential uses and schools near the airport. The Plan focused on attracting additional commercial and industrial uses that would have access to cargo facilities at DIA. The documents fully support the desire to avoid future safety and noise conflicts between the airport and other land uses. The Denver and Adams County IGA also contains some land use provisions, such as those to restrict development on airport grounds to "airport serving" uses, ensuring that economic development may occur off airport.

The annexation and relocation of the airport contributed substantially to the inventory of developable vacant land in Denver. At the time of annexation, the City and County of Denver were estimated to have only 118 acres of vacant land within the boundary. The annexation not only added the airport, but all of the area covered by the Gateway Plan and it freed up the Stapleton site for redevelopment. Redevelopment at Stapleton has added new commercial and residential options to the community and new property to the Denver tax rolls.

The market forces development around the airport to be stronger for residential demand than anticipated. Commercial and industrial demand in the area has been steady as well, as anticipated, and has filled nearby sites that are not in the immediate vicinity of DIA, such as the Montbello Industrial Park. The strong market for residential land and slower-paced market for land zoned for non-residential uses has led to varied implementation of the land use plans. The Adams County Airport Environs Concept Plan anticipates additional entrances to DIA beyond Peña Boulevard, which Denver built as the airport's "driveway" for passengers. In fact, it is presently the only access onto DIA property and Denver planners indicate that capacity challenges are anticipated in the near future. Generally speaking, the Gateway area, through which Denver extended access and utilities to the airport, has experienced more development and development pressure than in other areas where infrastructure is not readily available. Because the residential real estate market has been so strong, and other parts of the metro area have

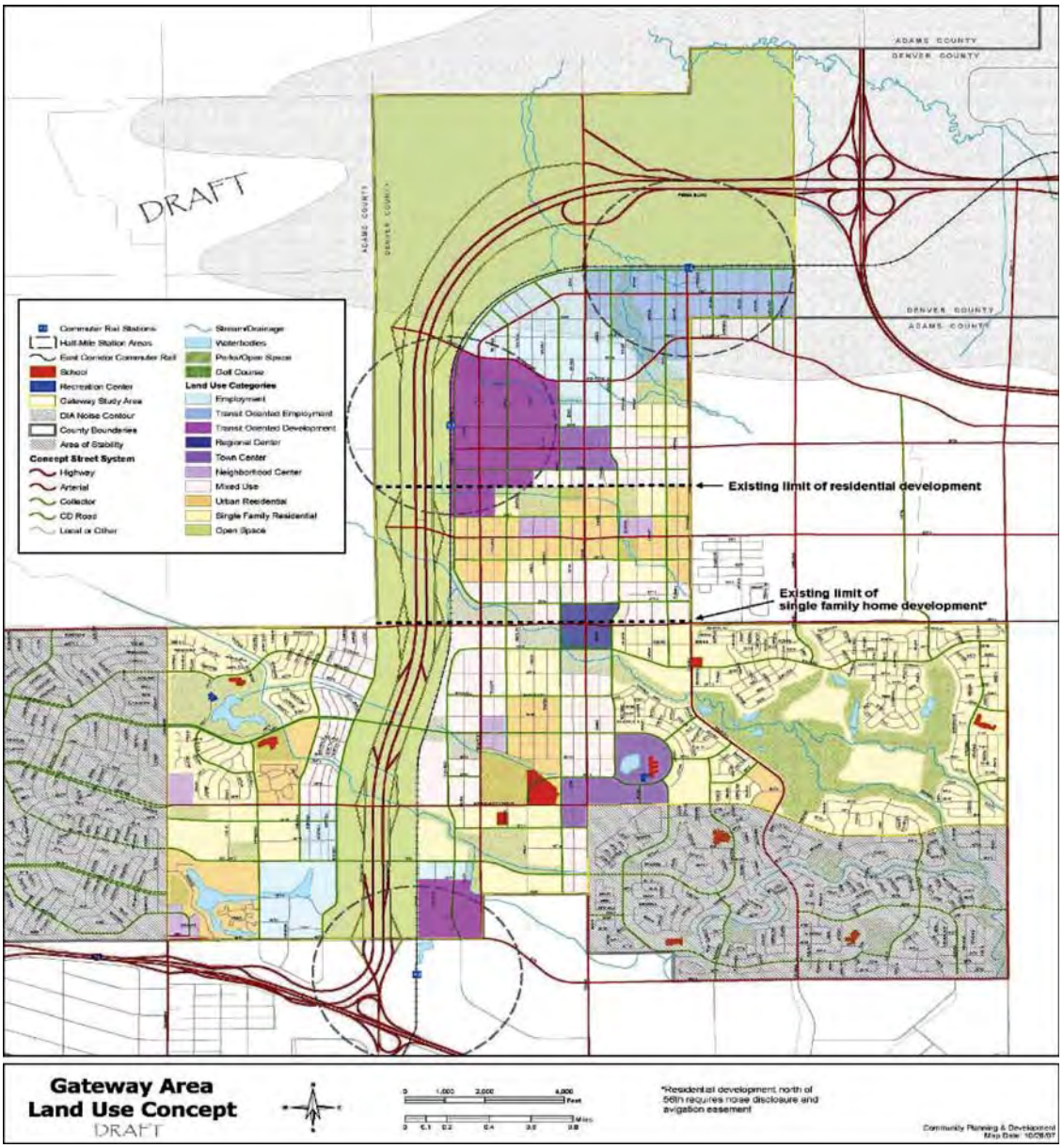


Figure 2.6-6. Draft future land use plan from the Gateway Plan update.

proven strong competitors for commercial and industrial development, few developers have been willing to bear the cost of building infrastructure for such development. Neither the developers nor local jurisdictions have been able to build additional secondary access roads to the airport. Cargo facilities and operations have not increased as anticipated at DIA due to a lower than expected demand for industrial and commercial operations in the vicinity.

The approval of the High Point development by Denver and Aurora opens the potential to revisit whether or not the local jurisdictions are going to have the will to restrict new residential within the 55 DNL. When the airport owner/operator, who has the most at stake, creates an exception to the general principle, it makes it easier for other communities to make similar discretionary determinations. In the future, as land is annexed by jurisdictions that were not party to the original IGA, it is possible that these jurisdictions may question even the 60 DNL restrictions. Future residential development is another concern if jurisdictions are pressured to approve

neighborhood schools to serve the residents, which can potentially add another noise sensitive use to the area.

Airport Master Plan

Passenger growth has led to a review of DIA's master plan. In 2007, the airport announced a five-year, $1.2 billion plan for concourse expansion, a terminal hotel, additional security areas, expanded parking, and an upgraded baggage and train network. The airport controls a sufficient amount of land to accommodate a great deal of future growth and any changes to the master plan will have a low likelihood of affecting land use compatibility.

Adjustments to Airport Operations

Beginning in 1995, the airport worked with the FAA and airline operators in the Noise Working Group to route the noisiest aircraft to western departures, which takes them over the fewest IGA noise grid points and residences. According to the DIA 2007 Noise Report, the decrease in the number of older, two-stage aircraft in modern fleets has improved noise compliance and reduced the number of aircraft that are routed in the Western Departure pattern. It is unclear whether the current airline industry trend toward larger aircraft, which is outside the control of the airport, may result in an increase in larger, louder aircraft in the fleet in the future.

Other Programs

The noise violation payments have funded a number of programs to address noise issues in the recipient jurisdictions. Each jurisdiction that receives payments was required before the funds were released to plan for how to spend the payments to address noise impacts. The jurisdictions came up with individual approaches that vary. Several include noise attenuation measures which have been quite successful. The City of Aurora hired a full time noise coordinator, who reviews development proposals in the vicinity of all three airports for compliance with noise regulations, and also heads efforts to purchase lands in the 55 and 60 DNL contours. The acquisitions to date total about 1,900 acres, and included three residential properties, which have been retired from residential use. The city is currently developing a framework plan for what land uses to allow in the area, which is at present lacking in infrastructure. At least some of the land is anticipated to be maintained as permanent undeveloped land that may be used for agriculture or open space.

In conjunction with DIA Leadership, a committee of the Metro Denver Economic Development Corporation, the airport has been promoting a Homebuyer's Guide to the Denver International Airport Region, which seeks to educate potential home buyers about current and future noise impacts. The program, modeled after a program at Washington Dulles, was developed in partnership with real estate companies in the region. Although participation is voluntary, it appears that many of the real estate agents are using the information to inform buyers looking in the airport vicinity.

Community Involvement

Even in the 1970s, Stapleton Airport generated noise impacts and received complaints and there were many groups and stakeholders involved in thinking about solutions. As early as 1974, the Denver Regional Coalition of Governments (DRCOG) began a regional discussion about alternative locations for the Airport. These meetings included a range of communities whose residential neighborhoods were impacted by noise, as well as Denver, the airport operator. Six options were identified for possible airport expansion or location, including expansion onto the

adjacent, closed Rocky Mountain Arsenal facility. This option was rejected because of concerns about the contamination on site, as well as concern that it would simply increase noise impacts on the residential uses that were currently impacted. By 1983, DRCOG had not been able to lead the group to agree on a site alternative, and Denver elected a new mayor, Federico Peña. Under Peña, Denver took a new, stronger position and Denver and Adams County began the bilateral process that eventually led to the layout selection, site selection, and IGA. DRCOG continued to play a role in the promotion of regional benefits from the Airport. In 1988, the DRCOG published an economic impact analysis of the Airport that promoted the benefits of jobs and visitors.

During the development of the IGA and continuing after the annexation was approved, Denver and Adams County met with representatives from the municipalities within Adams County who have been and could be most affected by noise at the new airport, including the cities of Thornton, Brighton, Commerce City, Northglenn, and Aurora. Staff from these cities worked together to complete the Airport Environs Concept Plan in 1988. The group, of which Denver was not a member, eventually formalized into the Airport Coordinating Committee (ACC). The ACC continues to exist and is more or less active depending on the need. The ACC used to meet regularly and collected dues for several years in order to bring lawsuits against Denver for violations of the IGA noise limits at the grid points. The ACC now meets on an ad hoc basis. In recent years, Denver has proposed to amend the IGA and the concept went before the ACC and was rejected, for reasons previously discussed.

DIA Partnership was a group of private and public sector interests that work to promote DIA and its role as an economic engine in the metro area. In 2007, the former DIA Partnership merged with Metro Denver Economic Development Corporation (MDEDC). The new DIA Leadership (DIAL) committee of the MDEDC carries on the work of DIA Partnership, with the following purposes:

- Provide private sector advocacy for DIA.
- Support additional funding for future DIA expansions.
- Provide input for job growth around DIA and adjacent area planning, including development patterns and transportation access.
- Increase international trade opportunities for Colorado companies by supporting nonstop international air service to un-served destinations and retaining existing routes.
- Conduct programs to educate and inform key decision makers and the public on the importance of maximizing the economic potential of DIA.

Economic Impact

In 1987, Stapleton served more than 32 million passengers. DIA had already expanded to more than 50 million passengers served in 2005 and has room to continue to meet increasing demand over at least a 20-year time frame, assuming that incompatible uses do not constrain the planned expansion. According to 2008 estimates from the Colorado Department of Transportation Division of Aeronautics, DIA is estimated to have a total employment of more than 217,450 jobs and an economic impact on the region of more than $22.3 billion. The Airport does not use tax revenues for its operations.

Final land acquisition and construction costs to relocate DIA were close to $5 billion and did not include the sixth runway that was to be built in Phase I. The runway construction was postponed when Congress delayed FAA funding to DIA in response to the noise violations of the IGA. The real reason that the funding was delayed may have been as much political wrangling as compassion for those affected by noise and this effort was led by Senator Wolfe of Virginia, whose district had competed with Denver for attraction of an annex to the National Air and Space Museum. The IGA noise violations and political squabbling delayed funding and runway

construction for more than seven years and added substantially to the construction costs. The original cost estimate for the sixth runway in 1995–96 was $110 million. The actual cost in 2003 was approximately $165 million, which included some design changes that added about 15 percent to the cost, with the remaining increase attributable to the noise-related funding delay. In addition, payments for IGA noise limit violations topped $41 million in 2007.

Cargo operations at DIA have not expanded to date as much as was originally anticipated in the Airport Master Plan. Slow growth in non-residential development and lack of separate access for cargo operations appears to have created something of a chicken-and-egg delay scenario with development of cargo facilities. When market conditions are favorable, DIA has plenty of land to expand cargo facilities.

Conclusion/Analysis

Safety

Land acquisition has been an effective and expensive tool used to address safety compatibility issues at the DIA in the airport influence zones. Safety was a concern at Stapleton and also one of the reasons for relocating the airport. Denver chose to purchase and control adequate lands at the DIA location to meet all long term needs for safety compatibility. The airport purchased 34,000 acres, which is nearly 10 times the land area of Stapleton. Even so, there is potential for incompatible land uses in the greater airport vicinity that could create steam or other visual impediments, or attract birds to the pre-existing landfill if it is not well managed.

Land use planning in the Gateway area sought to restrict land uses, such as schools, from nearby off-airport lands. This restriction has been useful, but less successful. The former Denver mayor, Wellington Webb, directed city staff to change the mapped noise contours and zoning conditions to push the deal through, in order to gain political kudos and property tax dollars from the proposed High Point development.

Airspace

Few, if any, airspace hazards exist in the airport vicinity. Most local jurisdiction regulations reference and respect FAA's Part 77 height limitation standards. Aurora requires avigation easements on all new subdivisions in the vicinity of an airport. Both Aurora and Denver require avigation easements and real estate disclosure notice on all property in the High Point development. However, few jurisdictions had any regulations to address potential sources of glare, steam, or other uses that could potentially cause hazards in the airspace more than one-half mile off of runway ends.

Noise

The local airport operator and many of the surrounding jurisdictions have determined that the FAA standard for compatible noise impact of 65 DNL on residential uses is not locally acceptable. The noise impacts of Stapleton were one of the main reasons behind the selection of the present location. Figure 2.6-7 is a map of noise complaints from the 2007 annual noise report. The map indicates that a greater number of noise complaints are from distant locations with very low ambient noise than from within jurisdictions adjacent to DIA. Local efforts focus to avoid future noise incompatibility when airport operations reach the full build-out scenario. During the planning stages, stakeholders agreed that the federal standard of 65 DNL was not appropriate for the local context. Since then, many jurisdictions have employed a range of tools, includ-

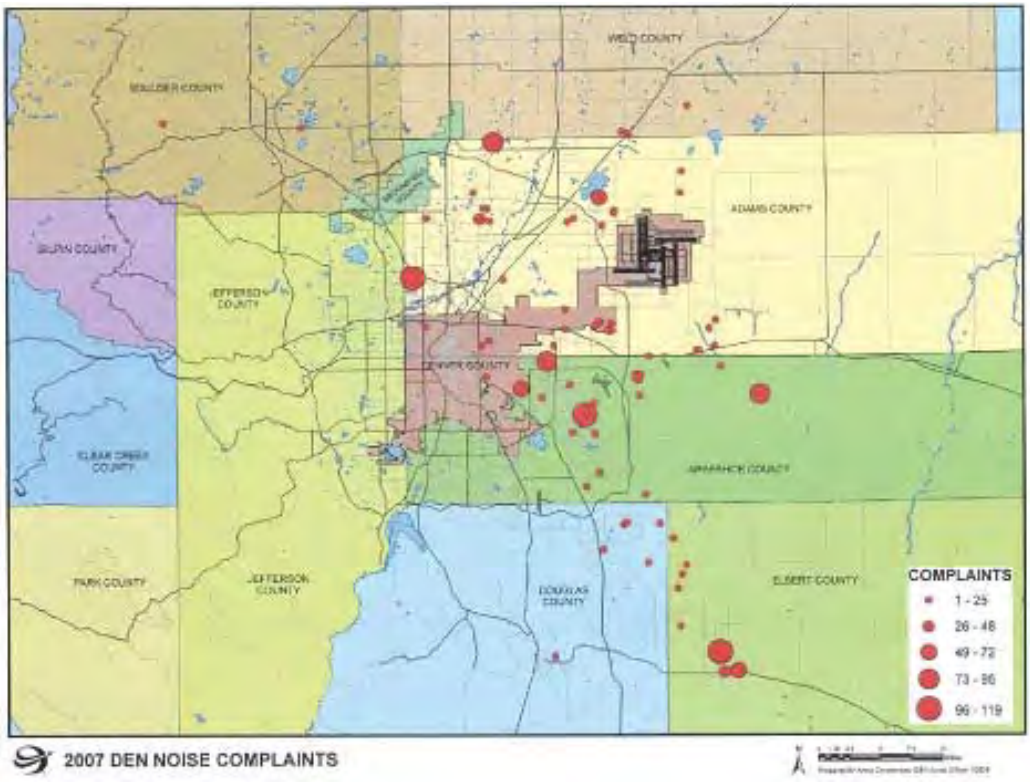


Figure 2.6-7. Map of noise complaints filed against DIA in 2007.

ing regulatory prohibitions on new residential in the 60 DNL, avigation easements, and noise disclosure to avoid future noise conflicts with residential uses in the vicinity of DIA.

During the planning stages of DIA, local jurisdictions and the airport owner/operator (Denver) agreed that new residential should also be curtailed in the 55 DNL, but were unwilling in most cases to adopt firm restrictions within that contour. At present, local jurisdictions struggle with higher than anticipated residential development pressure, lower than anticipated interest in nonresidential development near the airport, lack of infrastructure for nonresidential uses, and the challenge of restricting development today in areas that will be impacted by noise in the future. In addition, new jurisdictions have annexed land and are not beholden to the agreements that others signed in the past. Taken together, these factors have led to differences in opinion and strictness of enforcement of the provisions to discourage residential uses in the 55 DNL when exceptions to the general rule can and should be made. Unfortunately, this "gray area" of interpretation has also led to some degree of finger pointing and mistrust, as each considers whether to enforce restrictions where they believe that others may be lenient.

Several interviewees indicated the absence of guidance from either the FAA or the state regarding airport noise impacts in low ambient conditions has meant that the local jurisdictions are "on their own" to determine the appropriate noise contours and avoid future noise incompatibilities. A great deal of cooperation and consensus existed during and immediately following the relocation of the Airport, but appears to have eroded over time.

Fort Bragg Army Base/Pope Air Force Base, Fayetteville, North Carolina

Introduction/Airport Overview

Fort Bragg Army Base (Fort Bragg) and Pope Air Force Base (Pope AFB) are located to the west and north of the city of Fayetteville, North Carolina. Fort Bragg and Pope AFB comprise one of the world's largest military installations occupying 161,000 acres in six counties and includes seven major drop zones, two Army airfields, and one Air Force runway. Camp MacKall, a satellite Special Forces training camp that is part of Fort Bragg contains one of the Army airfields. The other, Simmons Army Airfield, is located in the southeast portion of the base. Global Security Magazine reported in 2007 that Simmons Army Airfield alone is home to 203 military and civilian aircraft valued at more than $1.4 billion. Helicopters, as shown in Figure 2.7-1, are the primary type of aircraft used at Simmons and MacKall airfields and a wide range of military aircraft use Pope AFB.

Figure 2.7-1. Military helicopter at Fort Bragg.

Fort Bragg and Pope AFB has an essential and irreplaceable role in the national military mission and also plays an enormous role in the economy of the surrounding region and the state of North Carolina. The annual estimated regional economic impact of the base is $7 billion. Many residents in the area have served or are active in the military and communities around the base have a strong military culture.

History of the Airport

Camp Bragg was established in 1918 for the Army to expand its field artillery training facilities in preparation for World War I. The Army chose the location because it had a climate suitable for year-round training and was in close proximity to a port and rail transportation. The location was 127,000 acres of desolate sand hills and pine trees and was designated as a U.S. Army installation. The War Department officially established Pope Field in 1919 and the camp was redesignated as Fort Bragg on September 30, 1922 (Figure 2.7-2). Initially, the Fort grew slowly, reaching 5,400 soldiers by the summer of 1940. With the threat of World War II and passage of the Selective Service Act, Fort Bragg exploded to a population of 67,000 soldiers by 1941.

Fort Bragg's airborne history and tradition began in 1934 with the first military parachute jump. In 1942, the first airborne units trained here, as did all World War II airborne divisions during the course of the war. The 82nd Airborne Division was assigned to Fort Bragg in 1946. Pope Field became an Air Force Base with the creation of the U.S. Air Force on September 18, 1947.

Figure 2.7-2. Pope Field at Fort Bragg, c.1920s.

More than 200,000 young men underwent basic combat training on the base during 1966–70. At the peak of the Vietnam War, Fort Bragg's military population was at 57,840.

Today, Fort Bragg is the world's largest airborne facility with more than 45,000 military personnel. Pope AFB adds approximately 4,700 military personnel. The XVIII Airborne Contingency Corps is the only airborne corps in the defense establishment of the United States. Pope Air Force Base is home to the 43rd Airlift Wing, which provides contingency airlift to the 82nd Airborne Division and other special units at Fort Bragg.

Long-term expansions plans at Pope Air Force Base are to extend its 7,500-foot runway by an additional 3,000 feet. The expected cost is approximately $50 million. An environmental impact study on the proposed runway extension has been completed. The Base is waiting for Congress to find money for the project, which is not expected in the near future.

In its 2005 Base Realignment Advisory Commission (BRAC) recommendations, Department of Defense (DoD) recommended to realign Fort Bragg and Pope Air Force Base. A complex list of shifting assignments ultimately means a net increase to the base of 7,000 military and support personnel and an expected increase of approximately 10,000 family members. In addition, real property at Pope Air Force base will be transferred back to the Army. The change of hands is not expected to substantially alter the type, number, or land use impacts of operations at Pope Field.

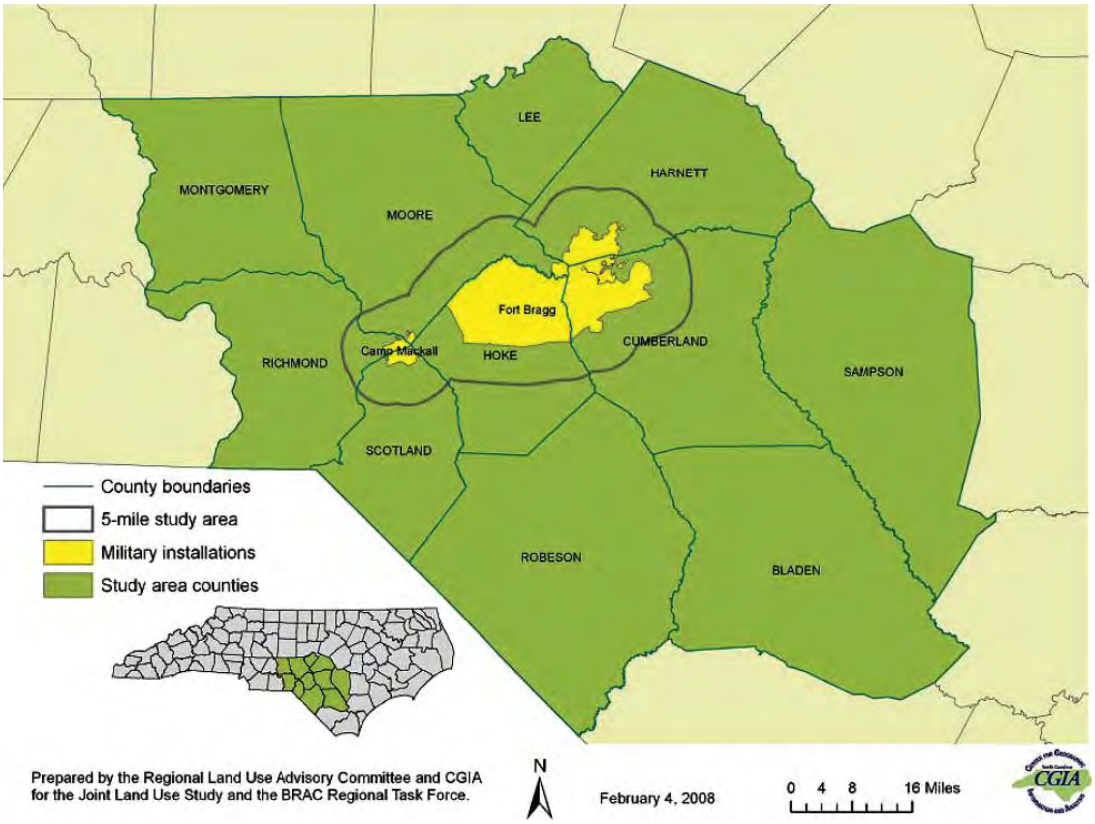
Governance

The DoD owns the Fort Bragg/Pope AFB complex. Each of the two facilities has base planning staff. The base planners are involved with on-base and regional land use planning efforts. The regional area around the base is depicted in Figure 2.7-3. The base planner for Fort Bragg initiated joint regional planning between the Base and local governments in 1988 with a Joint Land Use Study. The base planners for Fort Bragg and Pope AFB work closely together on many issues, including airport land use compatibility and ongoing involvement in regional land use coordination.

Six counties and two municipalities, Fayetteville and Spring Lake, both in Cumberland County, share a border with the Fort Bragg and Pope AFB facility. An additional eight municipalities have jurisdiction over lands within five miles of the base, which is the area included in regional land use plans. All of these jurisdictions are members of a regional land use advisory commission, who work on compatibility planning for the area around Fort Bragg and Pope AFB. The land use plans that are created are nonbinding on the members and implementation of the plans depends on local decisions.

Cumberland County serves as the central agency for joint planning for all local jurisdictions within in the county, except for Fayetteville. With the exception of Fayetteville, each municipality in the county and unincorporated areas is subject to identical zoning regulations. Each is also governed by one or more specific land use area plans prepared by the county in consultation with the town or city. County Planning staff conducts review of all development proposals for conformity with the zoning regulations and all applicable plans. Fayetteville was formerly part of the joint land use planning board, but in 1996, the city separated from the joint planning board and adopted separate zoning regulations due to political disagreements. Staff members from both

Joint Land Use Study Region, 2007



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-3. Region of the joint land use study, 2007.

agencies indicate that they continue to cooperate and share resources on many important land use planning issues.

The economic and overflight impacts of Fort Bragg and Pope AFB affect at least 11 counties in North Carolina, according to the Base Realignment Advisory Commission (BRAC). According to the city of Fayetteville, more than two thirds of Fort Bragg's soldiers live off-post in the surrounding civilian communities. A large number of these soldiers live in Fayetteville, the largest municipality in the region, or in Cumberland County.

North Carolina does not have statewide airport land use compatibility requirements for local governments, such as those that have been adopted in California or Minnesota. The North Carolina General Assembly passed a law in 2004 requiring that local governments notify a military installation if any rezoning or subdivision is proposed within five miles of the military installation. Fort Bragg and Pope AFB contracted a Regional Land Use Advisory Commission (described below) to review development proposals referred by the local jurisdictions for conformity with the land use compatibility plans.

Discussion of Compatibility Issues and Responses

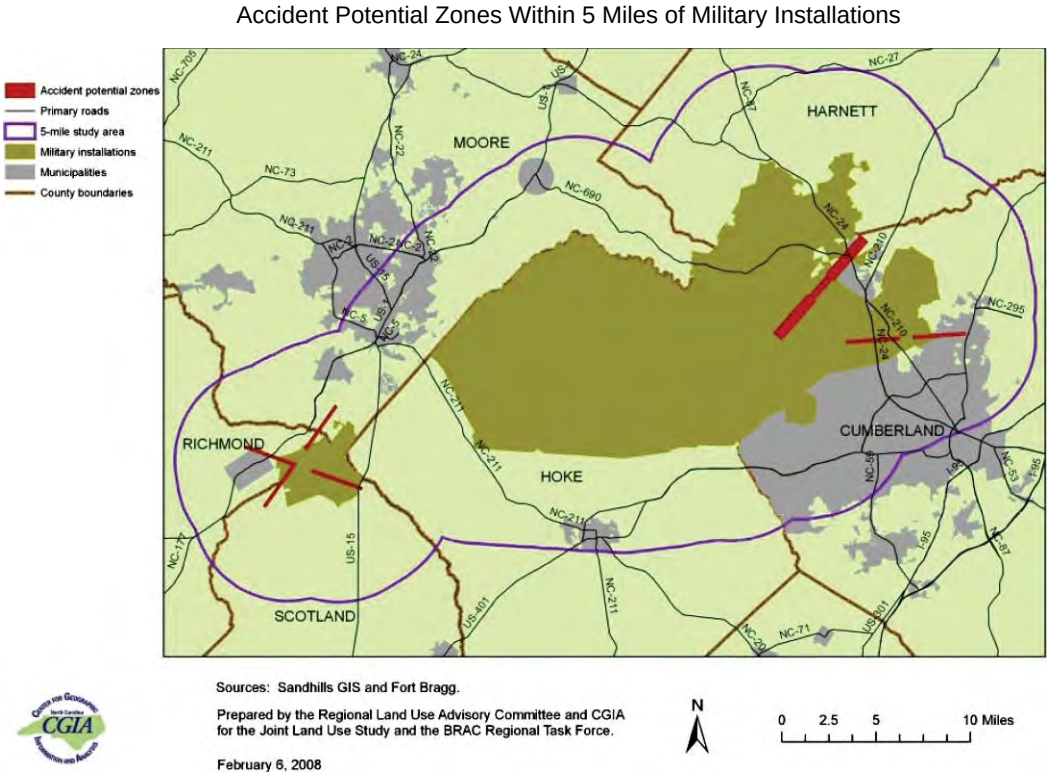
Approximately 50 percent of the land in the five-mile radius around Fort Bragg and Pope AFB is developed at urban densities. However, there are only a limited number of airport incompatible land uses.

Safety

The Safety Zones for Fort Bragg and Pope AFB, as well as for Camp MacKall to the southwest, are shown in Figure 2.7-4, which is from the 2008 Joint Land Use Study (JLUS). The majority of the safety zones extend over the base and into undeveloped land off-base that the U.S. Army has acquired. There are two exceptions to this rule, which include: (1) small portions of the northeastern approach zone for Pope AFB within the town of Spring Lake and Cumberland County and (2) the eastern portion of the approach zone for Simmons Airfield that extends somewhat into the north part of the city of Fayetteville. In Fayetteville, land uses that are developed in the safety zone include single-family neighborhoods, a golf course complex, and a Methodist College. These uses are generally low density and are located in the outer safety zones, where they are not ideal, but neither are they strictly incompatible. In 1992, the city of Fayetteville adopted zoning regulations to address impacts and limit development in the Noise and Accident Potential Zones (NAPZs) to prevent future incompatibility in these zones (red areas in Figure 2.7-4). The NAPZs are zones defined by the DoD and are included in the regional land use plans for Fort Bragg and Pope AFB.

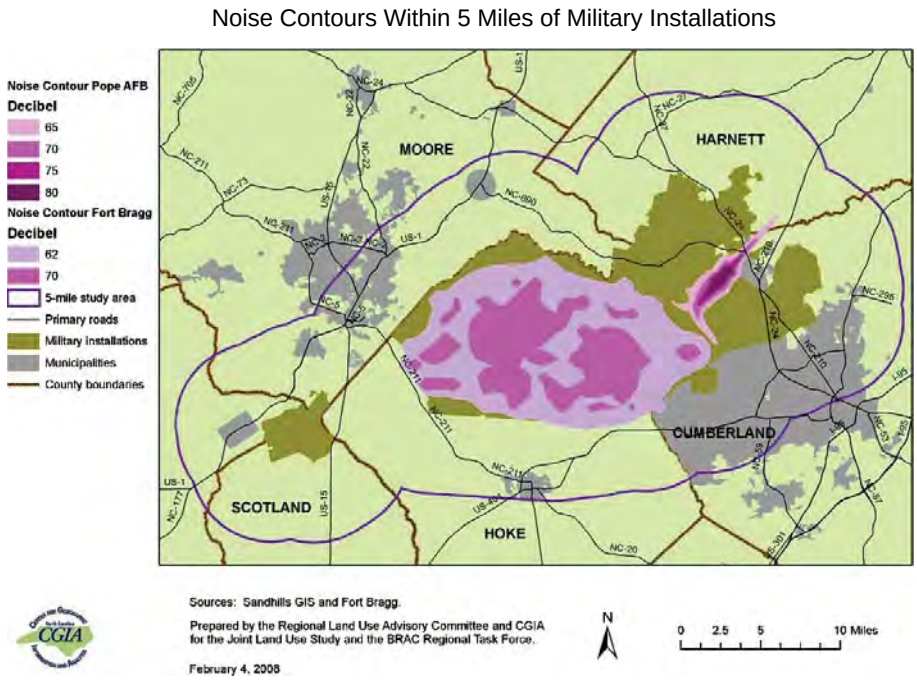
Noise

Noise contours at Fort Bragg and Pope AFB are derived from both aircraft and artillery sources and are shown in Figure 2.7-5. Within the city of Fayetteville, aircraft noise impacts are very limited, in part because helicopters are the primary aircraft that use Simmons Airfield. Similarly, no noise contours are derived from aircraft operations at the Camp MacKall portion of the base. Noise impacts from Pope AFB operations extend off base property and into the town of Spring Lake, as well as into Cumberland and Harnett Counties. The airport planners did not identify any existing noise incompatible uses in these areas.



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-4. Accident potential zones near Fort Bragg and Pope AFB, 2008.



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-5. Noise contours for Fort Bragg and Pope AFB.

Airspace Protection

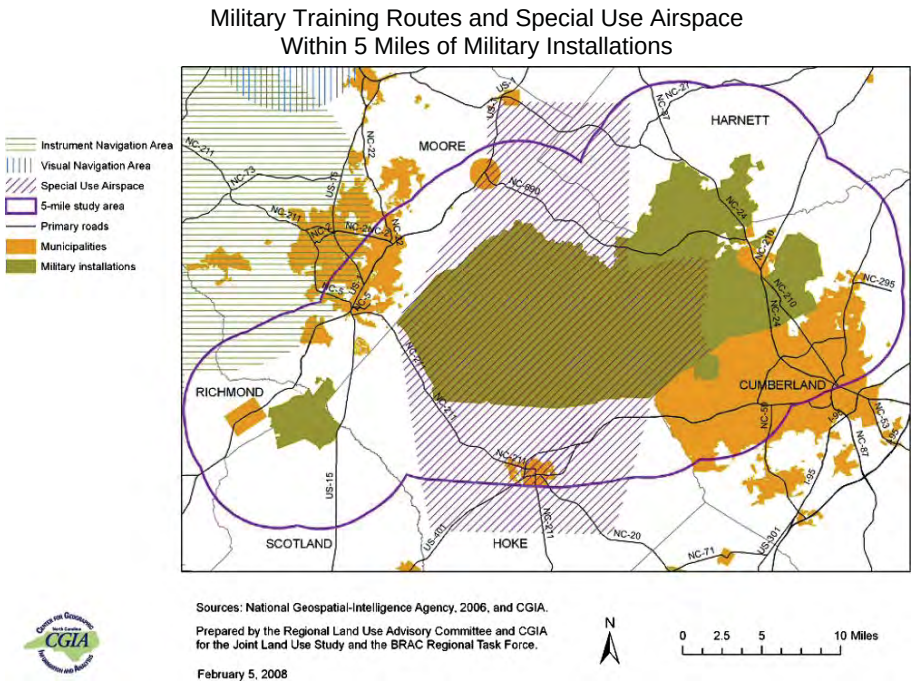
Airspace protection is a continuing concern around Fort Bragg and Pope AFB. The nature of the mission involves substantial numbers of low-elevation flights in the area, particularly in Hoke and Monroe Counties. The military training routes are depicted in Figure 2.7-6 on the following page. Although no serious concerns exist today, stakeholders identified concerns about the increasing number of cellular telecommunications towers in the area, both from the perspective of tall structures, as well as possible electromagnetic interference with radio signals. In addition, light pollution from current and future development has been identified as a potentially mission-endangering problem that needs attention and regulation in order to be avoided in the future.

Existing Studies, Planning, and Regulations

1991 Joint Land Use Study

In 1988, Fort Bragg began work on its first Joint Land Use Compatibility Study (JLUS). The DoD directs military installations to engage in joint land use planning on areas around military facilities as necessary to protect the military mission and operations. The DoD provides guidance and model documents for such land use planning. A specific impetus for Fort Bragg and Pope AFB to initiate the 1988 JLUS was that suburban residential development had encroached on one of the military's practice drop zones inside the Base. The potential for accidents near or in the residential areas caused the Army to shut down this drop zone, which raised awareness on the Base and eventually in the surrounding communities about the potential for urban encroachment to negatively affect the ability of the Base to accomplish its mission.

In the early stages of preparing the JLUS, the base planner in charge of the project contacted the planner for the region working out of the state regional planning office, the North Carolina



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-6. Military training routes and airspace usage near Fort Bragg and Pope AFB.

Division of Community Assistance. The two began a cooperative and productive working relationship that has lasted for 20 years and counting. The study, completed in 1991, mapped Noise and Accident Potential Zones (NAPZs) onto the surrounding jurisdictions and was widely distributed off the base. It also included information about low elevation flights in the area. The study recommended land use guidelines and adoption of zoning regulations to protect against incompatible uses in the NAPZs. Another very important outcome of the initial 1991 JLUS was the formation of a Regional Land Use Advisory Commission (RLUAC) with representatives from all of the local municipal and county jurisdictions in the six-county area. This group met monthly for several years. Through the rather intensive joint planning process, members were informed about land use compatibility issues and the risks of not protecting the base from encroachment and local residents from impacts. It appears that the process resulted in a high buy-in by the members, many of whom helped to champion the final document. The majority of RLUAC member jurisdictions have adopted zoning regulations and planning policies that are in harmony with the JLUS recommendations. After adoption of the 1991 JLUS, the RLUAC continued to meet less frequently to work on implementation issues, but eventually found that there was no longer a need for the group and it was disbanded in 1998.

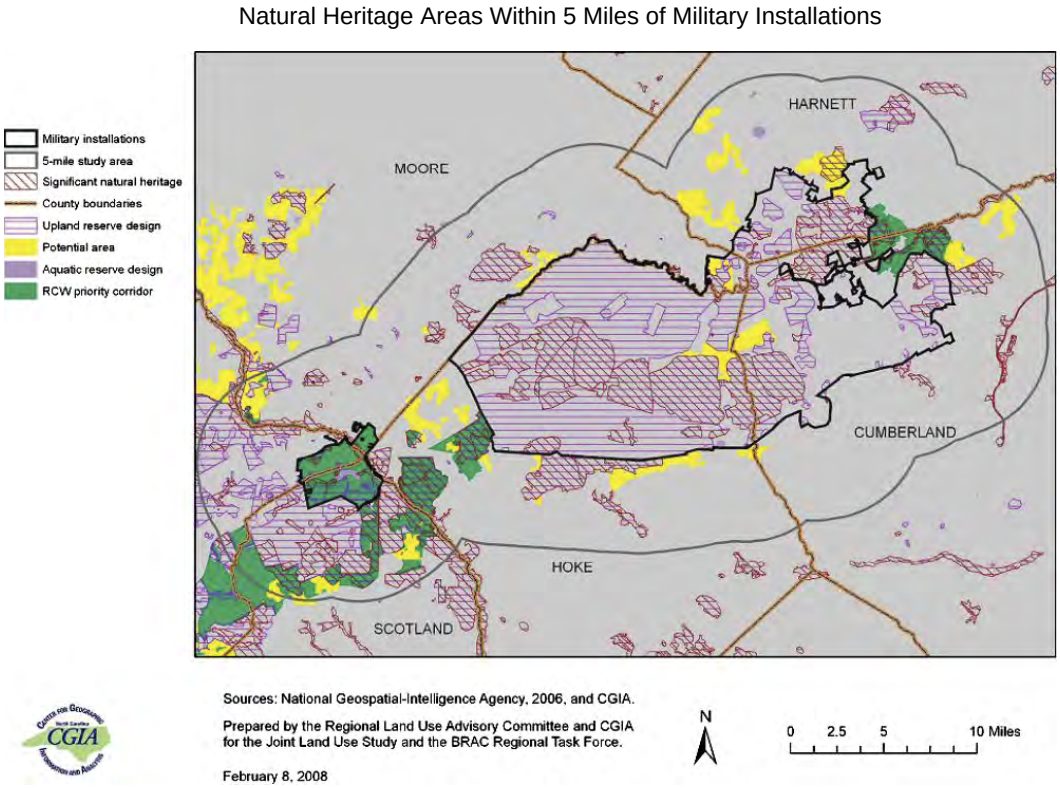
2003 Joint Land Use Study

In 2000, the U.S. Fish and Wildlife Service (USFWS) began to recognize that development may be detrimental to important habitat in the region. A USFWS representative contacted the two original JLUS planners, asking whether the RLUAC could be reconvened to discuss habitat issues in the region. The USFWS and Fort Bragg provided grants for an update to the JLUS document with new Geographical Information Systems (GIS) data and technology. The RLUAC was reconstituted, this time with the former regional planner serving as part-time executive director, paid through the grant funds. The GIS mapping component added time series data of developed acres

within the five-mile radius of the base to the 2003 update and painted a clear and easy-to-comprehend picture of the urbanization increase in the area.

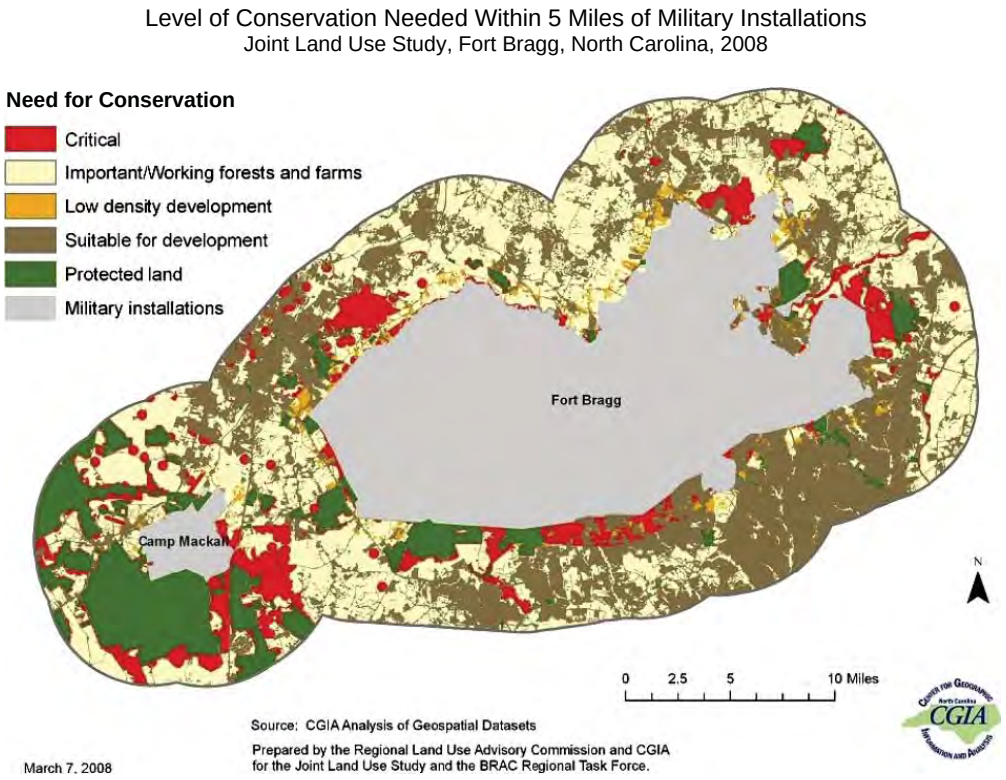
The 2003 update took an innovative new approach to integrate habitat maps with noise and accident protection zones, as shown in Figure 2.7-7 and Figure 2.7-8, which are from the further updated 2008 JLUS. The 2003 and 2008 JLUS maps specifically identify lands with low-to-high conservation/habitat value, flood prone areas, low-to-high levels of protection from development, and other attributes of nearly 500 in total. The mapping layers result in a clear method of prioritization of land suitability for development and conservation within the five-mile buffer area. This was the very first effort in the nation to combine conservation buffers with the traditional elements of the JLUS. It has been replicated through the Army Compatible Use Buffer (ACUB) program, which the DoD has implemented through planning and a pool of acquisition funds to help acquire high priority habitat and buffer lands. These funds have been an important tool that Fort Bragg and Pope AFB has used to purchase critical buffer and wildlife habitat lands as opportunities have arisen since 2003.

Both the 1998 and 2003 JLUS resulted in a series of recommendations to implement land use planning compatible with the maintenance of the base mission. In addition to the adoption of zoning regulations, one of the key accomplishments since the 1991 JLUS is that the North Carolina General Assembly passed a law in 2004 that requires local jurisdictions to notify a military base when any rezoning proposal is considered within five miles of the base. Fort Bragg and Pope AFB initially conducted such reviews, but since the announcement of the BRAC, the Base has contracted such reviews to the RULAC, which uses the GIS-based database to review proposals with parcel-based information and the land classification priorities. In addition, since 2004 the state has allocated millions of dollars to several state trust funds to acquire properties that serve dual



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-7. Natural heritage areas within five miles of Fort Bragg and Pope AFB.



Source: Fort Bragg / Pope Air Force Base Joint Land Use Study Update, March 2008

Figure 2.7-8. Conservation needs within 5 miles of Fort Bragg and Pope AFB.

conservation and base protection goals. These funds and federal sources, mostly military, have been used to acquire more than 10,000 acres of conservation lands, including more than 5,600 acres of lands designated as critically important. On completion, the RLUAC executive director undertook an extensive outreach program to all the local jurisdictions in the RLUAC area. All but two of the 18 member jurisdictions formally adopted the 2003 study.

2008 Joint Land Use Study

In 2005, the BRAC recommended substantial realignment and expansion at Fort Bragg and Pope AFB. BRAC provided funds to update the JLUS and recommendations for the entire 11-county BRAC region because it recognized the expansion would affect an area even greater than the six-county region that the RLUAC had been working in. The 2008 update also gave the RLUAC an opportunity to catalogue some of the many successes in the short five years since the 2003 update.

The RLUAC worked with an additional partner, Sustainable Sandhills, to add more GIS layers to its database, extend the study area, and refine recommendations for land use compatibility with military, community, and conservation issues. Sustainable Sandhills provides ongoing funding to maintain the GIS database.

The primary recommendations in the 2008 JLUS include:

- Request real estate disclosures through state legislation and/or local government action.
- Adoption of military impact zoning districts in remaining local zoning ordinances.
- Purchase "critical" and "important" lands as they become available from willing sellers.
- Lease development rights on other "critical" and "important" lands.

- Utilize the Sustainable Sandhills growth suitability model for local planning and development decisions.
- Review proposed rezoning and new subdivisions within the five-mile area, to be completed by RLUAC.

Local Plans and Zoning Regulations

According to the executive director of the RLUAC, most of the local government jurisdictions in the 1991/2003 planning area have adopted zoning regulations that support the JLUS recommendations. For example, Fayetteville adopted overlay zoning for the NAPZs in 1992. In that year, a development was proposed on over 100 acres in an area that was outside but adjacent to the City under the approach zone. The proposal was for residential development and was most appropriate to annex, but was proposed in a configuration and density that conflicted with suggested NAPZs. The City acted quickly to adopt amendments to the zoning code to include overlay regulations in accordance with the JLUS. It approved the annexation to bring the new development area into the city, but required conformance with the overlay zone district. The zoning provisions follow the JLUS precisely, which in turn follows the standard DoD guidance on land use compatibility with one variation to use of the 63 DNL rather than the 65 DNL noise contour. All the safety zones are as prescribed in the DoD guidance.

The city of Fayetteville also adopted the North Fayetteville Area Plan in the area most affected by Base and aircraft operations. The plan, which was developed in cooperation with Cumberland County, describes thoroughly the noise, safety, and overflight land use implications of base operations to include aircraft, artillery, and other. The plan refers to zoning regulations that protect against such impacts and includes a map of the NAPZs and approach zones.

Cumberland County has been working on base/land development compatibility issues since before the 1991 JLUS process. In the 1970s, Fort Bragg completed an Airport Installation Compatible Use Zone Study (AICUZS) and made findings regarding accident and noise zones. County staff indicates the subdivisions within the NAPZS in the 1970s and early 1980s were reviewed against and modified to be consistent with the findings and recommendations of the AICUZS. The Cumberland County 2010 Land Use Plan, adopted in 1996, includes, among eight overarching goals to "Maintain land use compatibility around military bases and airports."

Cumberland County has been reluctant to adopt the JLUS or strict zoning controls to implement the JLUS. In 2003, commissioners cited concerns that policies could infringe on private property rights and impact real estate agents and developers. They objected to two of the 10 recommendations. They considered the recommendation that all development within the one-mile buffer of the base should be restricted to one unit per 10 acres to be overly restrictive and expressed concern that it was significantly more restrictive than previous planning efforts. In addition, the county did not support the JLUS recommendation to restrict the expansion of public utilities in the one-mile buffer in order to discourage intense development in the area. The county did support the other eight recommendations, particularly those that were designed to address specific impacts, such as accident risk, noise impacts, and height restrictions.

In 2004, Cumberland County drafted a military compatibility plan that lists a number of goals consistent with the JLUS, such as protection of the mission and operational needs of the Base, as well as a goal of "providing land owners with a wider range of options to use their land and receive compensation." The plan was adopted in 2006 as the Cumberland County Fort Bragg Small Area Plan. As an outgrowth of these efforts, the County developed an innovative program to lease development rights on lands identified in the plan as "critical" or "important" to protect the Red-cockaded Woodpecker. This program is called the County Conservation Incentive Program and leases development rights for an amount that is equal to the assessed annual property

taxes for the property in question. County staff noted that the voluntary program has not been as effective as they hoped due to limited incentive for landowners to agree to lease rights on agricultural lands with low annual property taxes. However, the RLUAC notes this program is an unforeseen but welcome alternate approach to meet land use compatibility planning goals.

Light Pollution Study and Telecommunications Tower Study

The RLUAC was commissioned in 2007 to conduct two additional studies that are related to military compatible land use planning. The Light Pollution Study was released in early 2008 and the Telecommunications Tower Study will be forthcoming in late 2008 or early 2009. These studies look at specific land use impacts of urbanization and future development on the military mission and operations of the Base. The studies include specific recommendations and analysis to be used for policy development and adoption, as well for as specific development proposal review.

Community Involvement

Over the last 20 years, a range of community partners have come together for regional land use planning under the backing of the RLUAC. Primary partners include the Army and Air Force planners at Fort Bragg and Pope AFB, the North Carolina Division of Community Assistance, the USFWS, Sustainable Sandhills, and many local county and municipal governments. In addition, private donors have provided certain key land areas, including at least one large and important parcel containing portions of a NAPZ. In addition, both active and retired military in the communities have at times championed the work of the RLUAC and need to protect the Base and its mission.

The RLUAC continues to lead a number of very important initiatives and activities. These include the recently completed 2008 update to the JLUS and Light Pollution Study, and the forthcoming Telecommunication Tower study. RLUAC staff and members play a key role in campaigning regional, multi-purpose land use compatibility planning to protect communities, the Base, and wildlife. The base planning personnel and RULAC recently conducted yet another round of community information sessions to present the 2008 update of the JLUS to all member governments in an effort to maintain and expand the regional consensus of support for the document and its goals. Review of development proposals, using the database designed and managed jointly with Sustainable Sandhills, has been and will continue to be an important activity as well. The RULAC indicates that in the two-plus years since it began to review development proposals, only two have proven inconsistent with the JLUS priority land designation, both involved suspected Red-cockaded Woodpecker habitat. In the first instance, the developer amiably undertook additional studies to establish that the birds were not present. RULAC was beginning to respond to the second case as this research was conducted.

Interviewees for this case study indicated that the groups most adverse to the recommendations of the RLUAC have been the local homebuilders and real estate professionals. These groups have opposed land use restrictions designed to limit density or development potential on private property in the region and have opposed state legislation that would specifically enable local government to require real estate disclosure notification of land use impacts of the base, such as noise, overflights, and accident potential. Their efforts are cited as the reason the legislature has not, to date, passed enabling legislation for real estate disclosure such as that recommended by the JLUS. The rights of private property owners and the lack of participation of the real estate community in developing the JLUS were cited by Cumberland County commissioners when they declined to adopt the 2003 JLUS update.

Economic Impact

Fort Bragg and Pope AFB is a significant economic presence in North Carolina, with an annual estimated economic impact of $7 billion on the surrounding ten counties, according to the city of Fayetteville website. Fort Bragg and Pope Air Force Base generate retail sales of approximately $2 billion for Cumberland County. Military personnel expenditures have proved to be a vital source of economic growth and development for both the city of Fayetteville and Cumberland County.

It is difficult to estimate the economic impact to protect Fort Bragg and Pope AFB from serious encroachment of land uses that could endanger its military mission. If incompatible land use encroachment were to shut the Base down, it would be disastrous for the local economies. Base realignment has and is expected to shut down many military facilities in many communities across the country, with difficult and sometimes devastating effects on local economies. That has not been the case in Fayetteville, Spring Lake, Cumberland County, and surrounding jurisdictions, which are expected to thrive under the expansion of Fort Bragg and Pope AFB. The fact that Fort Bragg and Pope AFB is one of the largest military facilities in the world, with an essential and irreplaceable role in the national military mission, is both a driver and a result of land use compatibility. The high importance of the facility led to early recognition of the need to protect its mission through land use planning and controls. It received ample federal funding to assist with land use planning and implementation measures. The well-protected facility has been targeted for expansion because it has the ability to expand its operations without critical land use conflicts.

Conclusion/Analysis

Regional planning has been an effective tool for the Fort Bragg and Pope AFB region to raise awareness and avoid land use incompatibility issues. Over a 20-year period, regional land use planning, coupled with recognition by local officials of the enormous economic importance of the Base, led to a range of actions and implementation at the local level that avoid and prohibit incompatible land uses. In addition, the effort has allowed the Base to secure and allocate funds that meet both military and off-base interests and needs.

Five key elements appear to have been critical to the success of the program and include:

1. The base is a central underpinning of the regional and state economy, a fact that is indisputable and widely recognized.
2. The local culture highly values the military presence. Many leaders in the area have been or are part of the military and take the need to protect the interests and mission of the Base very seriously. This increases overall community willingness to tolerate impacts and accept land use restrictions that protect the Base.
3. Base planners got an early wake-up call about the need to coordinate with the local jurisdictions when the base lost the ability to use one of the military drop zones due to residential encroachment in the late 1980s. They were motivated and able to get started on efforts to avoid additional land use conflicts before other major encroachments of the Base mission occurred.
4. Initial and subsequent efforts were undertaken in a cooperative manner between the Base and regional land use planning agency, which led to a high level of understanding of issues and land use compatibility plans.
5. Two individuals, one at the Base and one in the regional planning agency, took responsibility and ownership over the process and document and carried it forward for nearly 20 years, and counting. Both remain actively involved in the regional planning efforts to this day. Their personal commitment to the process, cooperative stance, and ability to find win-win outcomes have convinced many to participate in a cooperative outcome.

The regional cooperation on compatible land use planning is voluntary in the Fort Bragg and Pope AFB area and has been largely successful to date. However, without state or federal mandate, there have been some discrepancies among jurisdictions and their willingness to participate. For example, Cumberland County has wholeheartedly embraced limits on development specifically related to noise impacts, accident potential, and airspace protection in the NAPZs since the first AICUZ in the 1970s. However, as the goals of the land use plans have expanded and sought to curtail development within a mile of the base, the county has questioned policies recommended in this area. Cumberland County land in the one-mile buffer area has greater development potential and pressure than in most of the other jurisdictions. The County has disagreed with the across-the-board recommendation to limit development in the entire one-mile buffer area to the very low densities of one unit per ten acres as recommended in the JLUS.

Although the voluntary nature of the regional land use planning process around Fort Bragg and Pope AFB means that responses are not uniform, the executive director of RULAC said they did not feel a mandatory process would be better. He indicated that for one, a non-coercive approach has ultimately been important to build community consensus and mutual trust over time. He noted, however, that it has taken 20 years to build the trust to a level of consensus that the region enjoys today and there are still some gaps in the level of protection they would like to see. Variations in approach, such as the County's development rights leasing program, have been a positive outcome of the lack of mandate for uniform implementation of land use compatibility policies.

Fort Lauderdale Executive Airport, Fort Lauderdale, Florida

Introduction/Airport Overview

Constructed in 1941 as an auxiliary landing field to train naval aviators during World War II, this airport was named West Prospect Field. The federal government deeded the property to the city of Fort Lauderdale in 1947 to be used as a public airport and the airport was unofficially named Fort Lauderdale Municipal Airport, but pilots called it Prospect Field. In 1959, the city of Fort Lauderdale's City Commission Resolution # 7336 changed the airport's name to Fort Lauderdale Executive Airport (FXE).

The city established the Airport Industrial Board and sold airport land to companies like Allied Signal, Bendixx and Harris Computer Corporation in order to bring economic development into the area and create job opportunities. Funds from these land sales were used for airfield improvements, such as taxiway construction, lighting systems, and guidance signs. The first building on the airport, a flight school maintenance hangar constructed in 1959, is still in use today. FXE is surrounded by industrial, commercial, and residential uses, as shown in Figure 2.8-1. Currently, over 125 businesses are located in the Industrial Airpark, including Marriott Hotels, Citicorp Latino, Walgreens, and Lucent Technologies.

FXE operations include a relatively large fraction of business jet traffic due to an emphasis on commercial interests. FXE had approximately 200,000 operations in 2007 and the distribution of the operations is shown in Table 2.8-1.

The percentage of jet aircraft is relatively small compared to piston aircraft. However, the jet aircraft are traditionally the cause of most noise complaints and dominate the DNL contours. As an indicator of this importance, the reduction in the number of Stage 1 and 2 jets between 2002 and 2005 was largely responsible for the decreased noise exposure shown in Figure 2.8-2.

Discussion of Compatibility Issues and Responses

FXE has pursued maximizing land use compatibility through use of the FAR Part 150 process. But this process, to the extent it has been successful, is largely a result of changes the airport and its users have made, rather than a result of changed land use patterns, primarily due to the extensive development that already exists around the airport. The city of Fort Lauderdale, on behalf of FXE, completed Part 150 studies or updates in 1988, 1994, and 2002. The primary elements of the resultant Noise Compatibility Plan (NCP) are shown on in Table 2.8-2, which lists the operational elements of the NCP, and Table 2.8-3, which shows land use and continuing program elements. Two of the operational elements and all the continuing program elements are described further, following the Tables because they serve as indicators of the city's commitment to reduce noise and land use incompatibilities.

Figure 2.8-1. General location of FXE.

Preferential Runway Use

Runway 26 was to be maximized for departures and Runway 08 for arrivals at night in order to minimize use of Runway 13/31 by jet aircraft on a 24-hour basis and nighttime use of Runway 13/31 by all aircraft. The tower was not staffed at night at the time of the 1988 Part 150 study, which made nighttime preferential use infeasible. In order to implement the nighttime preferences, the city decided to cover the expenses of nighttime staffing from airport funds at approximately $230,000 in 2002. Residential population in 2002 within the 65 to 70 DNL contours has decreased almost 50% and no population resides at levels exceeding the 70 DNL.

Preferential Flight Track Use

Table 2.8-1. Distribution of FXE operations.

Aircraft Category	2002	2005
Jets	8 percent	11 percent
Stage 1 and 2 Jets	3 percent	1 percent
Stage 3 Jets	6 percent	10 percent
Turboprops	5 percent	4 percent
Piston Aircraft	82 percent	77 percent
Helicopters	5 percent	7 percent
Total	**100 percent**	**100 percent**

Source: Analysis of ANOMS8 data by HMMH and 2002 part 150 Study

There are several preferred departure turns, though the most important to minimize noise incompatibilities and complaints is a left turn for jet aircraft departing Runway 08, following the I-95 corridor east of the airport, as shown in Figure 2.8-3.

This preferential departure track has significantly reduced incompatibilities and complaints. The track has been refined as an on-going process for almost 20 years. A brief history of it's development includes:

- FXE's first Part 150 Noise Compatibility Program (NCP) submission (1986) initially recommended the I-95 turn, noting that: "The majority of significant noise complaints received by FXE are from persons living in residential developments east of I-95." Analysis of the proposed turn in the study indicated that it would reduce population within the 65 decibel (dB) DNL contour by nearly 50%, from 1,715 to 932.

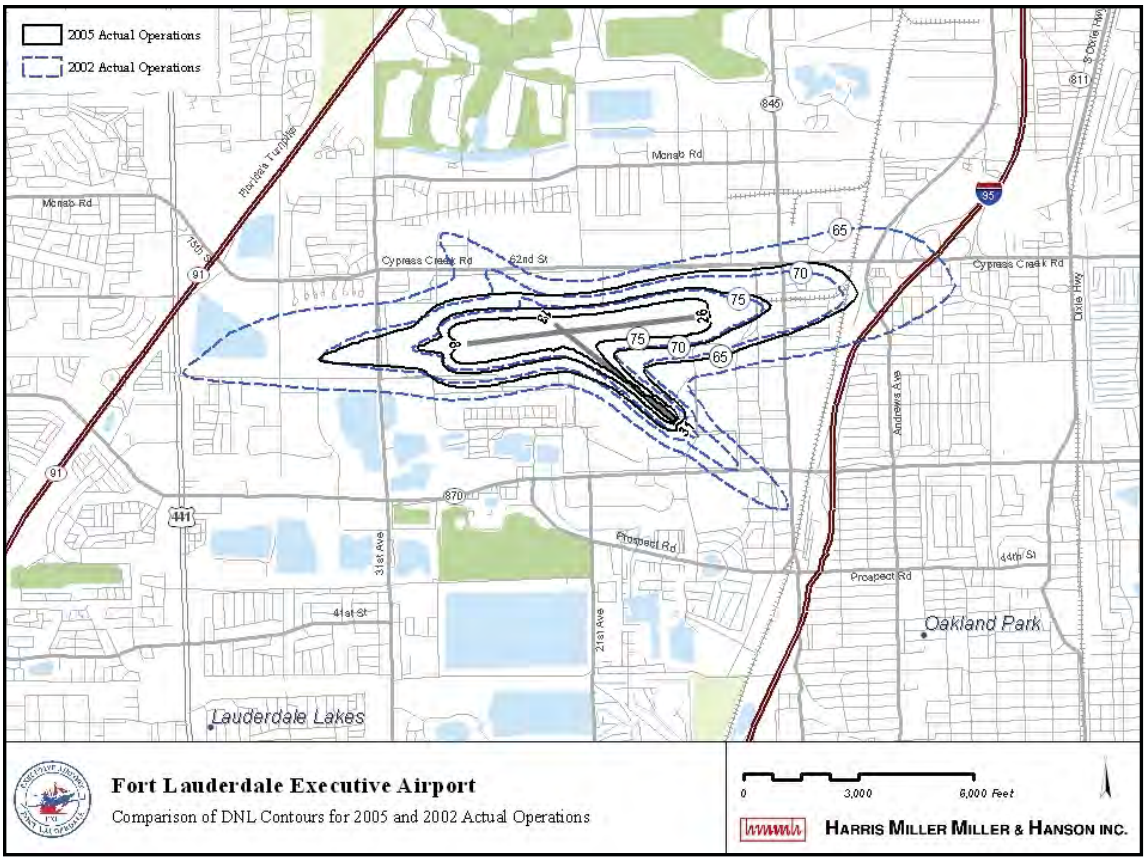


Figure 2.8-2. Comparison of DNL contours for 2005 and 2002 actual operations.

- FXE's second NCP submission (1995) noted that the I-95 turn, which was implemented in 1994, "is the single most effective measure available to FXE. Elimination of this ongoing measure would increase the population within the 65 dB DNL contour by approximately 1,026 people, clearly supporting the procedure."
- FXE's third NCP submission (2002) noted that "the I-95 turn is one of the cornerstones of the FXE NCP. Increasing the utilization and effectiveness of this procedure was a major topic of discussion at most MPCC (Master Plan and Part 150 Coordinating Committee), community, and user meetings."
- Analysis of recent noise complaints indicates that jet departures following the I-95 turn rarely lead to complaints; FXE received only 57 complaints related to turned departures during FY 2006-2007. Over the same one-year period, straight-out jet departures led to 1,679 complaints, despite the fact that only 36% of Runway 08 jet departures flew straight out. On a per-operation basis, the difference in complaint rates is striking; straight-out departures led to an average of one complaint per every two operations, while on average only one complaint was received per every 106 turned departures.

Existing Studies, Planning, and Regulations

Continuing Programs

Continuing programs assist FXE to communicate airport information to users and to the surrounding communities and provide useful information to improve the FXE noise compatibility elements. FXE produces and distributes materials to educate both the users and public about the

Table 2.8-2. Operational noise mitigation elements, FXE Part 150 NCP.

#	Measure	FAA Action	Further City Action
Operational			
1.	Formal restriction of jet use of Runway 13/31.	Disapproved as to formalizing procedure; continuation of the current procedure on a voluntary basis is approved.	Runway 13/31 continues to be closed at night, unless Runway 8/26 is unavailable.
2.	Extend upwind leg for Runway 31 departures to the Turnpike.	Disapproved.	None required. Not an ongoing noise issue.
3.	Voluntary use of turbojet noise abatement departure profiles.	Approved as a continuing voluntary measure.	Continued voluntary implementation.
4.	Formal implementation of Runway 26 departure heading.	Disapproved formal procedure; approved continuation of current voluntary procedure for VFR traffic, as traffic, weather, and airspace safety and efficiency permit.	Continued voluntary implementation.
5.	Formal implementation of "Quiet One" departure 8 pm to 7 am.	Disapproved both formal implementation and continued implementation of the current procedure on a voluntary basis.	The objective of this measure is addressed by Measure 10, which City continues to pursue.
6.	Formal "Quiet One" implementation 10 pm to 7 am if measure 5 disapproved.		
7.	Support airport perimeter development as a noise barrier.	Approved as a continuing measure.	Implementation as opportunities arise
8.	Formal maintenance runup restriction, 7 pm - 7 am, at runup pad.	Approved as a continuing measure.	Continued formal implementation.
9.	Night preference for Runway 26 departures and Runway 08 arrivals, for all aircraft.	Disapproved formal procedure; approved continued voluntary implementation, as wind weather, airspace safety, and efficiency permit.	Continued voluntary implementation.
10.	Amend existing Runway 8 I-95 turn as a mandatory, formal instrument procedure under FAA radar control, applicable to all aircraft, wind, weather, and traffic permitting.	Disapproved mandatory, formal procedure; approved continuation of existing voluntary measure when traffic, weather, and airspace safety and efficiency permit, 11 pm to 7 am.	As of 8/1/04, extended to all turbojet departures 11 pm to 7 am, weather and traffic permitting. City is pursuing additional extension of hours.
11.	Restrict night, weekend, and holiday touch-and-go operations and practice approaches on a voluntary basis.	Approved as a voluntary measure.	Continued voluntary implementation.
12.	Raise approach slope on all runway ends to 3.5°.	Disapproved for purposes of FAR Part 150.	Request that VFR pilots stay as high as feasible.
13.	Future use restriction if operational measures do not meet objectives.	Approved for further study.	Continuous review.

elements and status of various NCP actions. Materials used to publicize and promote the NCP include:

- Jet pilot handout;
- Helicopter pilot handout;
- Propeller pilot handout;
- AFD (Airport Facilities Directory) remarks related to noise abatement;
- Educational materials used in pilot workshops;
- Noise abatement hotline information fact sheet;
- Noise abatement program summary sheet; and
- Frequently asked questions (FAQ) sheet.

The monthly Aviation Advisory Board (AAB) report is the primary mechanism to describe the compliance of the Noise Compatibility Program. The report includes a text summary and numerical data in tables and graphics that report on:

Table 2.8-3. Land Use Control and Continuing Program Elements, FXE Part 150 NCP.

#	Measure	FAA Action	Further City Action
Land Use			
1.	Rezoning non-compatible property as opportunity arises.	Approved as continuing measure.	FXE staff monitor local land use activities to seek opportunities to implement. City has requested cooperation of local jurisdictions.
2.	Local jurisdictions to incorporate noise requirements into development control.	Approved as continuing measure.	
3.	Voluntary fair disclosure by real estate agents.	Approved as continuing measure.	FXE staff pursues educational outreach to realtors.
4.	Monitor noise to determine exact extent of contour into residential area.	No action required.	City monitors with noise monitor #6.
Continuing Programs			
1.	Noise abatement advisory committee.	Approved as a continuing measure.	Implement through Airport Advisory Board (AAB).
2.	Noise Abatement Officer.	Approved.	Implemented.
3.	Permanent noise and operations monitoring system enhancements.	Disapproved pending submission of additional information.	Implemented in part with FDOT assistance.
4.	Public information program.	Approved as continuing measure.	Continuously implemented.
5.	Airfield noise abatement advisory signs.	Disapproved.	No action.
6.	Pilot manual noise abatement insert.	Approved as continuing measure.	Regularly implemented.
7.	Noise Exposure Map (NEM)/NCP review and revision.	Approved.	Regularly implemented.
8.	Automatic Terminal Information Service (ATIS) noise abatement advisory.	Disapproved.	No action.
9.	Achievements in Community Excellence (ACE) awards.	Approved as continuing measure.	Regularly implemented.
10.	Pilot Noise Abatement Workshops.	Approved as continuing measure.	Regularly implemented.

- Noise Abatement Program Statistics;
- Noise Abatement Cooperative Effort;
- Runway 8 Jet Departures and Noise Event Report; and
- Aircraft Noise Community Response Report.

FXE also responds to requests for information from individual residents, community or neighborhood associations, and aviation interests on an ad hoc basis.

Communication with aircraft operators who function in a non-complaint or undesirable manner is a major area of noise office activity. Noncompliant aircraft operators may receive a letter if he/she fails to comply with noise abatement measures or exceeds the high range threshold at microphone #2.

Complaint response is a major area of noise office activity. The monthly AAB report includes tabular and graphic summaries of complaint activity, including:

- Noise Abatement Program Statistics (counts of reports and concerned citizens submitting reports);
- Noise Abatement Cooperative Effort table (households reporting and reports correlated with aircraft noise events, by noise level); and
- Aircraft Noise Community Response Report (bar charts on numbers of household reporting).

FXE has made an effort to gain information from its aviation users. In December of 2007, FXE staff held a meeting with pilot, Fixed Base Operator (FBO), Air Traffic Control Tower (ATCT),

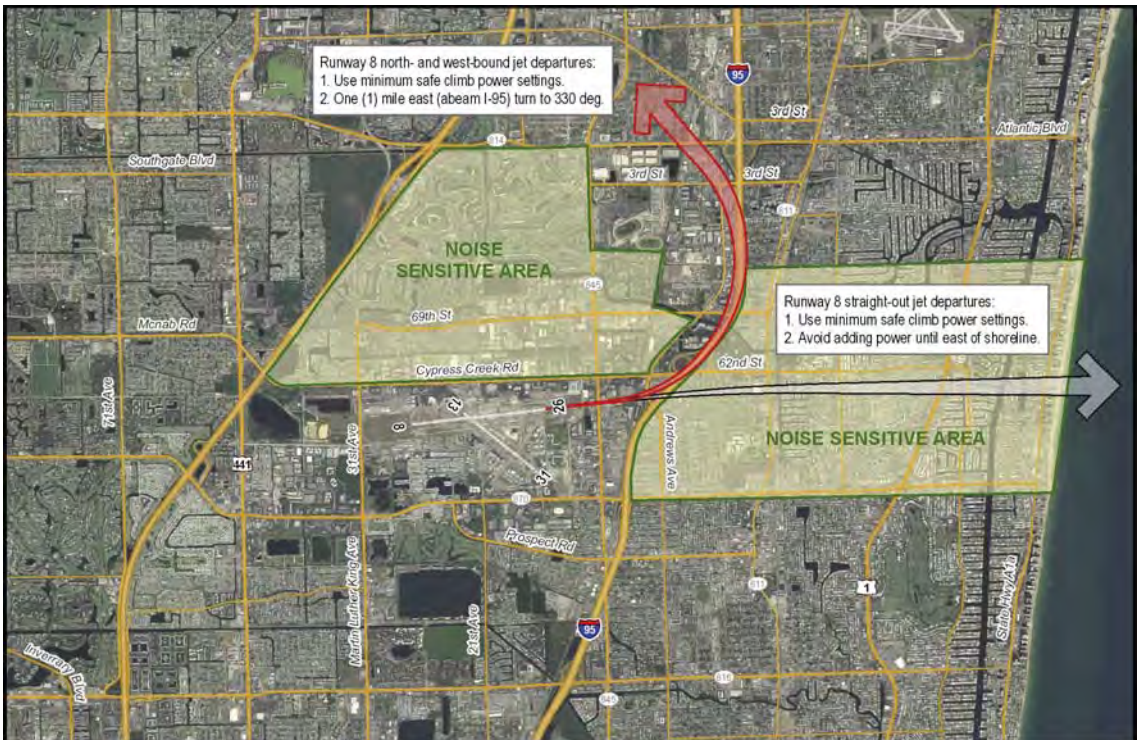


Figure 2.8-3. FXE Runway 08 preferential departure track.

and other aviation industry representatives to obtain feedback on existing and potential program publicity measures. The primary purpose was to obtain input on how the city can most effectively promote the program to based and itinerant pilots. Sixteen industry representatives attended and some of the results include:

- Diverse, on-site notices are required to inform pilots who are unfamiliar with FXE abatement measures and keep all pilots focused on compliance, such as:
  - Place a sign and holder for noise abatement handouts at the Customs building.
  - Place signs and holders for noise abatement handouts on tugs.
  - Place signs at gates into the Airport Operations Area (AOA), airport entrances and exits, FBO entrances, and in other conspicuous locations with a notice stating something like "Thanks for Flying Quietly–Know the FXE Procedures" or "Call FXE Noise Abatement for information".
  - Prepare and distribute an appealing and informative poster to display in flight planning rooms.
  - Provide noise abatement information when distributing gate cards.
  - Run advertisements in pilot-orient publications.
- FXE should work with flight planning websites to add current noise abatement information because few jet pilots use hard-copy Jeppesen manuals or refer to the AFD for noise abatement information.
  - Maintaining an up-to-date Form 5010, as these websites typically obtain noise abatement summaries from that source.
  - FXE should request these websites to provide links to pilot handouts on the city's website.
  - Request that Jeppesen include noise abatement with their electronic guides.
  - Augment existing training to:
    - Include noise abatement in AOA training.
    - Prepare DVDs that focus on noise abatement procedures for distribution to charter and corporate operators for use in their training programs.

- Require FBOs to provide noise office with contacts for all new based aircraft, for direct follow-up.
- Develop a Standard Instrument Departure (SID) for the Runway 08 departure.

Noise Contour Update

FXE committed to monitor the jet fleet mix and the implementation and effectiveness of noise abatement measures to determine whether the projected retirement of non-Stage 3 jets, combined with operational measures, would accomplish two objectives to eliminate:

- Residential and other potentially noncompatible land uses within the 65 DNL contour.
- All Runway 08 straight-out (090° heading) jet departures, with the exception of those required by emergency or safety conditions.

In 2006, the city had a comprehensive analysis performed that generated updated noise contours for 2005 operations. That analysis conclusively demonstrated that cumulative noise exposure over calendar year 2005 was less in all areas around the Airport than previously forecasted for 2007. It also showed that the city had accomplished its noise objective two years ahead of schedule.

Federal Congressional Request

Once a year, each city department presents a limited number of requests for assistance to the city's representatives in Congress. The requests relate to high-priority items under the jurisdiction of federal agencies. This city-wide initiative represents a truly exceptional element of the FXE Continuing Program efforts. It presents a model for other airport operators to consider. In 2006, the city requested Congressional support for an extension of the hours of the I-95 turn. That request led to a cooperative response from FAA representatives, and included potential willingness to start the turn at 10 p.m., subject to city preparation of an Environmental Assessment (EA).

Noise Abatement Website

The city uses a website to publicize noise compatibility efforts at FXE. The NCP did not contemplate the use of a website. The current website includes a broad range of informative text and graphical descriptions of elements of the FXE noise program, including:

- Noise Alert for Pilots page (copies of the jet- and helicopter-focused informational sheets);
- 2002 and 2007 Noise Exposure Maps;
- Listing of all NCP elements;
- Monitoring system description;
- 24-hour Noise Abatement Hotline – (954) 828-6666;
- Pilot Education Program and Noise Abatement Workshops; and
- Achievements in Community Excellence (ACE) awards.

FXE Relationship to Florida County Regulations

The primary state level regulation that applies to land use around airports is Chapter 333 of the Florida Statues, "Airport Zoning." This regulation establishes the public interest to limit land uses near airports to protect the capability and capacity of the state's public aviation transportation system and the investment in it, while preserving public health, safety, and welfare. Chapter 333 requires political subdivisions to adopt, administer, and enforce airport zoning regulations governing the height of structures and land uses in the airport environs. The city of Fort Lauderdale

Comprehensive Plan and the FXE Part 150 NCP basically conform to this regulation. Section 333.03, "Power to adopt airport zoning regulations" states in part:

> (2)(c) Where an airport authority or other governing body operating a publicly owned, public-use airport has conducted a noise study in accordance with the provisions of 14 C.F.R. part 150, neither residential construction nor any educational facility as defined in chapter 1013, with the exception of aviation school facilities, shall be permitted within the area contiguous to the airport defined by an outer noise contour that is considered incompatible with that type of construction by 14 C.F.R. part 150, Appendix A or an equivalent noise level as established by other types of noise studies.
>
> (2)(d) Where an airport authority or other governing body operating a publicly owned, public-use airport has not conducted a noise study, neither residential construction nor any educational facility as defined in chapter 1013, with the exception of aviation school facilities, shall be permitted within an area contiguous to the airport measuring one-half the length of the longest runway on either side of and at the end of each runway centerline.
>
> (3) In the manner provided in subsection (1), airport zoning regulations shall be adopted which restrict new incompatible uses, activities, or construction within runway clear zones, including uses, activities, or construction in runway clear zones which are incompatible with normal airport operations or endanger public health, safety, and welfare by resulting in congregations of people, emissions of light or smoke, or attraction of birds. Such regulations shall prohibit the construction of an educational facility of a public or private school at either end of a runway of a publicly owned, public-use airport within an area which extends 5 miles in a direct line along the centerline of the runway, and which has a width measuring one-half the length of the runway. Exceptions approving construction of an educational facility within the delineated area shall only be granted when the political subdivision administering the zoning regulations makes specific findings detailing how the public policy reasons for allowing the construction outweigh health and safety concerns prohibiting such a location.
>
> The city's Comprehensive Plan states:
>
> POLICY 3.8: All classroom areas located within the City of Fort Lauderdale shall comply with the noise level requirements of F.A.R. Part 150 (Appendix), as amended from time to time, and all schools located within the City of Fort Lauderdale shall comply with the requirements of Section 333.03 (2)(c), (2)(d), and (3), Florida Statutes.

Thus with this plan policy combined with the FXE FAR Part 150 NEM and NCP, the city conforms with the requirements of Florida State Regulation 333.

FXE Relationship to Broward County Regulations

Broward County has policies that address airport noise, aircraft noise, and safety related height restrictions. For the city of Fort Lauderdale, the Part 150 process has addressed the noise issues in ways that are consistent with Broward County policies.

From the 1989 BROWARD COUNTY LAND USE PLAN, Original adoption – March 1, 1989, Text amendments adopted as of June 24, 2008:

> *OBJECTIVE 15.02.00 AIRPORT EXPANSION*
>
> Ensure adequate land is available for those airports necessary to serve Broward County's existing and future population and economy.
>
> POLICY 15.02.01 The general location of proposed airport facilities shall be identified on the Future Broward County Land Use Plan Map (Series).
>
> POLICY 15.02.02 Existing airports and lands committed for airport use shall be designated under the Transportation land use category as defined within the Permitted Uses subsection of the Implementation Requirements Section of the Broward County Land Use Plan, and should not be converted to other uses unless adequate replacement sites and facilities have been provided.
>
> *OBJECTIVE 15.03.00 AIRPORT/HELIPORT LAND USE COMPATIBILITY*
>
> Identify and reduce incompatible land uses adjacent to existing and proposed airport/heliport facilities.
>
> POLICY 15.03.01 Areas surrounding existing and proposed airports/heliports shall be planned to promote compatible land uses consistent with the affected elements of comprehensive plans of local governments.
>
> POLICY 15.03.02 Within areas surrounding existing or committed airports/heliports, Broward County's local governments shall not issue development orders for land uses or structures that are incompatible with

airport/heliport uses, pursuant to the Development Review Requirements subsection of the Plan Implementation Requirements section of the Broward County Land Use Plan.

POLICY 15.03.03 The recommendations of adopted Part 150 Study Technical Reports shall be taken under consideration during land use decisions affecting airports/heliports and their adjacent areas.

POLICY 15.03.04 The Broward County Planning Council, in coordination with all affected local governments and the Broward County Aviation Department, shall identify land use compatibility issues with respect to the development of new and expansion of existing airport and heliport facilities within Broward County and, if warranted, propose additional land use plan policies to prevent and eliminate incompatibilities.

POLICY 15.03.05 Broward County's local governments shall protect from obstruction Federal Aviation Administration approved and locally adopted aircraft air corridors.

Discussions

The following paragraphs represent a synthesis of the preceding material with issues raised through discussions with FXE staff members.

The FXE experience with land use compatibility might be considered as a quintessential general aviation (GA) airport experience and an example to other GA airports presently untroubled by compatibility issues.[1] In the 1960s, FXE had virtually no jet operations and both the Airport and surrounding communities had little concern about adjacent land uses. However, as jet traffic increased, residents who thought they were living near a relatively quiet airport became concerned about the changes and began to complain and put pressure on the city to control operations. By this time, habits of land use, planning, and development approvals were set and surrounding jurisdictions (of which there are close to a dozen) had no interest in altering development patterns, which concerned the Airport.

As both jet operations and citizen resistance to these operations increased, FXE was proactive to minimize adverse effects on both the communities and on airport operations. The actions taken and the lessons learned may be summarized in five areas, which are discussed below.

Relationships of Trust

Relationships apply to all stakeholders and include community residents, planning staff and officials of surrounding jurisdictions, aircraft operators, and people directly affected by airport operations. There are several fundamental principles that the airport should follow, which include:

- Who was "there first" is irrelevant.
- The Airport and the community must work together to find solutions.
- All ideas are welcome and will be thoroughly investigated.
- Solutions must work for the community, Airport, operators, and pilots.
- Build these relationships before there are compatibility issues.

Once these relationships are established, they need to be maintained. Individuals can forget what was previously discussed or agreed, new residents move in, new pilots use the airport, new staff join the planning departments, and all of these individuals need to be brought into the relationship and educated about the past, current, and future efforts.

[1] At this point in the discussion, we shall define "compatibility" from an airport operator's perspective. Namely, "compatibility" means the airport is surrounded by land uses and communities that accept the airport, that the airport receives few or no complaints about its operations, and that there are no development pressures for either residential uses that can bring noise complaints or for buildings or structures that will impinge upon airspace necessary for safe operations. It is a definition that coincides with an airport operator's perspective of how land use affects airport operation, rather than the traditional definition based on 65 dB DNL (or any other particular metric).

Federal and State Policy Limitations

Federal policy addresses GA airport noise issues only after incompatibilities have become serious, as does Florida policy because the two are linked. For GA airports with few or no jet operations, the compatibility noise exposure guideline of 65 DNL is typically on airport property, or close to it. Table 2.8-4 shows why this is the case and gives the number of operations required to produce an exposure level of 65 DNL. It also shows approximately what portion of the day that outdoor speech will be interrupted, which occurs when the aircraft level exceeds 60 dB. Propeller aircraft can be significantly quieter than many jets and the number required to produce 65 dB DNL much larger. It is understandable that communities react negatively to propeller operations, even if the noise exposure is below 65 DNL. However, if there are no incompatible land uses at 65 DNL or higher, current federal policy will not support noise mitigation efforts.

The FAR Part 150 process requires (FAR Part 150, Sec. B150.7(b)):

> At a minimum, the operator shall analyze and report on the following alternatives, subject to the constraints that the strategies are appropriate to the specific airport (for example, an evaluation of night curfews is not appropriate if there are no night flights and none are forecast):
>
> (1) Acquisition of land and interests therein, including, but not limited to air rights, easements, and development rights, to ensure the use of property for purposes which are compatible with airport operations.
>
> (2) The construction of barriers and acoustical shielding, including the soundproofing of public buildings.
>
> (3) The implementation of a preferential runway system.
>
> (4) The use of flight procedures (including the modifications of flight tracks) to control the operation of aircraft to reduce exposure of individuals (or specific noise sensitive areas) to noise in the area around the airport.
>
> (5) The implementation of any restriction on the use of airport by any type or class of aircraft based on the noise characteristics of those aircraft. Such restrictions may include, but are not limited to—
>
> (i) Denial of use of the airport to aircraft types or classes which do not meet federal noise standards;
>
> (ii) Capacity limitations based on the relative noisiness of different types of aircraft;
>
> (iii) Requirement that aircraft using the airport must use noise abatement takeoff or approach procedures previously approved as safe by the FAA;
>
> (iv) Landing fees based on FAA certificated or estimated noise emission levels or on time of arrival; and
>
> (v) Partial or complete curfews.
>
> (6) Other actions or combinations of actions which would have a beneficial noise control or abatement impact on the public.
>
> (7) Other actions recommended for analysis by the FAA for the specific airport.

These alternatives can suggest to the public that substantial actions might be possible to limit noise. In reality, the implementation of federal policy with respect to Part 150 usually leads to approval of only voluntary actions, other than sound insulation or noise barrier construction.

Table 2.8-4. Number of operations in 24 hours (daytime) to produce 65 dB DNL.

Aircraft Type	Maximum Departure Level	Distance from Brake Release	Required No. of Operations in 24 Hrs for 65 dB DNL	~Time Above 60 dB(A), Each	~ Total Time Above 60 dB(A)
MD80	85 dB(A)	2-3 Miles	100	35 Seconds	1 Hour
737-700	80 dB(A)	2-3 Miles	300	25 Seconds	2 Hours
Twin Prop	75 dB(A)	1-2 Miles	1000	20 Seconds	6 Hours

Any mandatory limitations on operations or associated costs or fines will not be approved. Further, actions that affect only properties located at levels of exposure less than 65 DNL are also unlikely to be approved.

Airports could benefit from clear federal and state policy support to ensure all local, jurisdiction, or county comprehensive planning includes recognition of airport needs to limit noise sensitive land uses and to place height restrictions on buildings and structures located near airports. Such support would also necessitate revision of the compatibility guidelines to address GA airports, as discussed above.

Disclosures

Potential home buyers should be made aware of noise and safety considerations in the vicinity of an airport through a disclosure. FXE experience has shown that 1) developers may readily accept such a requirement at the time of application for building permits, but may not follow-through at the time of home sales; 2) it is difficult to place the disclosure so that the potential buyer is informed fully and in a timely manner; and 3) realtors have access to politically powerful means to oppose disclosures.

Value of Objective Data

Citizen reactions to aircraft noise are a personal experience and perception. Flight tracking and noise monitoring data are effective to frame discussions on quantitative data. A single unusually loud aircraft operation may focus residents on all aircraft operations and raise perceptions that operations have become louder, or off-course, or later at night, or earlier in the morning. Perceptions are real and flight track and noise level data can put concerns in a quantitative perspective and focus discussions on whether or not operations have changed, how they have changed, and what can be done to limit or counteract the changes.

Jurisdiction, Airport, and FAA Goal Alignment

Jurisdictions, airports, and the FAA may be significantly at odds about land use development plans or airport development plans. A land use planning conflict that occurred near FXE involves the Transit Oriented Development (TOD), which is a higher density development and is recognized as valuable to limit or reduce suburban sprawl by creating higher density development near public transportation, thus facilitating use of public transit. But an unfortunate placement of a proposed development not only put high density residential use directly under a primary flight path but, with proposed high-rise construction, affected airspace clearances needed by the Airport. One of the affected jurisdictions approved the development despite Airport efforts to convince the decision makers of the potential impacts.

The FAA's goal to expeditiously reduce, delay, and/or increase capacity may or may not be aligned with airport goals. Airports serve not only the air transportation industry and its passengers, but act as a neighbor to surrounding communities. One proposed solution to a delay situation at FXE was to increase the use of the cross-wind runway. But FXE's NCP promised minimum use of this runway and to start using it would have been contrary to the goal that FXE and the communities had accepted.

Conclusion/Analysis

- Building relationships of trust should be an early and primary airport goal.
- Current federal and state definitions of compatibility may be ineffective to protect lower volume airports that anticipate future growth.

- FAR Part 150 has been very useful to provide a process and funding to address many airport noise issues, but can raise false expectations due to how it is presently formulated.
- Designing effective, acceptable disclosures to developers and potential home buyers is difficult and has many constraining factors.
- Objective flight tracking and noise monitoring data can be helpful to communicate with the public
- Jurisdictions, airports, and the FAA often have conflicting development goals and resolution of these conflicts will require, at a minimum, the establishment of trust, an open dialog among all parties, and willingness by all to compromise.

VOLUME 2, CHAPTER 9

Independence State Airport, Independence, Oregon

Introduction/Airport Overview

Independence State Airport (7S5) is owned and operated by the state of Oregon Department of Aviation (ODA) and is located one mile northwest of the city of Independence, within Polk County (Figure 2.9-1). The airport has a diverse user base that includes recreational, agricultural, local business, and tourism. The airport is also frequently utilized by residents of the local airpark, which is located on the east side of the airport. A unique feature of the airpark is the existence of separate taxiway lanes behind homes while the roadways are in front of the homes to provide a defined separation of vehicles and aircraft traffic. The airpark was established in 1964 and has attained national recognition. Currently, the airpark includes 90 homes with hangars.

The airport's usage is shown in Table 2.9-1 and Table 2.9-2, while Table 2.9-3 illustrates the physical features and facilities of the airport.

Source: http://maps.live.com

Figure 2.9-1. Aerial view of Independence State Airport.

Table 2.9-1. Based aircraft at 7S5.

Aircraft	Total
Single-Engine Airplanes	134
Multi-Engine Airplanes	3
Jet Airplanes	0
Helicopters	0
Military	0
Ultra-Light	5
Total Based Aircraft	**142**

Source: *AirportIQ 5010*

Table 2.9-2. Aircraft operations at 7S5.

Operation	Total
Commercial	0
Air Taxi	1,121
General Aviation Local	7,995
General Aviation Itinerant	22,542
Military	0
Ultra-Light	5
Total Aircraft Operations	31,663

Operations for a 12-month period ending October 18, 1999.
Source: *AirportIQ 5010*

Table 2.9-3. Independence state airport profile.

Major Features
Airfield
▪ Runway 16/34: 2,935 feet long, 60 feet wide; asphalt
▪ Runway Lighting: Medium Intensity runway edge lights
▪ Full parallel taxiway
Property
▪ Existing: 66 acres
▪ Property encompasses airfield, building area, runway protection zones
Navigational Aids & Instrument Approach
▪ Runway 16: 4 Light PAPI on right
▪ Runway 34: 4 Light PAPI on left
Building Area
▪ Development located on east and south sides of Airport
▪ Apron
▪ Aircraft Parking Capacity
▪ Aviation-Related Facilities
▪ Non-Aviation Related Facilities
Management and Services
Management
▪ Airport Management and Maintenance:
- Oregon Department of Aviation
Fixed Base Operator (FBO) Services
▪ Aircraft Fuel (100LL and Jet A)
▪ Aircraft Parking and Storage
▪ Flight Training
▪ Aircraft Rental

Source: *AirportIQ 5010*

History of the Airport

In the early 1960s, the city of Independence, with assistance from Polk County, purchased land from a local farmer to begin the development of the airport. In 1962, a conceptual layout of the proposed airport was submitted as the preliminary Airport Master Plan. When construction was completed, the city of Independence donated the airport to the state of ODA (formerly known as the Oregon Department of Transportation Aeronautic Division) in 1964.[1]

The Independence State Airport Master Plan was adopted by the ODA in November 1985. Also that year, the Polk County Board of Commissioners amended Ordinance No. 78, Chapter 180 and 181of the Polk County Zoning Ordinance to include the establishment of the Airport Development District and the height restriction overlay for the airport.[2]

Governance

The airport is owned by the ODA, which is responsible for the management, maintenance, and operations. The city of Independence is obligated to regulate and zone the airport appropriately to protect from incompatible land use. Independence created two separate zoning categories that encompass the airport and the surrounding area, which include Airpark Zoning and Airport Overlay Zoning. The categories were created in accordance to state mandated Airport Planning Rule statutes that include land use limitations, height limitations, as well as development within the runway protection zone (RPZ).[3]

Since 1974, Oregon's Land Use Planning Act, incorporated in Oregon Revised Statutes (ORS Chapter 197), requires all cities and counties to develop and adopt comprehensive plans. These plans must be updated through a process known as periodic review (ORS 197.682-650) to ensure that the plan continues to meet applicable statutes, administrative rules, current laws, and policies. More specifically, the Airport Planning Rule (APR), which establishes a series of local government requirements and rules pertaining to aviation facility planning, was developed to promote a convenient and economic system of airports in the state and provide for land use planning to reduce risks to aircraft operations and nearby land uses. The APR serves as the state regulatory basis to ensure that local government airport planning conforms to the hierarchy of state plans and statutory requirements. In addition, state statute requires all airports with three or more based aircraft to be identified and zoned as an airport in local planning documents.

[1] Independence State Airport Support Group website.
[2] Origin of the Independence State Airport, By Glenn Plymate, Supervisor of Airports, Oregon State Board of Aeronautics, 1962–1965.
[3] Interview comments from Michael Danko, Community Development Director/Public Works Director.

Discussion of Compatibility Issues and Responses

Independence City and the state of Oregon have implemented several policies and regulations to help ensure that the area surrounding the airport continues to be compatible with airport operations. Fortunately, these policies have proven to be successful; however, there are still some concerns related to land use compatibility which continue to be addressed.

To maintain compatibility around the airport, the ODA will acquire land to the north and west of the airport to expand the urban growth boundaries (UGB). This boundary encircles land that is presently developed, as wells as a supply of undeveloped land to direct and shape future development in the area. The land encompassed within the expanded UGB can be developed in a manner that is compatible to airport operations, and will maintain airport viability.

Independence City and the state of Oregon continue to face pressure by developers who propose that an additional residential airpark be constructed on the west side of the airport. This property is currently utilized for agriculture and lies beneath the aircraft traffic pattern. The existing airpark has not reached complete build-out and has approximately 20 vacant lots that remain. The airport has not reached capacity at this time nor is it currently experiencing any operational concerns.[3] Therefore, the ODA has determined that an additional airpark is not a need at this time.

Michael Danko, Community Development Director/Public Works Director of the city of Independence, noted that at this time, in addition to the capacity related issue, he believes the ODA will not expand the airpark due to the FAA position on residential airparks. The FAA has issued letters to the ODA to oppose residential airpark development on public-use airports.[4] The letter from the FAA headquarters states, "The FAA is on record opposing the development of residential airparks with through-the-fence access to public-use, federally obligated airports. In fact, FAA has denied future funding to airports that have permitted airfield access from off-airport residential airparks. Such development can conflict with Title 49 U.S.C. 47107(a)(10), Grant Assurance 21, *Compatible Land Use* and possibly other grant assurances. A federally obligated airport must ensure, to the best of its ability, compatible land use both on- and off-airport. An airport sponsor will not be successful in defending its airport from incompatible residential development if the sponsor is also promoting residential airparks on or next to the airport. A residential dwelling with an attached hangar is still a residential dwelling and once introduced can lead to additional residential encroachment."

Zoning within the residential airpark includes a Residential Single Family Airpark Overlay zone, which is designated to minimize "exposure to crash hazards and high noise levels generated by air field operations by encouraging development which is compatible with the continued operation of the airport, and established airpark development."[5]

Avigation easements are not currently used at the airport, but home owners are required to sign noise and hazard waivers. These waivers acknowledge the property owners' proximity to the airport and documents the disclosure of the aviation impacts of the geographic location as noted in the covenants, conditions, and restrictions. The waivers are a condition of approval and are written into the property deed when property is purchased within the airpark.[6]

Wildlife hazards are often a major concern for airports, as wildlife strikes can result in significant safety concerns. According to Cummings, the airport does not have a wildlife management

[4] Interview comments from Michael Danko, Community Development Director/Public Works Director.
[5] City of Independence Development Code.
[6] Interview comments from Michael Danko, Community Development Director/Public Works Director.

or mitigation program in place; however, limited bird strike issues have been reported. The municipal sewer lagoons are located just off the end of the runway and are not covered nor do they have appropriate wildlife deterrent devices on them. It was noted that birds are not a concern surrounding the lagoons and the only bird problem occurs during the migration of geese throughout the year.

Litigation

At present time, there have been no litigations related to incompatible land uses at the airport.[7]

Aircraft Accidents

Danko noted that within the past 10 years there have been two aircraft accidents. One was an experimental crash; the other incident involved a plane running off the end of the runway. There have been no accidents related to incompatible land use recorded at the airport.

Existing Studies, Planning, and Regulations

In an effort to ensure land use compatibility around the airport and plan for future development, the city of Independence has undertaken several initiatives to achieve goals and meet state statute requirements.

City of Independence Transportation System Plan (TSP) 2007

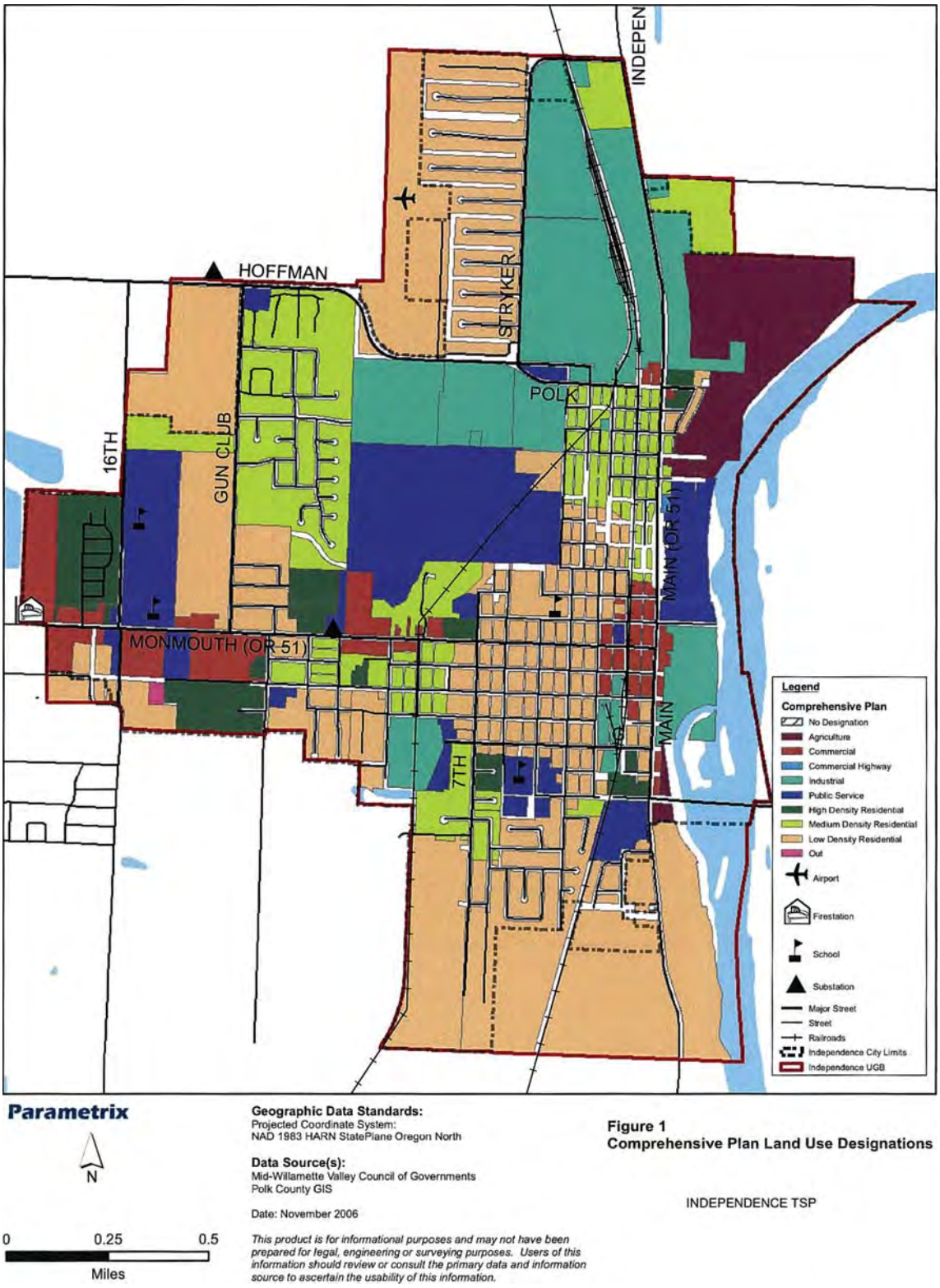
In 2007, Independence undertook a TSP Update that addressed transportation issues and needs for the entire Independence Urban Growth Boundary (UGB), including the airport (Figure 2.9-2). The following policies were excerpted from the City's 1998 TSP and are outlined again within the 2007 TSP:

- The city shall protect and maintain the Independence airport site and coordinate with Polk County and the ODA in protection and maintenance efforts.
- The city, in cooperation with Polk County, shall maintain airport overlay zoning which coincides with the future approach surface and FAR Part 77 surfaces. Airport overlay zoning should conform to ODA guidelines.
- The city supports designating Runway 34 as the calm wind runway in order to minimize noise exposure on nearby residential areas south of the airport. The city also supports a review of airport operating procedures to ensure that appropriate noise abatement procedures and standard traffic pattern elevations and locations are being utilized at the airport.
- The city of Independence Comprehensive Plan will incorporate the Airport Layout Plan (ALP).[8]

The recommendations outlined in the Independence State Airport, Airport Layout Plan Report (1997) and noted in the 2007 TSP include:

- An area of approximately 41 acres (540 feet wide) located along the west side of Runway 16/34 should be acquired and reserved for future general aviation parking and hangar development.

[7] Interview comments from Chris Cummings, Oregon Department of Aviation.
[8] 2007 City of Independence Transportation System Plan.



Source: City of Independence Transportation System Plan, 2007

Figure 2.9-2. Comprehensive plan land use designations.

- The City of Independence and Polk County should maintain airport overlay zoning that coincides with future approach surface and FAR Part 77 surfaces. Airport overlay zoning should conform to the guidelines provided by the ODA in terms of airport land use compatibility planning.
- Safeguard the RPZs and acquire property or aviation easements for portions of existing and future RPZs located outside airport property and not presently controlled.

The 2007 TSP established an Airport Safety and Compatibility Overlay Zone that is intended to:

> Support the continued operation and vitality of public use airports with only visual approaches by establishing compatibility and safety standards to promote air navigational safety at the Airport and to reduce potential safety hazards for persons living, working or recreating near such public-use airports.

The Overlay Zone includes an airport approach zone, which is a fan-shaped area that extends off the end of a runway for a distance of 4,000 feet and to a width of 1,250 feet. The Overlay Zone also includes an airport clear zone, which is also a fan shaped area that extends form the edge of the airport for a distance of 1,000 feet and to a width of 312.5 feet.[9]

Independence Development Code

The city of Independence established development codes that are intended to protect the airport and surrounding areas from potential dangers and conflicts caused from airport use. They establish height limitations and Airport Safety and Compatibility Overlay Zones. The Zones are intended to encourage and support the continued operation and vitality of the airport, promote air navigation safety, and reduce hazards for populations living, working, and recreating near the airport. Figure 2.9-3, on the subsequent page shows the zoning designations for Independence.

Table 2.9-4 shows permitted and prohibited uses for each of the RPZs. Additional information about the city of Independence Development Code can be found in Appendix A of this chapter.

Community Involvement

In 1995, local representatives of the airport became members of the Independence Monmouth Positive Action Community Team (IMPACT) for a long range planning effort of the two cities. The Infrastructure Subcommittee of IMPACT helped organize an Independence State Airport Support Group (ISAS Group) on December 11, 1996 as a permanent advisory group to the ODA (then Oregon Department of Transportation Aeronautics Division).

The Independent State Airport Support Group (ISAS) is comprised of volunteer airpark representatives who are involved with planning, development, operation, and promotion of the airport. The Independence Airpark Homeowners Association was organized to further protect the airport and airpark by developing covenants, conditions, and restrictions for airpark homeowners. In addition, the homeowners association enacted bylaws that govern the Independence Airpark Homeowners Association, which is further described in Appendix B.[10]

The airpark associations have assisted the City to enact airport zoning and incorporated the state mandated airport planning to protect the airport from encroachment. Although the airpark is considered an encroachment upon the airport, Cummings noted that the airpark has protected the airport from any further encroachment concerns. There is a volunteer team that

[9] 2007 City of Independence Transportation System Plan.
[10] Independence State Airport Support Group website.

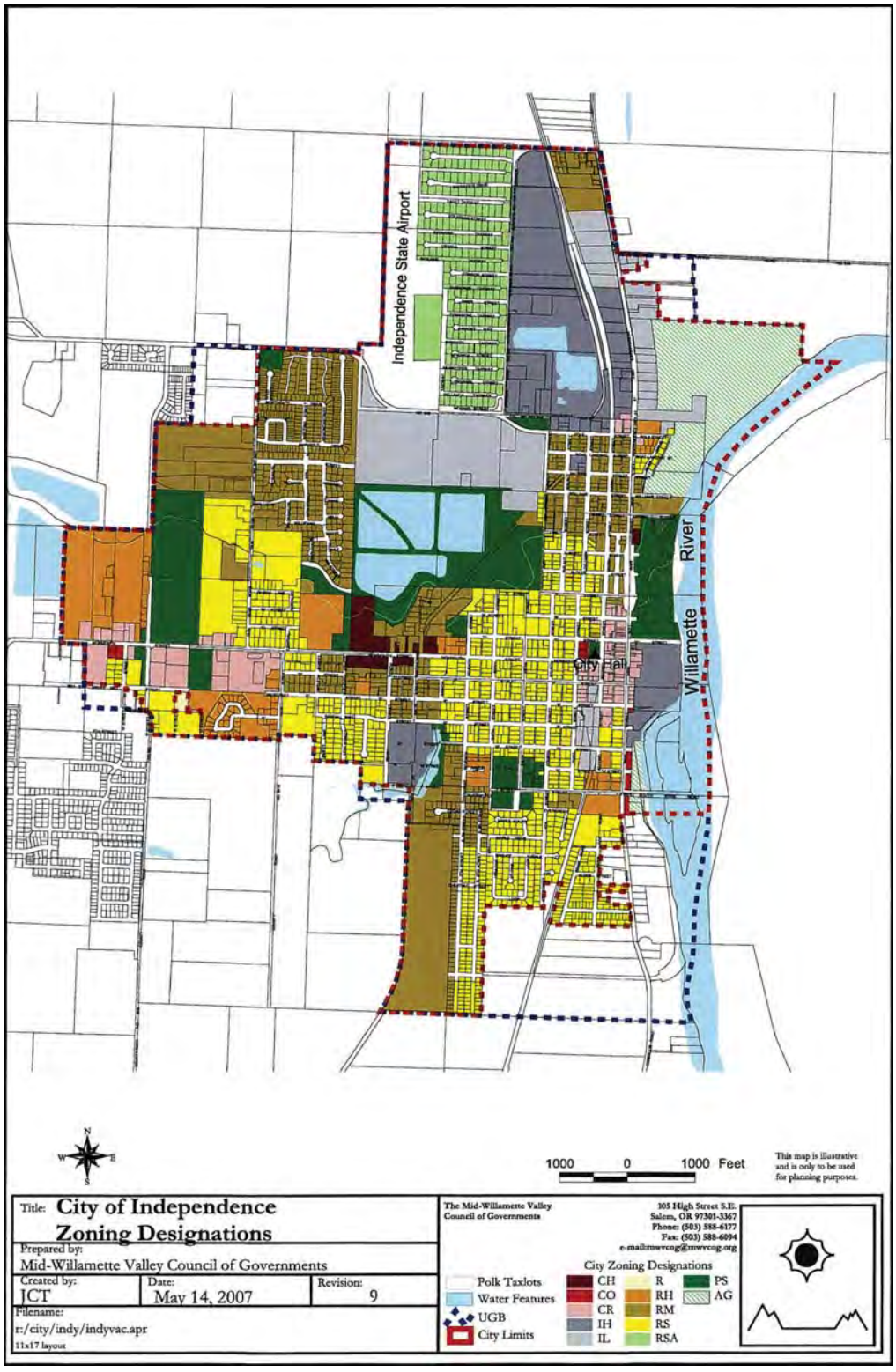


Figure 2.9-3. Zoning designations for the City of Independence.

Table 2.9-4. Land uses.

Use	RPZ[1]	Approach Surface[8]	Direct Impact Area
Public Airport	L[2]	L[9]	P
Residential	N	L[10]	L[10]
Commercial	N	L[9]	L[14]
Industrial	P	P	P
Institutional	N	L[9]	L[14]
Farm Use	P[3]	P[3]	P[3]
Roads/Parking	L[4]	P	P
Utilities	L[5]	L[5]	L[5]
Parks/Open Space	L[6]	P	P
Golf Courses	L[7]	L[7, 9]	L[7]
Athletic Fields	N	L[9]	L[13]
Sanitary Landfills	N	N	N
Water Treatment Plants	N	N	N
Mining	N	L[11]	L[11]
Water Impoundments	N	N	P
Wetland Mitigation	N	L[12]	L[12]

P = Permitted **N** = Not permitted **L** = Allowed under limited circumstances

1 No structures shall be allowed within the RPZ. Exceptions shall be made only for structures accessory to airport operations whose location within the RPZ has been approved by the FAA.
2 In the RPZ, public airport uses are restricted to those uses and facilities that require location in the RPZ.
3 Farming practices that minimize wildlife attractants are encouraged.
4 Roads and parking areas are permitted in the RPZ only upon demonstration that there are no practicable alternatives. Lights, guardrails, and related accessory structures are prohibited. Cost may be considered in determining whether practicable alternatives exist.
5 In the RPZ, utilities, power lines, and pipelines must be underground. In approach surfaces and in airport direct and secondary impact areas, the proposed height of utilities shall be coordinated with the airport sponsor and the Department of Aviation.
6 Public assembly facilities are prohibited within the RPZ.
7 Golf courses may be permitted only upon demonstration, supported by substantial evidence, that management techniques will be utilized to reduce existing wildlife attractants and avoid the creation of new wildlife attractants. Such techniques shall be required as conditions of approval. Structures are not permitted within the RPZ. For purposes of this Chapter, tree markers, tree signs, pin cups, and pins are not considered to be structures.
8 Within 10,000 feet from the end of the primary surface of an nonprecision instrument runway, and within 5,000 feet from the end of the primary surface of a precision instrument runway.
9 Public assembly facilities may be allowed in an approach surface only if the potential danger to public safety is minimal. In determining whether a proposed use is appropriate, consideration shall be given to: proximity to the RPZ; density of people per acre; frequency of use; level of activity at the airport; and other factors relevant to public safety. In general, high-density uses should not be permitted within airport approach surfaces, and nonresidential structures should be located outside approach surfaces unless no practicable alternatives exist.
10 Residential densities within 500 feet of the outer edge of the RPZ, shall not exceed 1 unit/acre.
11 Mining operations involving the creation or expansion of water impoundments shall comply with the requirements of this Chapter regulating water impoundments.
12 Wetland mitigation required for projects located within an approach surface or airport direct impact area shall be authorized only upon demonstration, supported by substantial evidence, that it is impracticable to provide mitigation outside of these areas. Proposals for wetland mitigation shall be coordinated with the airport sponsor, the Department of Aviation, the FAA, and wetland permitting agencies, prior to the issuance of required permits. Wetland mitigation shall be designed and located to avoid creating a wildlife hazard or increasing hazardous movements of birds across runways and approach surfaces. Conditions shall be imposed as appropriate and necessary to prevent in perpetuity an increase in hazardous bird movements across runways and approach surfaces.
13 Within the transitional surface, residential uses and athletic fields are not permitted.
14 Within the transitional surface, overnight accommodations, such as hotels, motels, hospitals, and dormitories, are not permitted.

watches over the airport and reports back to the state on a monthly basis.[11] Along with the volunteer group, the airpark associations help to educate the community and market the airpark by identifying the benefits to the community.

Economic Impact

It was noted that the residential airpark attached to the airport makes up approximately one-third of the cities tax ratable.[12]

Conclusion/Analysis

Independence State Airport is owned by the state of Oregon, which makes the implementation of regulations designed to ensure compatibility much more difficult for the city of Independence.

In addition, the airport receives minimal funding from the FAA due to its size and the existence of a residential airpark next to the airport. The FAA is on record opposing residential airpark development on public-use airports. As a result, the airport has turned down an additional residential airpark development proposed on the west side of airport property.

Fortunately, the airport has taken additional steps to ensure compatibility in the surrounding areas and requires all homeowners in the airpark to sign noise and hazard waivers. In addition, the land within the airpark has been zoned to minimize hazards that result from airport operations. Finally, the city of Independence has adopted a comprehensive plan in accordance with regulations of the state of Oregon to help minimize and mitigate the encroachment of incompatible land uses.

[11] Interview comments from Chris Cummings, Oregon Department of Aviation.
[12] Interview comments from Chris Cummings, Oregon Department of Aviation.

APPENDIX A

City of Independence Development Code

Airport Development District – Subchapter 76
The Airport zones were created and established for the approach surfaces and clear areas and include:

- Approach surface – longitudinally centered on extended runway centerline and extended outward and upward from each end of the primary surface.
- RPZ – area off the runway end used to enhance protection of people and property on the ground.
- Primary surface – the surface longitudinally centered on a runway.

Airport Zone Height Limitations – Subchapter 77
The purpose of this chapter is intended to prevent the establishment of air space obstructions in approaches through height restrictions. Examples of application of Airport Zone Height Limitations Provisions are:

- In any zoned area where an airport approach area is combined with a primary zone, the following regulations shall apply. If any conflict in regulation or procedure occurs within a primary zone herein before specified, the provisions of this chapter shall govern.
- The Planning Commission shall designate airport approach surface and runway protection zone areas illustrated on the Airport Development District Map.
- The following standards shall be applied to the Airport Development District in establishing appropriate height limitations for structures and objects of natural growth:
    - The runway protection zones will be kept free of any height obstructions which might be hazardous to normal air navigation operations, as determined by ODA.
    - Nothing in this chapter shall be construed as prohibiting the construction or maintenance of any structure, or growth of any tree to a height of up to 35 feet above the surface of land, except for areas in the approach surface. Height limitations for the approach surface will be based upon the following ratio: slopes 20 feet outward for each foot upward beginning at the end of the paved runway and extended to a horizontal distance of 5,000 feet.
    - Where an area is covered by more than one height limitation, the more restrictive limitation shall prevail.

Airport Safety and Compatibility Overlay Zone – Subchapter 78
The purpose of this overlay is to encourage and support the continued operation and vitality of the airport with only visual approaches by establishing compatibility and safety standards to promote air navigation safety at the airport and to reduce potential safety hazards for persons living, working, or recreating within proximity to the Airport. These zones include:

- Imaginary Surface and Noise Impact Boundary Delineation – The Airport elevation, the Airport noise impact boundary, and the location and dimensions of the runway, primary surface, RPZ, approach surface, horizontal surface, conical surface, and transitional surface are part of the Independence Zoning Map. All lands, waters and airspace, or portions thereof, that are located within these boundaries or surfaces shall be subject to the requirements of this overlay zone.
- Notice of Land Use and Permit Application within Overlay Zone Area – Except as otherwise provided herein, written notice of applications for land use or limited land use decisions, including comprehensive plan or zoning amendments, in an area within this overlay zone, shall be provided to the airport sponsor and ODA in the same manner as notice is provided to private property owners entitled by law to written notice of land use or limited land use applications.
- Height Limitations on Allowed Uses in Underlying Zone – All uses permitted by the underlying zone shall comply with the height limitations.
- Land Use Compatibility Requirements – Applications for land use or building permits for properties within the boundary of the overlay zone shall comply with the requirements within the zoning ordinance.
    - Noise – Within airport noise impact boundaries, land uses shall be established consistent with the levels identified in OAR 660, Division 13, Exhibit 5. A declaration of anticipated noise levels shall be attached to any subdivision or partition approval, or other land use approval or building permit affecting land within airport noise impact boundaries. In area

where the noise level is anticipated to be at or above 55 DNL, prior to issuance of a building permit for construction of a noise sensitive land use (real property normally used for sleeping or as a school, church, hospital, public library or similar use), the permit applicant shall be required to demonstrate that a noise abatement strategy will be incorporated into the building design that will achieve an indoor noise level equal to or less than 55 DNL. [NOTE: FAA Order 5100.38A, Chapter 7 provides that interior noise levels should not exceed 45 decibels in all habitable zones.]

- Outdoor Lighting – No new or expanded industrial, commercial, or recreational use shall project lighting directly onto an existing runway or taxiway or into existing airport approach surfaces except where necessary for safe and convenient air travel. Lighting for these uses shall incorporate shielding in their design to reflect light away from airport approach surfaces. No use shall imitate airport lighting or impede the ability of pilots to distinguish between airport lighting and other lighting.
- Glare – No glare producing material, including but not limited to unpainted metal or reflective glass, shall be used on the exterior or structures located within an approach surface or on nearby lands where glare could impede a pilot's vision.
- Industrial Emissions – No new industrial, mining, or similar use, shall, as part of its regular operations, cause emissions of smoke, dust, or steam that could obscure visibility within airport approach surfaces, except upon demonstration, supported by substantial evidence, that mitigation measures imposed as approval conditions will reduce the potential for safety risk or incompatibility with airport operations to an insignificant level. The review authority shall impose such conditions as necessary to ensure that the use does not obscure visibility.
- Communications Facilities and Electrical Interference – Proposals for the location of new or expanded radio, radiotelephone, and television transmission facilities and electrical transmission lines within the overlay zone shall comply with all other requirements and shall be coordinated with ODA and the FAA prior to approval.
- Use Prohibitions in RPZ – Notwithstanding the underlying zoning, the following uses are prohibited in the RPZ: new residential development and public assembly facilities.
- Landfills – No new sanitary landfills, sewage lagoons, sewage sludge disposal facilities, or similar facilities shall be permitted within 5,000 feet from any airport runway used by only piston-type aircraft or within 10,000 feet of any airport runway used by turbojet aircraft. Expansions of existing landfill or sewage treatment or disposal facilities within these distances shall be permitted only upon demonstration that the landfills are designed and will operate so as not to increase the likelihood of bird/aircraft collisions. Timely notice of any proposed expansion shall be provided to the airport sponsor and the FAA, and any approval shall be accompanied by such conditions as are necessary to ensure that an increase in bird/aircraft collisions is not likely to result.
- Limitations and Restrictions on Allowed Uses in the RPZ, Approach Surface, and Airport Direct and Secondary Impact Areas – land uses identified in Table 4 and their accessory uses, permitted under limited circumstances, or prohibited in the manner therein described. In the event of conflict with the underlying zone, the more restrictive provisions shall control.
- Wetland Mitigation, Creation, Enhancement, and Restoration within Approach Surfaces and Airport Direct Impact Boundaries.
- Avigation Easement – Within this overlay zone, the owners of properties that are the subjects of applications for land use or limited land use decisions, for building permits for new residential, commercial, industrial, institutional, or recreational buildings or structures intended for inhabitation or occupancy by humans or animals, or for expansions of such buildings or structures by the lesser of 50% or 1,000 square feet, shall, as a condition of obtaining such approval or permits, dedicate an avigation easement to the airport sponsor.

APPENDIX B

Covenants, Conditions and Restrictions

JOINT DECLARATION OF RESTRICTIONS, COVENANTS AND CONDITIONS OF THE SEVERAL PHASES OF THE INDEPENDENCE AIRPARK

This document is a Common English revision of the Restrictions, Covenants, and Conditions first promulgated by the Independence Airpark on October 23, 1973 and due for renewal after its initial term of 25 years*. It incorporates the amendments, construction standards, and subsequent versions of similar documents of Airpark North as well as Independence Meadows. This document attempts to unify the various development phases of the whole Independence Airpark Homeowners Association under one code.

We hereby declare that all current owners and subsequent owners of parcels within the Independence Airpark voluntarily subject our property to the following restrictions, covenants, and conditions in compliance with ORS 94.580 and the Independence State Airport Ingress/Egress Agreement made with the State of Oregon. We impose these rules on all lots for our mutual benefit and obligate ourselves to a general plan of improvement and maintenance.

We vest the power of enforcement of the provisions of this document in the Board of Directors of the Independence Airpark Homeowners Association (IAHA). Officers, terms, and election dates are specified in the by-laws.

* Revised on Dec. 6, 1998 and recorded on Dec 9, 1998

General Provisions

Section 1: Duration. Covenants and restrictions of this declaration shall run with and bind the land and shall inure to the benefit of and be enforceable by the Association members for a period of twenty-five years from the date this declaration is recorded. After such term, such covenants and restrictions shall be automatically extended for successive periods of ten years each unless this declaration is amended pursuant to the provisions of ORS 94.590.

Section 2: Notices. Notice shall be deemed to have been properly sent when hand-delivered, or mailed by first class mail, post paid, to the last known address of the person who appears as a member on the official association roster at the time of the mailing. Notices concerning delinquent assessments will be by certified mail.

Section 3: Enforcement. The members of the association, collectively, or any individual member shall have the right to enforce by any proceeding at law or equity all restrictions, conditions, covenants and reservations imposed by the provisions of this declaration and a similar right shall exist with respect to the recovery for damages and cost, including reasonable attorney fees, for such violation. Failure of the association, or members to enforce any covenant or restriction shall in no way be deemed a waiver of the rights to do so thereafter at any time.

Section 4: Severability. Invalidation of any one of these covenants or restrictions by judgment or court decree shall in no way affect any other provision of this declaration; the balance thereof remaining in full force and effect.

Section 5: State, County, Municipal Laws and Ordinances. Other authorities having jurisdiction over any member or their property described herein shall govern where more restrictive than these covenants and restrictions.

Section 6: Construing Context of Declaration. The singular pronoun may be taken to mean and include the plural and the masculine the feminine and the neuter.

Article 1: The Association

The current owners of each lot are the only members of the association. Each lot is entitled to one vote. Votes may not be subdivided into fractions. The Association is governed by a Board of Directors elected annually and is obliged to function according to its by-laws.

Article 2: Property Rights in the Common Properties

All members have the right to easement and quiet enjoyment in and to the common properties subject to the rules and regulations of the association. The common properties include the system of taxiways and sidewalks granted to the association by the original developers. Any member may share his right of quiet enjoyment to the common properties to members of his family, his guests, or to his tenants. Any damage to the common properties by a member or his delegates will be repaired, with all dispatch, at the member's expense, and, in no case, be delayed for more than 30 days. Vehicles are prohibited from using the taxiways under any circumstances except in the case of emergency medical treatment or the removal of disabled aircraft.

Article 3: Covenant for Maintenance Assessment

Section 1: Assessments. All members agree to pay to the Association annual assessments and special assessments for capital improvements. This obligation is a continuing lien upon the property, and together with interest and costs of collection (if necessary) will be a personal obligation of every member. These assessments are used exclusively for the maintenance of and improvements to the common properties, and protecting the health, safety, enjoyment and welfare of the residents. Each member has an equal pro-rata liability to the association for common expenses. Upon original sale of each lot by the developer to the member a $500 fee is assessed. The annual assessment shall be $100, and is subject to change by a vote of the members. Special assessments or changes in the annual assessment must have the assent of two-thirds of the vote of all members who are voting in person or by proxy at a meeting duly called for that specific purpose. Written notice clearly stating the purpose of such a vote shall be sent to all members at least 30 days in advance of the meeting. Annual assessments are due and payable on January 1 of each year. The initial annual assessment for a member is prorated on a calendar year basis. The due date for any special assessments will be set by the Board of Directors in an authorizing resolution.

Section 2: Duties of the Board of Directors. The Board shall notify each member in writing at least 30 days in advance of the due date of the annual assessment. The Board will prepare and maintain a roster of all members that includes the status of all assessments. This roster is subject to inspection by any member. Upon request, the Board will furnish to any member a written letter setting forth the status of his assessment. The Board has sole discretion over the Maintenance Fund, assigns maintenance priorities, and enforces the provisions of this document.

Section 3: Non-Payment of Assessments. Delinquent assessments, together with interest at a legal rate and the actual costs incurred in the collection including legal fees and court costs, shall constitute a lien upon the property. "Notice of Delinquency" shall be filed with the county clerk. When the lien is released by the payment of the appropriate sum by the member, the board will then file a "Satisfaction of Lien" with the county clerk. No member may waive or otherwise escape liability for assessments by non-use of the

common properties or abandonment of his lot. The sale or transfer of a lot shall not extinguish the assessment lien or release the lot from liability.

Article 4: Restrictions on Use of Property by Occupants

Section 1: Single Family Airpark Residential Use Only. The requirements of the City of Independence RSA Zone shall be strictly adhered to. Members may combine a lot or parcel with another for a building site, but no member may divide a lot or parcel. Motor homes, house trailers, or other off-site manufactured housing are not permitted as permanent residences. Outbuildings shall be permitted and include garages and hangars, but they shall be equal to the exterior construction and appearance of the residential dwelling. Members will repair, restore, or remove any damaged or destroyed structure with all dispatch.

Section 2: Livestock, Poultry, and Family Pets. No farm animals, livestock, poultry or other animals of any kind shall be raised, bred, or kept by any member on any lot within the RSA zone for commercial purposes. No family pet animals shall be kept which may or does become an annoyance, nuisance or menace to the neighborhood, except as may be determined acceptable by the Association. Pets--except cats--are not allowed on the common properties except when they are accompanied by their owner or delegated caretaker and properly restrained.

Section 3: Industrial and Aviation Noise. Members forever waive all rights to protest against industrial and/or aviation noise resulting from operations and activities conducted in relation to the operations of Independence State Airport.

Section 4: Nuisances. No noxious or offensive activity shall be carried on, nor anything done which may become an annoyance or nuisance to the other members or detract from the value of the residential neighborhood.

Section 5: Sanitary Conditions to be Maintained. Trash, garbage, and other waste shall not be kept on any lot, except temporarily in sanitary containers, screened from public view, awaiting collection. Common properties are not to be used for composting, waste piles, burn piles, etc.

Section 6: Members' Private Aircraft Only. Members shall not allow their property to be used as a base or site for maintaining, repairing or selling aircraft or aviation fuel to the public. Members do retain the right to construct or re-build antique, experimental, homebuilt, fixed wing and rotary wing private aircraft and to perform routine maintenance. No flight instruction is to be conducted, and no aircraft is to be allowed to be used for flight instruction, on or from the Airport property by themselves, homeowners/residents, or any Association without the express written consent of Aeronautics.

Section 7: Stored Vehicles. No boat or trailer of any kind, recreational vehicle or motor home, camper, bus, disabled vehicle or other similar vehicles are to be left, kept, or stored on any street or on any portion of the front yard setback.

Section 8: No Occupancy During Construction. No residence shall be in any manner occupied during the course of original construction. Construction or reconstruction of any building is to be prosecuted with reasonable diligence continuously from commencement until completion.

Article 5: Architectural Guidelines

Section 1: Architectural Guidelines. All buildings are subject to the approval of the Architectural Review Committee. The Committee will review each application to insure a pleasant, homogeneous residential community that blends with its neighbors while still allowing for individuality. The scale and proportion of the residence, garage, hangar and outbuildings should be appropriate and complimentary to the neighborhood. Minimum recommended living area is 1,350 square feet without a hangar and 1,000 square feet with a hangar.

Section 2: Exterior Treatments. Siding materials may be natural wood, simulated wood, brick, stone, or stucco. Roofing materials may include manufactured roofing, tile, shake, shingle or architectural metal.

Section 3: Mechanical and Light Intrusion. Heating and cooling units should be visually screened and their noises attenuated to the greatest extent possible. Solar heat collector systems and high intensity lights of any kind must be installed in such a manner as to prevent intrusion onto neighboring properties.

Section 4: Reservation of Easements. All members grant to the Association perpetual easements to maintain all common utilities. Members are responsible for maintaining a clear zone next to the taxiways, and no buildings, fences, or shrubbery over eighteen inches tall will be allowed within 20 feet of the taxiway. The Association also reserves the right to trim any growth encroaching on common properties which might interfere with the safe movement of people or the operation of aircraft and to bill the member for this service if it becomes necessary.

Article 6: Construction Standards

Section 1: Authority and Procedure. The following standards have been developed in accordance with the By-Laws of the Independence Airpark Homeowners Association and under the authority of the Declaration of Restrictions, Covenants and Conditions (CC&Rs) which establishes that Association. These standards are provided to ensure the maintenance of quality dwellings within the airpark and to provide for the safety, comfort and convenience of airpark residents. All plans must be submitted to the Architectural Committee Chairperson before they are submitted to the City Building Inspector for the purpose of securing a Building Permit. Approval by two of the Committee members or a majority of the Committee is required, which ever is more. Notice of preliminary Committee approval or rejection will be mailed or delivered to the applicant within fifteen (15) days of receipt by the Committee Chair. Reasons for any rejection will be included with the notice. Final plan approval will be given upon notice of acceptance by City Building Inspector and review of any alterations required by the Inspector for conformance with standards outlined below. One copy of the site plan will be retained on file by the Committee.

Section 2: Standards.
Codes: All construction will conform to applicable State, County and Municipal building codes. Erection of off-site manufactured buildings or modular units is prohibited.

Taxiways and Tie-Down Areas: Connections to taxiways shall be properly tiled and graded to provide drainage to the east or to storm drains. All homeowners must provide paved or concrete connections to the taxiways and at least a paved or concrete tie-down area for aircraft.

Hangars: Hangars are strongly encouraged for all homes. If a hangar is not constructed when the home is built, a 10 foot side lot line setback is required on one side to provide access for hangar construction. All hangars must conform to the architecture style and be complementary to the associated home and to the community. Hangar size should be reasonable with respect to the home. A minimum of 40 ft. wide and 10 ft. high is recommended for hangar door opening. Off-site manufactured or modular buildings are not permitted.

Fences, Shrubbery, and Set-backs: Within the 20 foot rear lot line setback, no fence shall be more than four (4) feet in height and shall be of chain link or similar see-through construction. Random trees and shrubbery will be allowed for landscaping purposes, provided no continuous visual obstruction above four (4) feet is developed. Plans for fences on lot lines between lots must be submitted for review by the Committee by both property owners.

Cleanliness During Construction: Streets and taxiways will be kept clean and neat during construction. All mud and debris will be removed on a daily basis. If not removed within a reasonable time, the Maintenance Committee will notify the lot owner(s) responsible of their obligation.

Protection of Taxiways: All damage to taxiways occasioned by construction is to be repaired immediately, and is the responsibility of the lot owners. The lot owner is responsible for informing all contractors and persons delivering materials that taxiways are **NOT** to be used by trades people for **ANY** reason. Damage not repaired or scheduled to be repaired within ten (10) days of time that the Maintenance Committee Chair informs the lot owner of the condition, will be repaired by the Maintenance Committee and the lot owner will be assessed for those repairs and expenses in accordance with the CC&Rs and the By-Laws. A reasonable effort will be made to inform the lot owner and provide time for the owner to effect repairs.

Construction Progress: Progress toward completion must be reasonable. Reasonable progress is defined as the completion of all taxiway connections, driveways, sidewalks and installation of siding and roofing on the dwelling and hangar within twelve (12) months of the date of issuance of the building permit.

Grading: Grading and filling of lot is also required within this 12 month time period. Completion of landscaping is encouraged.

FAA: The FAA requires completion and filing FAA Form 7460-1. This form is available from the Oregon Aeronautics Division, Salem Airport.

NOTE: ARCHITECTURAL COMMITTEE APPROVAL DOES NOT CONSTITUTE A BUILDING PERMIT. SUCH A PERMIT MUST BE OBTAINED FROM THE CITY.

Article 7: Vacant Lot Maintenance Obligations of Members

Vacant lots will be maintained in a reasonable condition, and vegetation will not be allowed to grow more than eighteen inches high. If members fail to perform these duties, the Association will do it, after reasonable notice of an infraction of the rules, and bill the owner for the work as an assessment.

INDEPENDENCE AIRPARK HOMEOWNERS ASSOCIATION
P.O. Box 31, Independence, OR 97351

ADDENDUM No. 1 TO THE AMENDED DECLARATION OF RESTRICTIONS, COVENANTS AND CONDITIONS REVISED ON DECEMBER 6, 1998, AND RECORDED DECEMBER 9, 1998.

A. DEFINITIONS: Terms as used in this document and the revised CC&Rs are defined as follows:

Taxiway Common Property Dimensions. The width of the taxiway as platted is 60 ft wide and includes the area between the rear property lines on both sides of the taxiway as the IAHA Taxiway Common Property. See attached sketch drawing on page 4. *(Page 29 of this booklet.)*

Structural Pavement is that part of the Taxiway Common Property that is actually paved. The width of the Structural Pavement typically varies from 16 ft to 18 ft.

Personal Use Area of Taxiway Common Property. The area between the edge of the Structural Pavement and the rear lot line is the area for personal use by lot owner. The lot owner must install and maintain drainage along the taxiway and keep the area in a reasonably neat and attractive condition for the privilege of personal use. Vegetative growth cannot exceed 18 inches high nor obstruct aircraft nor the vision of the pilot while taxiing.

Rear Lot Setback. The rear lot setback is a minimum of 20 ft from the rear lot line and restricts any construction or vegetative growth above 4 ft high and must not interfere with the aircraft or vision of the pilot while taxiing. An exception is made to allow a minimum of 15 ft rear setback when the hangar door faces east or west.

Undeveloped Lots. An undeveloped lot is one which has been purchased but construction has not been started nor been approved by the Architectural Committee. An agreement must be made with the Maintenance Committee and the lot owner for personal use of the Common Property between the Structural Pavement and the rear lot line. This agreement will allow personal use of the area when drainage is installed. The Common Property area and the entire undeveloped lot must be maintained in a neat and attractive manner. Vegetation must be kept under 18 inches high and not obstruct an aircraft nor the vision of a pilot while taxiing. An exception to the 18 inch high restriction is for native trees or shrubs by application to the Board or when the personal use agreement is made with the Maintenance Committee. Dumping or storage of debris is prohibited on an undeveloped lot and the Common Property.
Association means the Independence Airpark Home Owners Association.
Declaration means this document.
Block means any plat of land so designated in the recorded plat of the Independence Airpark.
The Properties means all of the property herein described and any additions there to.
Common Property means all those areas of land shown as such as platted devoted to the common use of lot owners in the association.
Lot or Parcel means any numbered plot of land shown upon the registered subdivision plat of the properties which is not designated as Common Property or a Block.
Member means every person who holds membership in the Association.
Owner means the record owner, whether one or more persons, of fee simple title to any lot, but does not mean a mortgagee.
Street means any road or other thoroughfare shown on the recorded plat.
Setback means a minimum distance between a structure and a lot line.
Airpark means the Independence Airpark.
Aeronautics means the Oregon Aeronautics Division.

B. DESCRIPTION OF THE BOUNDARIES OF THE AIRPARK TO WHICH THE ATTACHED CC&Rs APPLY:

A general description of the boundaries of the Independence Airpark is that area designated in the City of Independence Ordinance No. 1336 establishing the Residential Single-Family Airpark Overlay Zone: "RSA". The Airpark Overlay Zone includes all property within city limits between Hoffman Road north to city limits, and between the Independence State Airport runway and Stryker Road. Excluding the commercial area between Airport Road and said runway, and the area north of Cadet Taxiway to the city limits. (Independence Airpark boundary on the north excludes the North Park Annex which is within the Airpark Overlay Zone but outside the boundaries of the Independence Airpark.)

A more precise description follows:
Independence Airpark - Phase 1. Located within the city limits of Independence in Polk County, State of Oregon. Beginning at the Initial Corner of this subdivision which is a 2 inch by 36 inch galvanized iron pipe set 6 inches below the ground at a point which is 1369.50 feet East and 1401.84 feet South 0 20 East and 500.0 feet East of the Northwest corner of the Thomas L. Burbank Donation Land Claim No, 43 in Township 8 South, Range 4 West of the Willamette Meridian in Polk County, State of Oregon; thence East 1344.37 feet to an iron pipe in West right-of-way of County Road No. 845; thence South 0 05 45 East 850.00 feet along said right-of-way to an iron pipe; thence South 0 05 15 West 83.00 feet to an iron pipe; thence South 44 54 45 West 42.43 feet to an iron pipe; thence South 89 54 45 West 827.60 feet to an iron pipe; thence North 0 2 West 414.17 feet to an iron pipe; thence West 400.00 feet to an iron pipe; thence North 0 20 West 467.28 feet to the point of beginning. Recorded October 23, 1973.

Added: Independence Airpark - Phase 2. Beginning at the initial corner of this subdivision which is a 2-inch by 36-inch galvanized iron pipe set 6 inches below the surface of the ground at a point marking the most Southerly Southwest boundary corner of Independence Airpark as said subdivision is platted and recorded in Volume 6, Page 49, Polk County Book of Town Plats, which point is recorded as being

1369.50 feet East 1401.84 feet South 0 20 East and 400.00 East and 414.17 feet South 0 20 East from the Northwest corner of the Thomas T. Burbank Donation Land Claim No. 43 in Township 8 South, Range 4 West of the Willamette Meridian in Polk County, Oregon; thence North 89 54 45 East along the Southerly boundary of said Independence Airpark Subdivision, 827.60 feet; thence North 44 54 45 East 42.43 feet; thence North 98 54 45 East 83.00 feet to a point in the West right-of-way line of County Road No. 845; thence South 0 5 15 East along said right-of-way, 820.00 feet; thence South 89 54 45 West 83.00 feet; thence South 44 5 45 West 42.43 feet; thence South 89 54 45 West 824.10 feet; thence North 0 20; West 820.00 feet to the point of beginning and containing 17.674 acres of land, more or less. Recorded December 29, 1978.

Added: Independence Airpark North. Beginning at a point which is 20.75 chains East and 14.16 chains South of the Northwest corner of the Donation Land Claim of Thomas L. Burbank and wife, Notification No. 1524, Claim No. 43 in Township 8 South, Range 4 West of the Willamette Meridian in Polk County, Oregon; thence running East 28.25 chains; thence South 7.08 Chains; thence West 28.25 chains; thence North 7.08 chains to the place of beginning. Recorded May 12, 1992. Added: Independence Meadows Airpark - Phase 1, located in the NE 1/4 of Section 20 and the NW 1/4 of Section 21, Township 8, South, Range 4 West, Willamette Meridian, City of Independence, Polk County, Oregon, recorded December 5, 1997.

Added: Independence Meadows Airpark - Phase 2, located in the NE 1/4 of Section 20 and the NW 1/4 of Section 21, Township 8, South, Range 4 West, Willamette Meridian, City of Independence, Polk County, Oregon, recorded February 10, 1998.

Added: Independence Meadows Airpark - Phase 3, located in the NE 1/4 of Section 20 and the NW 1/4 of Section 21, Township 8, South, Range 4 West, Willamette Meridian, City of Independence, Polk County, Oregon. This Phase 3 was platted as subdivision #011-0033 on November 27, 1998 and is included in these amended CC&Rs, and recorded on December 9, 1998.

current CC&R document as of 1-3-2008

VOLUME 2, CHAPTER 10

Indianapolis International Airport, Indianapolis, Indiana

Introduction/Airport Overview

The Indianapolis International Airport (IND) is owned and operated by the Indianapolis Airport Authority (IAA) and is located centrally in the state of Indiana. The airport is situated 10 minutes from the city center of Indianapolis and is situated near I-65, I-69, I-70, I-74, and I-865.

IND serves as the primary airport for the Indianapolis-Carmel metropolitan area, as well as the majority of the state of Indiana. In addition to IND, the IAA owns and operates four reliever airports and a heliport.

As a primary airport within the Indiana State Airport System, the IND serves over 8.5 million passengers on multiple air carriers, which include:

IND is home to the nation's second largest Federal Express (FedEx) hub facility, which handled 994,396 tons of mail and cargo in 2007 and occupies 1.9 million square feet of building space at the airport. In addition, FedEx has begun construction on an expansion that will add more than 600,000 square feet to the existing sorting facility. In conjunction with this expansion, the IAA embarked on a three-phase expansion that will include 14 additional aircraft parking spaces adjacent to the current cargo apron under a lease amendment with FedEx signed in 2006.[1]

The airport boasts an average of 282 daily air carrier aircraft departures. In 2007, more than 205,000 operations were reported at the airport, along with over five million tons of cargo being handled.

The airport has a significant number of based aircraft and experiences a considerable amount of daily use (Table 2.10-1). The majority of the aircraft operations are comprised of commercial and air taxi operations. Table 2.10-2 summarizes the major airfield facilities at the airport.

History of the Airport

Originally known as the Indianapolis Municipal Airport, the IND opened in 1931 with 947 acres and was owned by the city of Indianapolis and operated by the Board of Public Works. The airport was the main receiving and dispatching hub for all air mail circulated at Indianapolis. It was not until 1975 that the airport received its international designation.

IND has grown from 947 acres in 1931 to over 7,700 acres today, geographically changing the face of Marion County. The airport proper lies within Marion County and extends toward Hendricks County to the west. The airport noise contours extend

Table 2.10-1. Indianapolis International Airport.

Based Aircraft	
Jet Airplanes	47
Multi Engine	16
Single Engine	11
Helicopters	7
Total Based Aircraft	*81*
Aircraft Operations	
Commercial	45%
Air Taxi	41%
Transient General Aviation	13%
Military	*<1%*
Total Aircraft Operations	*Avg. 585/day*

Source: *AirportIQ 5010*, July 2008

[1] Indianapolis International Airport website.

Table 2.10-2. Airport Profile.

Property
▪ Existing: 7,700 acres
Airfield
▪ Runway 5L/23R 11,200 feet long, 150 feet wide; concrete
▪ Runway 5R/23L 10,000 feet long, 150 feet wide; concrete
▪ Runway 14/32 7,280 feet long, 150 feet wide; concrete
▪ Runway Lighting: High Intensity, ALSF2
Navigational Aids & Instrument Approach
• Runway 5L/23R: ILS/DME, MALSR
▪ Runway 5R/23L: ILS,DME, MALSR
Runway 14/32: PAPI, MALSR

Source: *AirportIQ 5010*

well into Hendricks County and impacts the Hendricks County planning and zoning activities, as well as the local residents with aircraft overflights and noise concerns. The airport has acquired many acres of land within both Marion and Hendricks Counties in an attempt to maintain land uses that are compatible with airport environs and minimize hazards and risks to local residents in proximity to the airport.[2]

Virtually all the development around IND occurred after the airport was initially established and resulted in more compatible land uses in the vicinity of the airport. In order to assure continued compatible land use development, the city of Indianapolis, under a federal grant and through the Department of Metropolitan Development, in cooperation with the IAA, has been developing an Airport Vicinity Land Use Plan with the following objectives:

- Control objects on aircraft approach and departure paths that might impair aircraft safety.
- Examine varying noise intensity in areas adjacent to the airport.
- Update transportation and land use planning.

The importance of airport planning was recognized as early as 1931, when the airport was first commissioned. Those same principals were echoed in the 1977 *Airport Master Plan,* as noted below in an excerpt from the Master Plan Report:

> The purpose of airport planning is to determine the airport's function for today and tomorrow. Airports are bridges to the present and gateways to the future. Whatever the present needs, plans must consider potential future requirements. In general, airport planning should focus on the airport's role as an access point to the total transportation system and a base for community growth. It must complement the community's projected goals. To meet the objectives of a public concerned with the environment and yet provide our community with necessary aviation facilities.[3]

The airport has completed construction for the new midfield terminal, which opened in 2008. The cost of the new midfield terminal, ancillary structures, and infrastructure is estimated at $1 billion. This project includes construction of the new midfield terminal building, vehicular parking garage; aircraft parking aprons and associated taxiways, and a new air traffic control tower. In addition to airfield facilities, I-70 to the south has been relocated and new entrance ramps and a dedicated exit have been constructed to provide direct access to and from the airport.

Governance

In 1945, the Indiana legislature passed the Board of Aviation Commissioners Act, which allowed an executive department of a city, county, or town, to be established to govern and operate airports within the state. This allowed the Indianapolis Public Works Department to transfer airport operations to the Indianapolis Aviation Board of Commissioners. Over the next 15 years, the airport experienced incremental expansions to the runways, taxiways, and associated buildings to serve the increasing aviation traffic.

In the early 1960s, a state statute was passed that allowed for the creation of airport authorities. The Evansville Airport Authority and the IAA were the first to be established under this new legislation. The IAA was established in 1962 and is responsible for operating, managing,

[2] Interview comments from Robert Duncan, Airport Director.
[3] 1977 Indianapolis International Airport Master Plan.

and developing the six aviation facilities in the greater Indianapolis metropolitan area which include:

- Indianapolis International Airport;
- Eagle Creek Airport;
- Gordon Graham Field/Hendricks County Airport;
- Downtown Heliport;
- Metropolitan Airport; and
- Mount Comfort Airport.

The Airport Authority statute established airports as independent units of government with their own executive, legislative, and taxing powers. Although the statute is very broad, one of the key attributes of the statute grants Airport Authorities in Indiana the exclusive right to determine the use of airport-owned property, thereby exempting airport owned property from local zoning land use ordinances. Therefore, IAA has the right to zone land within the city of Indianapolis, adjacent townships, and counties to ensure compatible land use. The legislation also provides the Airport Authority with the ability to sell both general obligation bonds and revenue bonds to generate revenue streams to support airport development.

According to Robert Duncan, IND Airport Director, the IAA has always had a unified vision for the airport and has rarely experienced political friction or seen excessive opposition to agenda items. Duncan noted that in his 35-year career with the airport, he has rarely seen the IAA receive a vote that was not unanimous with regards to the growth and development of the airport and the preservation of its operations. He notes that the board members appear to acknowledge and understand the value of the airport and support the economic contribution the airport provides the community. The history of the voting members has always been to act in the best interest of the airport.

In 1995, the airport experienced a change in management when the IAA commissioned British Airport Authorities (BAA) United States to manage the routine operations of IND and the five reliever airports. BAA held the management contract for 13 years and was successful in decreasing the operating cost per enplaned passenger while increasing non-airline revenue. However, the IAA felt that the BAA put too much emphasis on budget cuts and not enough emphasis on routine maintenance. In December 2007, by mutual agreement between BAA and IAA, BAA transferred the management of all six airports back to IAA and ceased operations. The IAA staff note that during the privatization period, the BAA was never given unlimited control of airport finances. The BAA managed the operating funds, while the IAA held control of the capital fund. This allowed the IAA to maintain and develop a capital improvement plan. There were no changes in the long-range planning or land uses surrounding the airport during the BAA operations.[4] The IAA continues to regulate zoning and land use around IND through either land acquisition or the Part 150 Noise Compatibility Plan, as part of the Uniform Airport Authority Act.

Discussion of Compatibility Issues and Responses

The primary compatibility concerns and the associated mitigation actions at IND are focused on noise issues. The continued expansion of the airport has greatly improved convenience for the traveling public and enhanced the economic growth of Indianapolis and the surrounding communities; however, with continued growth and expansion comes increased aircraft activity which inevitably generates more aircraft noise. Nighttime cargo flights are one of the primary contributors to increased noise levels. Aircraft operations are expected to increase in the future,

[4] Interview comments from Robert Duncan, Airport Manager.

given the projected growth of the Indianapolis metropolitan area and the pivotal role the airport plays in local economic development. The IAA recognizes its responsibility to minimize the noise impact on local residents and voluntarily initiated an aggressive program to mitigate the effects of increased noise levels.

In the mid-1980s, the IAA conducted a Part 150 Noise Study and in 1987, prepared a Part 150 Noise Compatibility Plan based upon the results of the Study. The FAA approved the Plan in 1988. In 1992, the IAA updated the original Plan to consider the effects of a future planned runway and the continued growth of late-night cargo hub operations. A second update was completed in 1997 and includes a more comprehensive land use management plan.

A Noise Compatibility Program was established to mitigate the effects of aircraft operation noise that homeowners may experience in the vicinity of the airport. The mitigation tools include:

- **Guaranteed Purchase.** This applies to single-family/multifamily residences in affected areas. Homes in this program are acquired and then demolished with the intent that the property will ultimately be sold for noise compatible private development.
- **Sound Insulation/Purchase Assurance.** This is available for single-family residences in affected areas. The program gives homeowners the opportunity to either remain in their homes and benefit from sound insulation improvements, or sell them directly to the IAA. Tenant-occupied residences are eligible for sound insulation treatment only. Acoustical treatment in the Sound Insulation Program concentrates on doors, windows, ceiling/walls, air conditioning, and improvements to other noise paths. Potential buyers of homes that have been sound insulated are informed that the homes are encumbered with an Air Easement and Non-Suit Covenant. The Air Easement and Non-Suit Covenant provide the IAA and users of IND the right to operate aircraft over or near the home and restrict homeowners from suing the IAA or its users over noise. If a buyer purchases a home that has been sound insulated by a previous owner or by the IAA as part of the Sound Insulation Program, the home is considered mitigated and is not eligible for purchase by the IAA. However, the homeowner is always free to sell the home.
- **Purchase Assistance.** Owners of a home within the designated assistance area are eligible for the Purchase Assurance Program, which assists the property owner with the sale of their property, should they choose to move from the area. The IAA will obtain and pay for an appraisal and review appraisal of the property. The fair market value of the home is determined through a detailed analysis by an appraiser. Homeowners will be allowed to remain in the home up to 60 days after closing and will be paid a $3,000 relocation allowance once they have vacated the property. If an original homeowner agreed to Sound Insulation improvements and later sold the house, the new buyer cannot participate in Purchase Assurance because the same property cannot be mitigated more than once. However, the new buyer will received the full disclosure of the Sound Insulation improvements. At the time a mitigation program is implemented and completed on a property, the IAA has no further obligation to that property.
- **Avigation Easements.** The IAA attempts to maintain the tax-base for the surrounding community and return as many homes back into the real estate market as possible. Homes purchased by the IAA will be placed on the open market for re-sale. Realtors who sell homes within the designated area are paid a sales commission of 4.5%. If the home is sold under the Purchase Assurance Program, the IAA will sound insulate the home. If the new homeowner decides later to sell the home, they will not have the option of re-selling it to the IAA, since a home cannot be mitigated twice. They can, however, sell the home themselves. When the IAA re-sells a house, it is encumbered with an avigation easement prior to any re-sale to ensure that the property is protected in perpetuity from incompatible land uses and height obstructions.
- **Sales Assistance.** Single-family homes in affected areas are eligible for sales assistance. Through sales assistance, the IAA provides the subject homeowner with 10% of the contract

sale price of the home. Tenant-occupied homes are not eligible for sale assistance. The Sales Assistance Program was designed to provide assistance for homeowners who may experience some intermittent nighttime noise impact, but lie just outside the 65 DNL contours. The intent of the program is to compensate homeowners for the diminished property value that might be attributed in part to airport noise. If a homeowner sells the home on the open market and chooses to enter the Sales Assistance Program, the IAA will provide the seller 10% of the contract sale price of the home. The IAA reserves the right to have the property appraised to verify the contract sale price submitted by the homeowner. The Program requires that homeowner(s) sign a participation agreement, which contains disclosure language to be contained in the deed of conveyance or other documents transferring the real estate.[5]

- **Wildlife Management Plan.** The airport has a wildlife management plan in place. IND utilizes a governmental wildlife specialist to control the wildlife hazards on the airport proper. The IAA reimburses the federal government for the time the wildlife specialist spends on-site controlling wildlife. Deer had been an issue for the airport until a 10-foot fence with razor wire was installed around the perimeter of the airfield to control access. Additionally, the airport has ceased agricultural operations on the airfield, since it was thought to be a possible wildlife attractant.[6] IND has experienced minimal bird strikes throughout the years, but does report any occurrence to the FAA. There are several water bodies surrounding the airport, none of which have control measures, such as monofilament, to reduce or deter wildlife use.
- **Height Limitations.** The airport utilizes the FAA Form 7460-1 to evaluate tall structures. Additionally, the state mandates that a tall structure permit be issued and approved prior to all construction.
- **Land Acquisition.** The IAA utilized land acquisition as the primary mitigation tool for compatible land use planning surrounding the airport. Land acquisition is funded through revenues generated by airport bonds, passenger facility charges (PFC), and FAR Part 150 programs.[7]

Litigation

The IAA staff noted that the airport has been involved in several legal actions associated with land use compatibility issues. IND has experienced a lawsuit that stemmed from the 2003 Part 150 Noise Study when residents located outside of the 65 DNL noise contours contested the study boundary. Due to the noise contours and the limits of the existing noise mitigation programs, there was little the airport could do to assist the residents with sound insulation or other mitigation techniques to relieve the noise impacts and nuisances created by aircraft operations.

Additionally, the IAA was named a defendant in a lawsuit regarding aircraft overflights and the taking of real property by inverse condemnation. The standard for overflight takings for all Indiana airports was established as a result of the lawsuit decision. The ruling set a precedent and clarified the level of proof required of a plaintiff to recover inverse condemnation damages due to aircraft overflights.[8] The Indiana Supreme Court denied the remainder of claims based on the premise that the aircraft were operating within the navigable airspace and therefore was not an inverse commendation on the plaintiff's property.

Since the onset of the litigation against the IND/IAA, the Indiana State Legislator has adopted a nuisance statute, which prohibits litigation claims based on nuisances such as aircraft noise. This state statute provides that once an airport completes a Part 150 noise study, it is free from the threat of nuisance claims, if a lawsuit is not filed within the first year after completion of the study.

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[5] Indianapolis International Airport Noise Compatibility Plan Neighborhood Compatibility Program Realtor Guide.
[6] Interview comments from Robert Duncan, Airport Manager.
[7] Interview comments from Robert Duncan, Airport Manager.
[8] Indianapolis International website.

Aircraft Accidents

The Indianapolis metropolitan system of airports has not experienced many accidents and those that have occurred resulted in minimal injuries. It was noted by Robert Duncan, Airport Manager, that a couple of airports within the IAA system of airports have experienced a few gear-up landings and overruns, with those occurring at Metropolitan Airport and Eagle Creek Airport. A major accident occurred at IND in 1987 when an Air Force A-7 attempted an emergency landing at the airport. The A-7 had a fuel pump malfunction, which caused an engine flameout that resulted in a loss of power. The pilot tried to accomplish an emergency landing at the airport. However, the aircraft did not make it to the runway surface and crashed into a local hotel, the Ramada Hotel. Seven people in the hotel were killed and the pilot survived with minor injuries.

Existing Studies, Planning, and Regulations

The IAA participates in the local comprehensive planning process of Marion County, which is the primary jurisdiction impacted by the operations at IND. A significant portion of Hendricks County is located within the IND noise contours; therefore, the IAA interacts with Hendricks County on land use planning issues. In addition, the IAA built a new reliever airport in Hendricks County to assist with general aviation (GA) aircraft traffic around IND. Hendricks County has been proactive and developed airport overlay zoning to protect the new airport from incompatible land uses.

The city of Plainfield, another neighbor of IND, has been involved with the IAA to support proactive planning efforts in proximity to the airport. Plainfield is experiencing rapid growth and development and measures are being taken to locate industrial and other compatible land uses near the airports under the IAA ownership. Plainfield's decision to coordinate airport compatible development was also stimulated by the Interstate development, as well as the continued growth of FedEx. The county recognized the value of the airport to the economic growth of the county. Plainfield has established development standards within the IND 65 DNL noise contour and has also created airspace zoning, which is more restrictive than FAR Part 77 surface requirements.

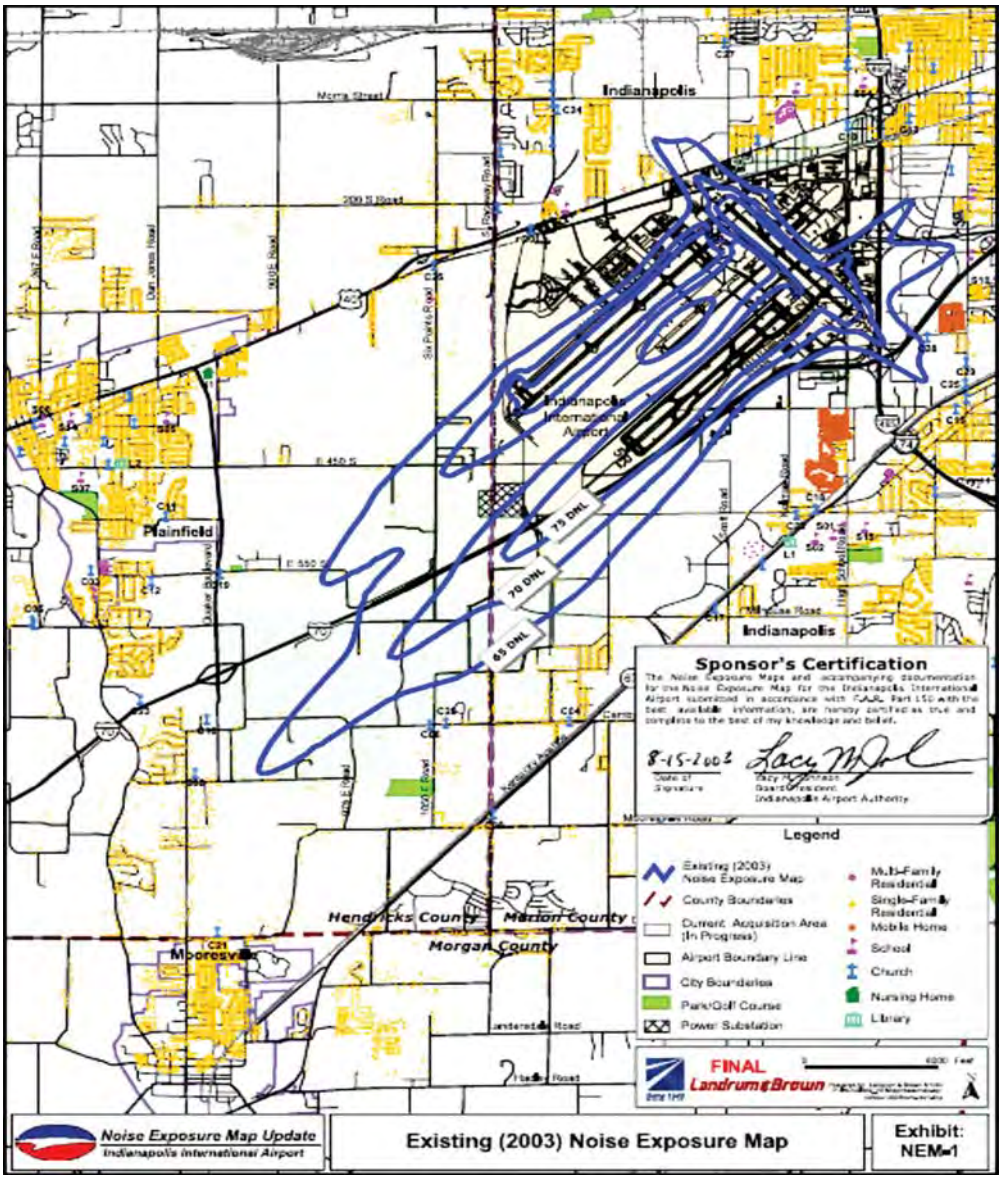
Both Plainfield and Hendricks County administer their own zoning and were both very active to develop the nighttime departure procedures for IND, which was established during the 1987 Part 150 study.

Noise Study

As previously mentioned, in 1987 the IAA commissioned its first FAR Part 150 noise study in recognition of increased levels of activity that were anticipated as a result of new runways at IND and the expansion of the air cargo operations. As a result of the study and in an effort to reduce noise impacts in the surrounding community, the IAA purchased homes, relocated residents, and sound insulated homes in areas that were significantly impacted by airport related noise. The IAA conducted full updates of the original study in 1992 and 1997. These updates have been impacted by the opening of a new south runway in 1990 and a new north runway in 1996.[9] The IAA, in August 2003, completed a Noise Exposure Map (NEM) Update project consistent with the Part 150 recommendation for updates every 5 years (Figure 2.10-1).

During the Part 150 Noise Compatibility Plan update in 2003, it was found that the existing elongated noise contours had decreased in size. This decrease was due in part to the U.S. Postal

[9] Indianapolis International Airport website.



Source: Indianapolis International Airport Website

Figure 2.10-1. 2003 Indianapolis International Airport noise exposure map.

Service ceasing operations at the airport. Although FedEx launched additional freight flights during this same time, they were typically utilizing quieter Stage 3 aircraft, while the U.S. Postal Service utilized aircraft that are typically noisier than Stage 2 aircraft. The airport's noise programming had been based off the 1986 to 1987 elongated noise contours. Surprisingly, when the contours decreased in length in 2003, the FAA continued to support the elongated noise contours originally established within the plan. Therefore, no change was made to the noise program or its limits. The airport is currently undergoing another noise study update and the surrounding residents are being involved in all aspects of this Part 150 updated Noise Compatibility planning process. Figure 2.10-1 illustrates the contours as they were developed in the 2003 NEM.

Even with the aggressive noise mitigation program that is currently in place at IND, there are still noise complaints associated with airport operations. For example, in 2007, the airport received just under 250 documented noise complaints. Those calls included complaints from six

different people with over 90 calls from a single individual. The single individual is located outside the 65 DNL noise contours; therefore, limited mitigation options are available for the property owner or the airport.[10]

Airport Master Plan

As with any airport included within the National Plan of Integrated Airport Systems (NPIAS), IND is required to have an Airport Master Plan and an associated Airport Layout Plan (ALP), which documents planned growth and development for the airport. IND has conducted periodic updates to the Airport Master Plan and the ALP and has planned for the growth of the airport in a systematic manner. For example, the planning for the reconfigured airport began in 1975 and included the construction of two parallel runways with a nonintersecting crosswind runway and a new midfield terminal complex between those runways, as well as new highway access from Interstate 70. The plan was fully realized in 2008 with the opening of the new midfield terminal, which is located between the two parallel runways that have been constructed over the past ten years. The approximate $1.1 billion cost of this reconfigured site was financed through a combination of federal grants, passenger facility charges (PFCs), airline facility rents, and aircraft landing fees. No state or local tax money was used to finance construction or repay construction bonds. Construction of the new terminal building began in July 2005 and opened in late 2008.[11]

Community Involvement and Economic Impact

Airports must include their local community in planning and development processes that involve the airport. The IAA staff noted that they have had to do little in terms of public outreach to educate local community members on the value of the airport. With the economic impacts of the FedEx facility, it is fairly easy to demonstrate the value of the airport and its associated tenants to the local communities. The IAA staff stated that they are certainly willing to participate in meetings if local groups make requests. Between 8,000 and 9,000 jobs are created by the airport itself, as well as the ancillary industries located on the airport property. FedEx is a significant employer, as well as the various airlines which operate from IND. Residents within the surrounding communities understand the advantages of a healthy airport as witnessed by the continued growth and expansion of FedEx, which continues to create job opportunities for area residents.

Conclusion/Analysis

IND serves as a good example of an airport that has been able to grow in a methodical manner due to good planning and development for more than 40 years, coupled with an ownership structure and state legislation that allows for the IAA to make land use decisions for surrounding areas based upon the needs of the airport. The communication between the IAA staff and the surrounding counties has resulted in a coordinated effort to protect both the airport and local citizens from adverse impacts associated with incompatible land uses.

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[10] Interview comments from Robert Duncan, Airport Director.
[11] Indianapolis International Airport website.

Naples Municipal Airport, Naples, Florida

Introduction/Airport Overview

World War II brought aviation to Naples. In 1942, the city of Naples and Collier County leased the land to the U.S. government for construction of the Naples Airdrome. After the war, the field with runways, ramps, barracks, and other improvements was returned to the city and county and was operated jointly until 1958 when the county sold its interest to the city. By the late 1960s, the facility was operating at a loss by the city. The Florida Legislature then created an independent City of Naples Airport Authority (NAA) in 1969. The NAA was given no taxing authority and has since run the Naples Municipal Airport (APF) at a profit with income from airport users and state and federal grants.

The NAA has been innovative, making APF a certificated air carrier airport with two commercial carriers (Continental Connection and Yellow Air Taxi), fire/rescue services; car rental agencies, flight schools and other aviation and non-aviation businesses. In 1998, the airport received the FAA's highest award for safety, being named the Southern Region's Air Carrier Airport Safety Award recipient.

APF is surrounded by considerable residential land use (Figure 2.11-1), and aircraft noise has been a significant issue and concern for the NAA. In March 1999, APF was the first airport in the nation, since the 1990 Airport Noise and Capacity Act (ANCA), to successfully ban all Stage 1 aircraft operations. Over the course of the next five years, the city of Naples successfully prohibited all aircraft certified as meeting Stage 2 noise limits identified in 14 CFR Part 36, Appendix C § 36.5, from operating at APF. The history of this action is the subject of this report.

Discussion of Compatibility Issues and Responses

When discussing existing and future compatibility issues, three basic areas were identified in an effort to assess current concerns, which include safety, airspace, and noise related issues.

Early Efforts to Control Aircraft Noise

An important component of Naples' ultimate success in prohibiting operation of Stage 2 jets at APF was the documented long-term efforts of the city and of the NAA to control aircraft noise. As early as the late 1970s, the airport took initiatives such as a resolution that called for all aircraft to use noise abatement procedures prescribed by the National Business Aircraft Association, minimize use of reverse thrust, and prohibit full power runups between the hours of 11:00 p.m. and 7:00 a.m. In 1987, the NAA conducted its first FAR Part 150 study which recommended six noise control measures that were ultimately implemented. In 1989, an "Airport High Noise

Figure 2.11-1. General location of APF.

Special Overlay District" was established that required rezoning for any new development or significant redevelopment of land within the 65 dB DNL contour.

Chronology of Naples Prohibition of Stage 2 Jets

Setting 60 dB DNL as the Limit of Compatibility

An important step in the chronology was to redefine the "High Noise Impact Area." Though in accordance with ANCA, all civil aircraft weighing more than 75,000 pounds operating in the United States after December 31, 1999 had to comply with Stage 3 noise limits, this "phase out" did not apply to aircraft weighing 75,000 pounds or less. Because of runway pavement strength considerations, APF had since 1995, prohibited all operations by aircraft that exceeded 75,000 pounds. Hence, the phase out had no effect on operations at APF – the louder Stage 2 lighter jets still could fly and use APF. Average annual day operations are given in Table 2.11-1 and Table 2.11-2.

Most noise and land use compatibility studies, in conformance with the guidelines of FAR Part 150, use 65 dB DNL as the determinant of compatibility. All noise sensitive land uses, such as residential areas, are considered compatible with aircraft noise exposure less than 65 dB DNL. However, the 1996 APF Part 150 Study and the associated Noise Compatibility Program (NCP) found that no noise sensitive land uses would lie within the 65 dB DNL contour,[1] (The land use within the 65 dB DNL contour is compatible with commercial, conservation or open land.) (Figure 2.11-2)

These revised noise contours, with all of the selected noise abatement alternatives and through other efforts by the NAA to reduce noise, reduced incompatible land uses as defined by FAA

[1] From Figure 4-2, "Revised Noise Compatibility Program, 1996" Final Report, February 1997.

Table 2.11-1. Distribution of APF 1996 and forecast 2001 average day operations, numbers.

Aircraft Category	1996	2001
Jets (75k or less)	26.14	31.48
Stage 1 & 2 Jets	3.44	4.12
Stage 3 Jets	22.70	27.36
Turboprops	61.97	68.44
Piston Aircraft	230.40	264.14
Total	**318.51**	**364.06**

Source: Naples Municipal Airport FAR Part 150 Study Revised Noise Exposure Map 1996 February 1997

Table 2.11-2. Distribution of APF 1996 and forecast 2001 average day operations, percentages.

Aircraft Category	1996	2001
Jets (75k or less)	8%	9%
Stage 1 & 2 Jets	1%	1%
Stage 3 Jets	7%	8%
Turboprops	19%	19%
Piston Aircraft	72%	73%
Total	**100%**	**100%**

Source: Naples Municipal Airport FAR Part 150 Study Revised Noise Exposure Map 1996 February 1997

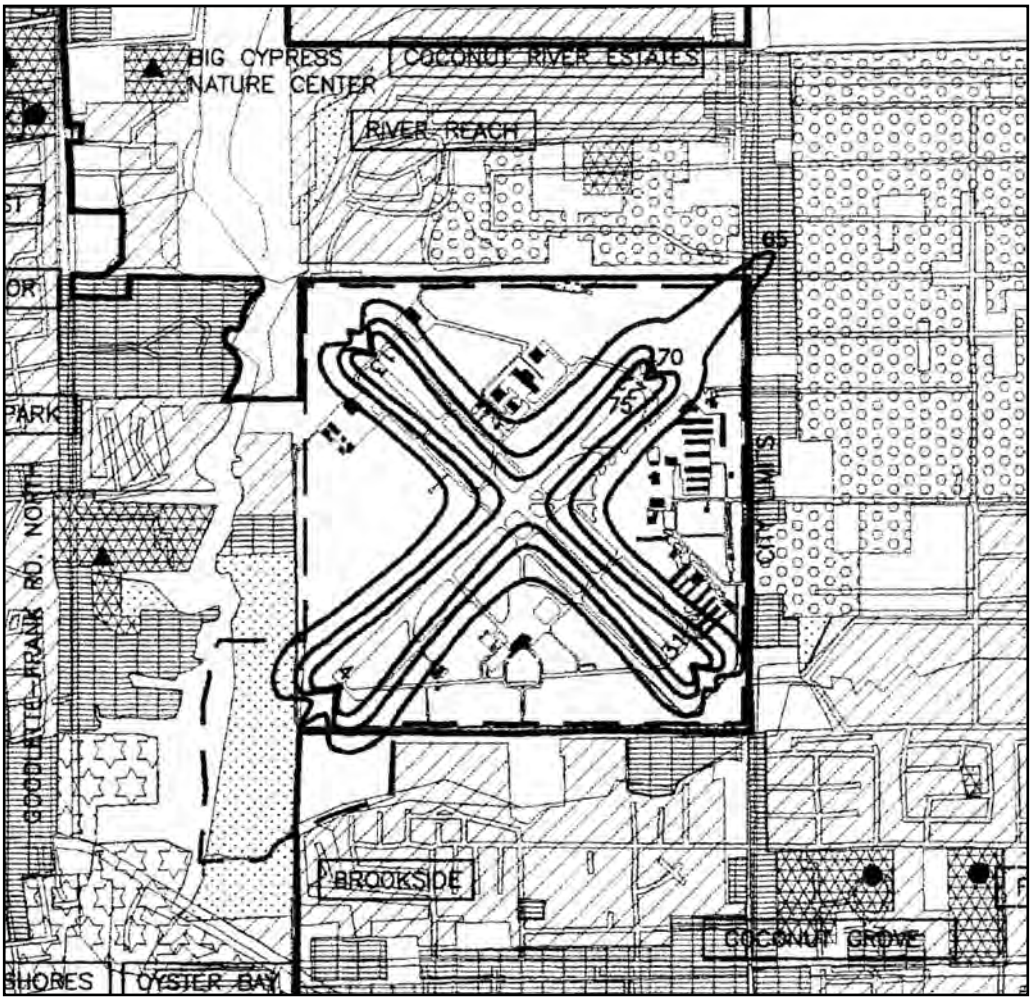

Figure 2.11-2. Forecast 2001 APF noise exposure map with NCP implemented.

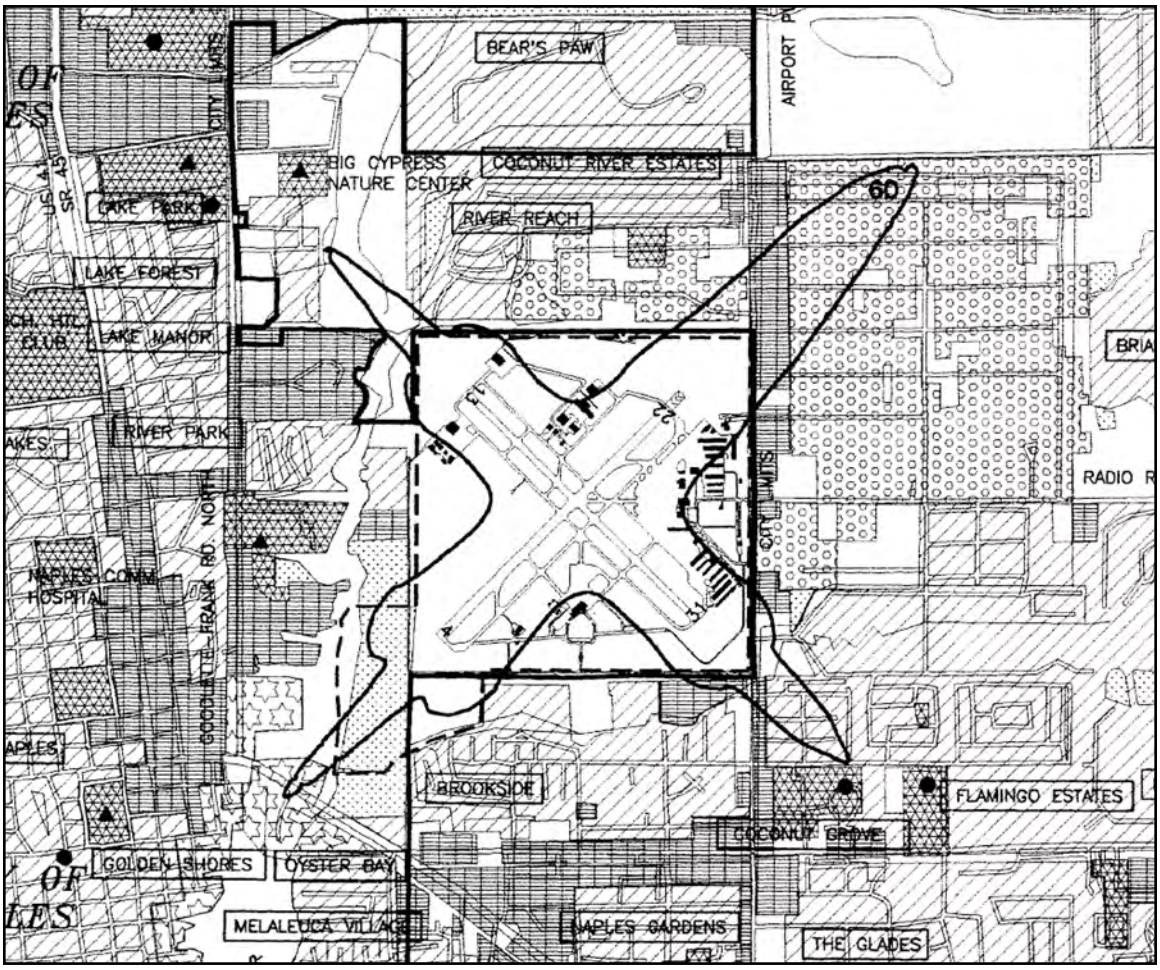

Figure 2.11-3. Forecast 2001 APF 60 dB DNL with NCP implemented.

guidelines. "However, public input has indicated that noise complaints extend beyond the 65 Ldn contour. Therefore, consideration should be given to utilizing preventive measures in the areas surrounding the Airport."[2] Consequently, the FAR Part 150 study provided the 60 dB DNL contour (Figure 2.11-3) and recommended that zoning be used by the city of Naples and Collier County as a preventive measure to preclude the development of incompatible uses in the vicinity of the airport.[3] Specifically, the study recognized that though both FAA guidelines and Florida Statutes, Chapter 333 encourage airport compatible zoning, those guidelines applied at the 65 dB DNL level.

The study contained the following recommendation:

> For Naples Municipal Airport, the FAA and FDOT guidelines do not apply since these guidelines use the 65 Ldn contour as the threshold of incompatibility, and the 65 L_{dn} contour does not contain any incompatible uses in the revised 2001 NEM which includes the noise abatement alternatives. However, it is important to create a buffer of compatible land use around the Airport. As such, another standard should be designated by the local land use planning agencies to ensure that residential and noise sensitive uses are not developed too close to the Airport. One possible standard is the 60 L_{dn} contour. Figure 2.11-3 depicts

[2] Ibid, page 5-2.

[3] It should be noted that APF operations are seasonal, with higher numbers of operations than those of the average day that produced the contours. Peak daily operations during the winter can be almost twice the average day so that the noise exposure can be much larger than shown and the effects of noise much more broadly distributed.

the 60 L_{dn} contour for the revised NEM including the noise abatement measures. Applying the land use compatibility guidelines normally used for the 65 L_{dn} contour to this 60 L_{dn} contour should create an adequate area of compatible land use.[4]

In March 1997, the city of Naples Comprehensive Plan was revised to show a "High Noise Impact Area" defined by the 60 dB DNL contour of the 1996 NCP (Figure 2.11-3) and within this area, outside of the airport site, land will require a General Development Site Plan (GDSP).[5] In January 1998, the City Council adopted this revised Comprehensive Plan as Ordinance 98-8165. It should be noted that since this change was made to the High Noise Impact Area, the city has permitted no residential development within the 60 dB DNL level.[6] In June of 2000, Collier County adopted 60 dB DNL as the limit for noise – land use compatibility.[7]

Existing Studies, Planning, and Regulations

FAR Part 161 Study

In response to the Airport Noise and Capacity Act of 1990 (ANCA), FAR Part 161, effective September 1991, established a program for reviewing airport noise and access restrictions on the operations of Stage 2 and Stage 3 aircraft. It contains many specific analysis requirements, including detailed analyses of the benefits and costs of any proposed restrictions.[8]

Despite eliminating incompatible land uses within the 65 dB DNL level, and the many other actions taken to control noise and limit incompatible land uses, including elimination of Stage 1 aircraft, NAA continued to receive complaints about Stage 2 operations. Most importantly, in compliance with ". . . the FAA Part 150 guidance that airport proprietors must defer to local authorities in determining land use compatibility, the NAA is respecting the city of Naples and Collier County 60 dB DNL land use compatibility criterion and considers residential land with the 60 dB DNL contour to be incompatible with aircraft noise. Accordingly, the NAA has established the goal of minimizing residential land within the 60 dB DNL contour to the maximum feasible extent."[9] In August 1999, the NAA tasked a consultant team to conduct a Part 161 study to identify operational restrictions authorized by federal law.

Among the findings, the resulting Part 161 study determined that operations by aircraft certificated pursuant to Part 36 of the FAA regulations as Stage 2 jets are the principal source of the noise impact that causes community concern.[10] Stage 2 jet operations were over 25 times more likely to cause noise complaints than Stage 3 operations, and nearly 250 times more likely to cause noise complaints than propeller operations. The number of people estimated to live within the 60 dB DNL contour (if there were no restrictions in 2000) was about 1400, while with a 24-hour restriction would be about 130. The benefit-cost comparisons are shown in Figure 2.11-4.[11] In the figure, the three restrictions analyzed are shown: 1) no night [10 p.m. to 7 a.m.] Stage 2

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[4] Ibid, page 5-11.
[5] The GDSP must provide considerable information about the design and use of the property, must be reviewed by the Planning Advisory Board and the Planning Director, and either approved by both or reviewed by the City Council for final disposition. Section 86-202 of the City's Requirements for Site Plan Review states that the GDSP review process is designed to make certain that the proposed development is compatible with the surrounding area.
[6] Naples Airport Authority, "History of Noise Compatibility Efforts for Naples Municipal Airport," October 2000, page 11.
[7] The City of Naples also has a noise nuisance provision in its Code of Ordinances. This ordinance sets a limit of 60 decibels (A-weighted) at property lines of the receiving land use. This code provision is enforced with sound level meter readings and can be applied to loud neighbors, entertainment venues, industrial uses, etc.
[8] FAR Part 161 (14 CFR Part 161), "Notice and Approval of Airport Noise and Access Restrictions," U. S. Department of Transportation, Federal Aviation Administration.
[9] "Naples Municipal Airport Part 161 Study," June 30, 2000.
[10] Information in this paragraph from "Naples Municipal Airport Part 161 Study," June 30, 2000.
[11] Ibid, Figure 1-4.

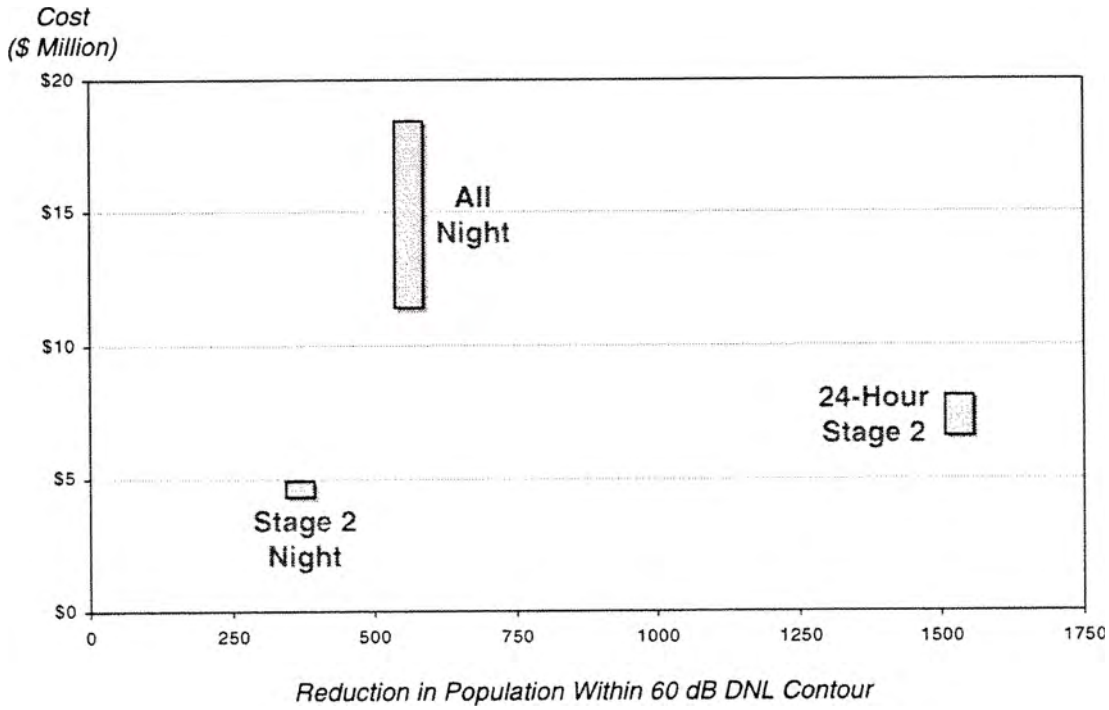

Figure 2.11-4. Benefit-cost comparison of alternative restrictions in 2000.

operations, 2) no night operations at all, 3) no Stage 2 operations at all. Roughly 70% of the estimated costs are due to projected replacement of approximately 11 aircraft.

Ultimately, the Part 161 study was published in June 2000 and recommended the total ban on Stage 2 aircraft operations as the most reasonable and cost-effective measure to minimize incompatible land use. On January 1, 2001, the Stage 2 restriction went into effect.

Following publication of the Part 161, a complicated series of efforts was accomplished as summarized in Table 2.11-3. A close reading of the table suggests how much time and effort was required on the part of NAA and its consultants over the 5-year period.

Discussion

The following paragraphs represent a synthesis of the preceding material with issues raised through discussions with NAA staff members:

- Theodore (Ted) D. Soliday, Airport Director (239) 643-0733
- Curtis Richardson, Noise Abatement Officer (239) 643-1140

Noise Compatibility Policy for Levels Less than 65 dB DNL

The previous sections should convey some idea of the effort that was required to achieve the total ban in accordance with Part 161 on Stage 2 jet operations at APF. Perhaps most critical was the fact that NAA provided convincing evidence that using 60 dB DNL for compatibility purposes is a policy and appropriate for the City of Naples.

For general aviation airports that expect growth in operations, particularly if the use of Very Light Jets (VLJs) is anticipated, working with surrounding jurisdictions and communities to

Table 2.11-3. Chronology of events leading to implementation of Stage 2 restriction.

Date	Event	Comments
June 23, 2000	NAA invitation to public to comment on proposed restriction on Stage 2 jet operations at Naples Municipal Airport	Comments due by August 21, 2000
June 30, 2000	Part 161 Study published	Notice of study availability and opportunity for comments distributed widely
November 16, 2000	Response to Comments published	Responses provided for 36 comment categories
December 2000	FAA initiates enforcement action alleging Stage 2 ban violated Part 161	NAA suspends enforcement of ban while responding to FAA.
December 2000	National Business Aviation Association (NBAA) and General Aviation Manufacturers Association (GAMA) sue NAA in federal court alleging ban unconstitutional	Ban upheld in federal district court, September 2001.
January 18, 2001	NAA meeting w/ FAA staff	Discuss FAA comments. FAA staff offer to work with the NAA in an informal process to resolve any agency concerns, approach to supplemental analysis.
August, 2001	Part 161 Supplemental Analysis published	
October 2001	FAA found that the study fully complied with the requirements of Part 161	
October 2001	FAA initiates second enforcement action under Part 161 rules which require 1) Investigation, 2) Hearing and 3) Final Decision.	FAA alleges that Stage 2 ban violates the grant assurance that "the airport will be available for public use on reasonable conditions and without unjust discrimination."
March 2002	NAA enforces ban	Grant money withheld
March 2003	INVESTIGATION: FAA issues a 94 page "Director's Determination" that Stage 2 ban is preempted by federal law and violated Grant Assurance 22 – "make airport available for public use on reasonable terms and without unjust discrimination to all types, kinds, and classes of aeronautical activities."	NAA appeals decision, provides responses to all FAA allegations
June 2003	HEARING: FAA attorney appointed as Hearing Officer and conducts hearing on NAA appeal,	Hearing Officer issues 56 page "Initial Decision" that ban ***not*** preempted, ***not*** unjustly discriminatory, but was 1) unreasonable, 2) Part 161 compliance does not affect Grant Assurance obligations, 3) FAA not bound by prior federal court decision [see December 2000, above]
July 2003	Both NAA and FAA appeal the Initial Decision	
August 2003	FINAL DECISION: Associate Administrator issues Final Agency Decision and Order – Grant funding be withheld so long as NAA enforces Stage 2 ban.	Decision: 1) FAA is not bound by prior federal court decision because FAA was not a party to the case; 2) Compliance with Part 161 has no effect on Grant Assurance Obligations; 3) Stage 2 ban unreasonable because there is no incompatible land use problem in Naples that warrants a restriction on airport operations [because there is no incompatible land use inside 65 dB DNL]
September 2003	Naples Airport Authority files petition for review	Petition to United States Court of Appeals for the District of Columbia Circuit
June 2005	U. S. Court of Appeals for the District of Columbia Circuit rules Stage 2 ban is reasonable (and Grant Assurances not affected)	Court found that it is permissible for NAA to consider the benefits of the restriction to noise sensitive areas within 60 dB DNL. It also found that Grant Assurances do apply, but that because the ban is not unreasonable, the Grants are not affected.

establish land use policies with regard to aircraft noise below 65 dB DNL (and safety / height considerations as well) would be prudent to protect the future of the airport.

When considering levels below 65 dB DNL for airport compatibility, in addition to being aware of the Naples experience, two other facts may be useful.

First, the noise and land use compatibility information provided in FAA's FAR Part 150, Appendix A, Table 1, includes the following footnote:

> The designations contained in this table do not constitute a Federal determination that any use of land covered by the program is acceptable or unacceptable under Federal, State, or local law. The responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities. FAA determinations under Part 150 are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.

The U.S. Court of Appeals decision recognized this acknowledgement that local determinations were not pre-empted:

> The FAA promulgated non-binding guidelines regarding noise levels and land use in 1984. Those guidelines stated that levels below DNL 65 dB are generally compatible with all land use. Generally means not always. The guidelines thus acknowledged that 'responsibility for determining the acceptable and permissible land uses and the relationship between specific properties and specific noise contours rests with the local authorities,' to which the FAA added that its guidelines 'are not intended to substitute federally determined land uses for those determined to be appropriate by local authorities in response to locally determined needs and values in achieving noise compatible land uses.'[12]

Second, the original investigation of noise and land use compatibility was conducted under the auspices of the U.S. EPA as required by the Noise Control Act of 1972.[13] This law required the U.S. EPA Administrator to conduct a study of the " . . . implications of identifying and achieving levels of cumulative noise exposure around airports. . . ."[14] This requirement resulted in the identification of Day Night Average Sound Level (DNL) as the measure of cumulative noise, and DNL 60dB as the threshold of compatibility; below this level, there should be limited annoyance and minimal complaints about aircraft noise. A report provides extensive discussion of why DNL was chosen and why DNL 60dB was identified as the appropriate limit of exposure.[15] The discussion focuses on effects on people and communities, including hearing, interference with speech, sleep and learning / thinking, annoyance, complaints, and provides some information on non-auditory health effects.[16]

Validity of Complaints

One often hears that complaints are not a valid consideration when determining noise and land use compatibility. The U.S. Court of Appeals recognized their value in developing the ban:

> In 1999, in response to complaints from residents, the Airport Authority commissioned a study to examine noise exposure from aircraft in the area surrounding the airport.[17]

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[12] City of Naples Airport Authority v. FAA, 409 F.3d 431.
[13] 42 U.S.C. 4901 to 4918.
[14] Ibid, §4906 Airport Noise Standards - Note that this section of the law has since been "omitted."
[15] U.S. EPA, "Impact Characterization of Noise Including Implications of Identifying and Achieving Levels of Cumulative Noise Exposure," PB224408, July 1973.
[16] For a more detailed discussion of the origins of DNL and associated levels, see the Annotated Bibliography developed as part of ACRP Project 3-03.
[17] Op. cit. 409 F.3d 431.

> The record shows that during these proceedings the City of Naples did adopt an ordinance forbidding all noise in excess of DNL 60 dB, including music and construction equipment; that the area is a retirement community; that the area is one of outdoor living; and that aircraft noise is the leading cause of noise complaints. This evidence, much of which the FAA never addressed, all supports the conclusion that DNL 60 dB level is considered a significant noise threshold in the City of Naples.[18]

Conclusion/Analysis

Whether an airport wishes to pursue a FAR Part 161 type restriction or work to pursue a course towards greater noise and land use compatibility based on cooperative efforts, the APF experience demonstrates the importance of working with surrounding jurisdictions to develop an integrated land use plan to which all parties are committed and which will ultimately result in land use decisions based on that plan. The court rulings from the Naples Part 161 case have established the precedent that local circumstances can justify more stringent restrictions than current guidance is generally believed to support.

[18] Ibid.

Naval Air Station Pensacola (NAS Pensacola), Pensacola, Florida

Introduction/Airport Overview

Naval Air Station Pensacola (NAS Pensacola) is owned by the United States Navy and is managed by the Naval Station Commanding Officer. Established in 1914, NAS Pensacola is home to the Navy Blue Angles flight demonstration team and Training Air Wing Six, which provides training for advanced Naval Flight Officer, Air Force Navigator, and International Flight Officer training. The naval base is situated in the western part of the Florida panhandle on the Gulf of Mexico, in the southern portion of Escambia County (Figures 2.12-1 and 2.12-2). The general physical facilities of the Airport are outlined in Table 2.12-1.

Figure 2.12-1. Aerial view of NAS Pensacola.

History of the Airport

In 1912, Congress enacted the Naval Appropriation Act, a directive to create aeronautical development, which included a provision to conduct a survey of aeronautical needs and to establish a policy to guide future development. One of the most important recommendations from the survey was the establishment of an aviation training station in Pensacola, Florida. Today, NAS Pensacola is one of the oldest naval flight training air bases in the nation. The air base is approximately 95 years old and is considered to be the "Cradle of Naval Aviation" where all naval aviators initiate their flight training.

NAS Pensacola has played a vital role for Navy activities in both World Wars. Upon entry into World War I, Pensacola was the only naval air station, with 38 naval aviators, 163 enlisted men trained in aviation, and 54 airplanes based at the station. As World War II approached, NAS Pensacola became the hub of air training activities. It expanded training to over 1,100 cadets a month, which was 11 times the amount trained annually in the 1920s.

Fortunately, initial civilian growth around the naval base was slow; however, encroachment is becoming a greater concern as a greater population continues to move to the coast. In recent years, encroachment of both residential and commercial development has threatened NAS Pensacola.

Figure 2.12-2. Aerial view of NAS Pensacola (Source: Google Earth Images).

Governance

The governance for the Airport falls into two categories. The bulk of the responsibility lies with Escambia County which is responsible for the day-to-day management of the associated land use plan. The initial development of the land use plan document, known as the Joint Land Use Study (JLUS), is done by Escambia County with technical assistance from the Navy and financial assistance from the Office of Economic Adjustment (OEA). The development of the JLUS is further discussed later in this report.

Discussion of Compatibility Issues and Responses

Discussions of existing and future compatibility issues covered three areas in an effort to assess current concerns: safety, airspace, and noise related issues. Escambia County and NAS Pensacola have implemented several policies and regulations to help ensure that the area surrounding the naval base continues to be compatible with military operations. Fortunately, these policies have proven to be successful; however, there are still some concerns related to land use compatibility, including light emissions, wildlife attractants, noise, and height issues, which continue to be addressed.

One operational concern for pilots is light emissions from urban areas. Naval pilots routinely practice with night vision goggles (NVGs). The ambient light produced by street/parking lot lighting, as well as the typical ambient light shed by urban areas,

Table 2.12-1. NAS Pensacola airport profile.

MAJOR FEATURES
Airfield
▪ Runway 7L/25R: 8,002 feet long, 200 feet wide; concrete/asphalt
▪ Runway Lighting: High Intensity (ALSF1)
▪ Runway 7R/25L; 8,001 feet long, 200 feet wide; concrete/asphalt
▪ Runway Lighting: High Intensity
▪ Runway 1/19; 7,137 feet long, 200 feet wide; concrete/asphalt
▪ Runway Lighting: High Intensity
Property
▪ Existing: 5,800 acres

can cause night blindness and training difficulties for pilots using NVGs. If there is too much ambient lighting, the pilot can not do the necessary training. This obviously has an adverse impact on the overall mission of the base and affects its viability.

Another operational concern that NAS Pensacola has experienced was the implementation of right hand turns for aircraft departing the runway to avoid overflights over residential areas. The problem with right hand turns is that it is not standard practice for Navy pilots; they are trained to do left hand turns which are standard on aircraft carriers. When a pilot can not make left hand turns, it takes away from the pilot's training, which could endanger both the pilot and the residents due to the increased accident potential.

NAS Pensacola is buffered by forested areas and experiences minor bird attractant issues. The county is not aware of, nor is it involved in, the control or management of wildlife and bird mitigation efforts for the military installations. Eva Peterson, Senior Urban Planner for Escambia County noted that the bird issue has not been a significant issue to involve the county at this time.

Peterson noted that there are minimal complaints regarding noise issues surrounding NAS Pensacola or any of the outlying airports utilized by the military. She believes this is due to the proactive approach taken by the county to educate and inform residents within proximity to the military base about potential noise issues. In addition, real estate disclosure notices are enforced for the sale of property in the vicinity of the Airport, making future owners aware of the naval base and the associated impacts such as noise, land use regulations, and zoning. The county's continued education and information efforts, coupled with area maps being available to citizens and realtors selling or purchasing homes within the Pensacola area, also help to eliminate the complaints. The county believes they have taken a very proactive and informative approach to land use development.[1]

Should complaints arise, Escambia County handles any complaints regarding noise or other land use issues pertaining to NAS Pensacola base prior to military involvement. Due to the excellent relationship with the military, Ms. Peterson consults the military for recommendations and comments on all matters involving the naval base.

Peterson also noted that height is a concern for structures in proximity to NAS Pensacola. The county has height restrictions based on zoning districts and military criteria, which are implemented as part of the development review process. Current height limitation zoning will not allow any new tall structures to be erected. The regulations for building and development designs are found in the land development code for the county.

Litigation

It was noted that there has not been litigation pertaining to the JLUS districts with the participating counties and military installations, although there were several instances where litigation could have been an issue had a compromise not been reached.[2]

Aircraft Accidents

It was noted that the military installation has not experienced any major aircraft accidents, thus demonstrating a general safety with current operations.

[1] Interview comments from Eva Peterson, Senior Urban Planner with Escambia County.
[2] Interview comments from Eva Peterson, Senior Urban Planner with Escambia County.

Existing Studies, Planning, and Regulations

To help maintain compatible land uses around NAS Pensacola and protect both the military base and surrounding populations, Escambia County and NAS Pensacola have conducted a JLUS. The JLUS is a basic planning process designed to identify encroachment issues confronting both the civilian community and the military installation and to recommend strategies to address the issues in the sponsoring community(s) comprehensive plan and zoning regulations. The JLUS program relies on strong community planning and land use zoning capabilities to implement the compatibility recommendations detailed in the community's comprehensive plan and zoning ordinances. The JLUS program is community controlled and community directed.

A JLUS is produced by and for a local jurisdiction or multiple jurisdictions where the military installation is located. It is intended to benefit both the local community and the military installation by combining the Air Installation Compatible Use Zone (AICUZ) program with the JLUS program. The purpose of the AICUZ program is to promote compatible land development in areas subject to aircraft noise and accident potential. The AICUZ reports describe three basic types of constraints that affect or result from aircraft operations, including height restrictions, noise zones, and accident potential zones. Each report also includes a list of land use guidelines.

Neither the DoD nor the various military branches provide additional funding to implement and/or administer the JLUS upon completion of the study. The county absorbs the additional costs associated with the planning, enforcement, and implementation of the JLUS in order to protect the county's asset and base which is viewed as an essential economic engine for the community.[3]

The JLUS is conducted in a collaborative manner involving a number of stakeholders, including the local elected officials, planning commissioners, local military base command staff, community business leaders, chambers of commerce, homebuilders, real estate interests, and affected residents.[4] The JLUS program objectives are twofold:

1. To encourage cooperative land use planning between military installations and the surrounding communities so that future civilian growth and development are compatible with the training and operational missions of the installation; and
2. To seek ways to reduce the operational impacts on adjacent land.

There are several criteria that must be met by the community and military installation as they proceed with a JLUS study. The most important of these are summarized below:

- Consensus building before, during, and after the study is of paramount importance. It is nearly impossible to do this unless all interested parties are meaningfully involved from the beginning of the process.
- Carefully crafted organizational structure can ensure that technical needs of the study team are met, and that policy makers and technical staff of participating jurisdictions and organizations have ample opportunity to contribute their ideas and express any concerns.
- The geographic planning area should include all jurisdictions that are impacted by the military installation activities in the geographic planning area. The designation of a Military Influence Planning District (MIPD), as the JLUS study area, can signify a special inclusive study area for purposes of developing a consolidated action plan to support compatible development near military installations.
- Rely heavily on the advice and experience of the Office of Economic Adjustment and the applicable military departments(s) and representatives from the areas that have successfully com-

[3] Interview comments from Eva Peterson, Senior Urban Planner with Escambia County.
[4] Joint Land Use Study Program Guidance Manual, November 2006.

pleted the implementation of a JLUS. They have been though this process many times and can help local leaders recognize and avoid potential pitfalls.[5]

As explained by Mike Davis and Rich Tenga, OEA representatives, the JLUS process works by nomination. The military will nominate a specific installation for the JLUS study to the DoD. The DoD staff then meets with the base commander and staff to discuss the JLUS process. If the base commander is willing to spend the staff time needed to produce the plan, then the DoD will approach the community to see if there is commitment on their part to undertake and implement the recommendations that come from the JLUS process. Once all the stakeholders commit to the JLUS process, a field evaluation is completed to assess the current condition of the military installation and the civilian community regarding encroachment issues. If any one of the aforementioned criteria is found to be negative, the DoD will not proceed with the JLUS program.

Escambia County decided to undertake the JLUS in 2005 to address both long and short term strategies to mitigate and minimize the encroachment of incompatible land uses upon the military installation. The JLUS recommendations were adopted into Escambia County's comprehensive plan, as well as their zoning ordinances, to affectively mitigate incompatible land use encroachment.[6] Florida State Comprehensive Plan Legislation as described by Tenga requires that comprehensive plans, as well as JLUS studies, be evaluated at the state level for compliance.

Recommendations in a JLUS are used to guide local jurisdictions in the creation and implementation of land use development controls. The intent of the control is to ensure that future public and private development around the military installation will be compatible with both the military mission and the development needs of the community. Its primary goal is to promote a "win-win" situation for all participants.[7]

It has been Escambia County's goal to try to increase the strength of some of the land use strategies and continue to emphasize the recommendations that were outlined within the NAS Pensacola JLUS study. The desire to keep the military's presence in Pensacola, by supporting the naval base, is a key motivating factor for Escambia County. Therefore, protecting this asset is a priority for county planning staff, the Board of Commissioners, and the County's development review committee which reviews all of the proposed development within the boundaries of the JLUS area.[8]

One of the things stressed in the JLUS program is that the military does not want to stop growth; the military wants to promote compatible growth throughout the communities that surround the military installation. It was stated that the County and developers do not feel the JLUSs' constraints have diminished the growth of the communities since the implementation of the program. While the military wants the community to continue to grow, it would like to see the growth managed in such a manner that it takes into account the health, safety, and welfare of residents within the Accident Potential Zone (APZ) and Airfield Influence Planning District (AIPD) areas (Figure 2.12-3). The purposes of the AIPDs are to promote an orderly transition and rational organization of land uses, maintain military airfield mission, identify areas that can affect or may be affected by military airfield operations, and to create a compatible mix of uses while maintaining the health, safety, and welfare of the public.[9]

The AICUZs include the areas surrounding the air base that are influenced by military aircraft operations (Figure 2.12-4). This area is referred to as the MIPD. The local community conducts

[5] Joint Land Use Study Program Guidance Manual, November 2006.
[6] Interview comments from Eva Peterson, Senior Urban Planner with Escambia County Joint.
[7] Joint Land Use Study Program Guidance Manual, November 2006.
[8] Interview comments from Office of Economic Adjustment (OEA) staff members Mike Davis and Richard Tenga, Pensacola Project Manager.
[9] Joint Land Use Study Program Guidance Manual, November 2006.

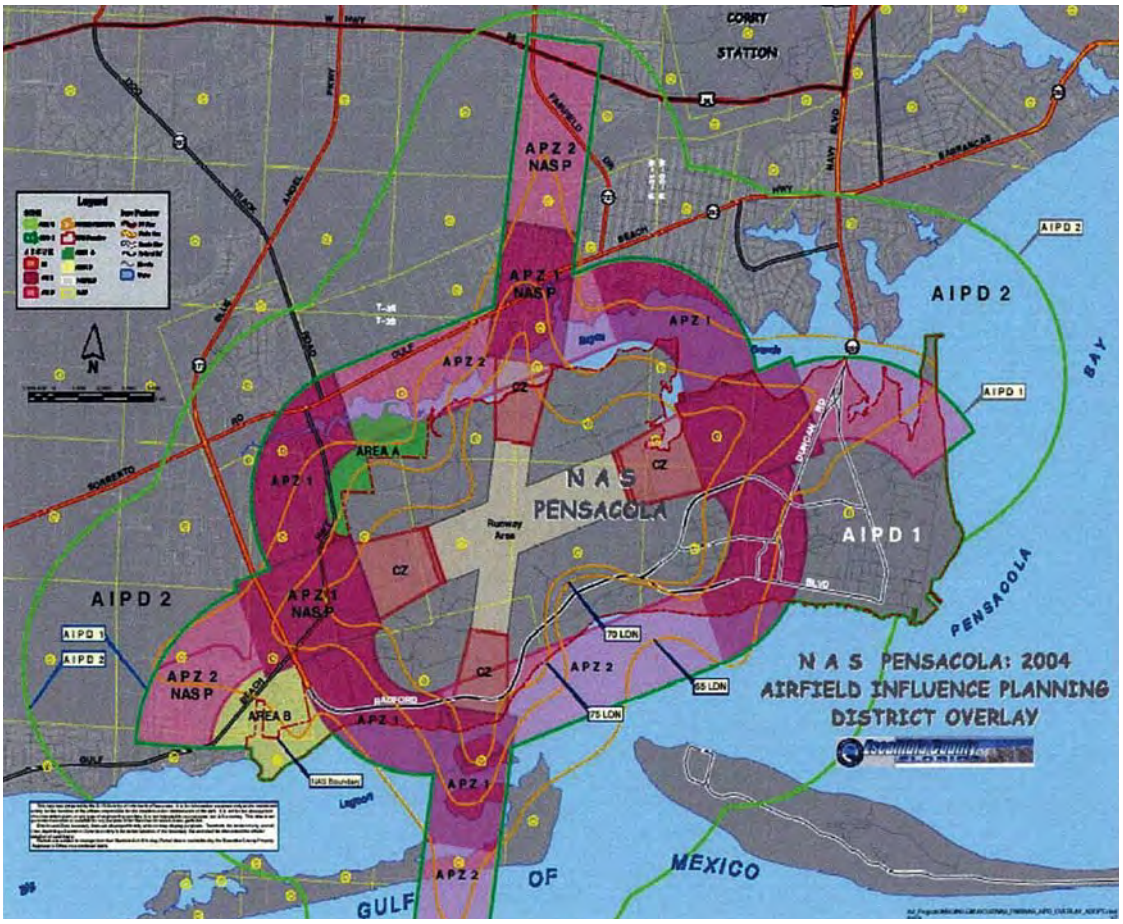

Figure 2.12-3. NAS Pensacola planning district overlay (Source: Escambia County JLUS - NAS Pensacola AIPD).

the study, adopts the study, implements and polices the recommendations outlined in the JLUS, local community(s) comprehensive plan and ordinances.

As a result of the JLUS, Escambia County has established specific policies and procedures that developers and real estate professionals must follow when proposing a new development, additions or modifications to existing structures, and the sale of property within the AIPD.

A few of the implemented JLUS mitigation tools utilized to limit incompatible land uses near NAS Pensacola include:

- A real estate disclosure form (Appendix B), which must be attached to every parcel of property sold within the county that is impacted by the JLUS and AIPD districts. This ensures that the purchaser is aware of the current zoning, future land use, and if the property lies within the AIPD, an APZ district, or Noise Zone. This facilitates understanding of what the impacts are on the property, and what is expected in advance of purchasing the property.
- A development review process is conducted for every site plan and building permit submitted to the county for approval. During the review process, a developer or resident must comply with the density and land use restrictions set forth in the AIPD districts. This process helps regulate all development and ensures compatibility with airport operations.
- Military review and comment within 10 working days on all proposed developments and building permits to certify compliance with military standards.
- Avigation easements for subdivision approval and building permit approval.

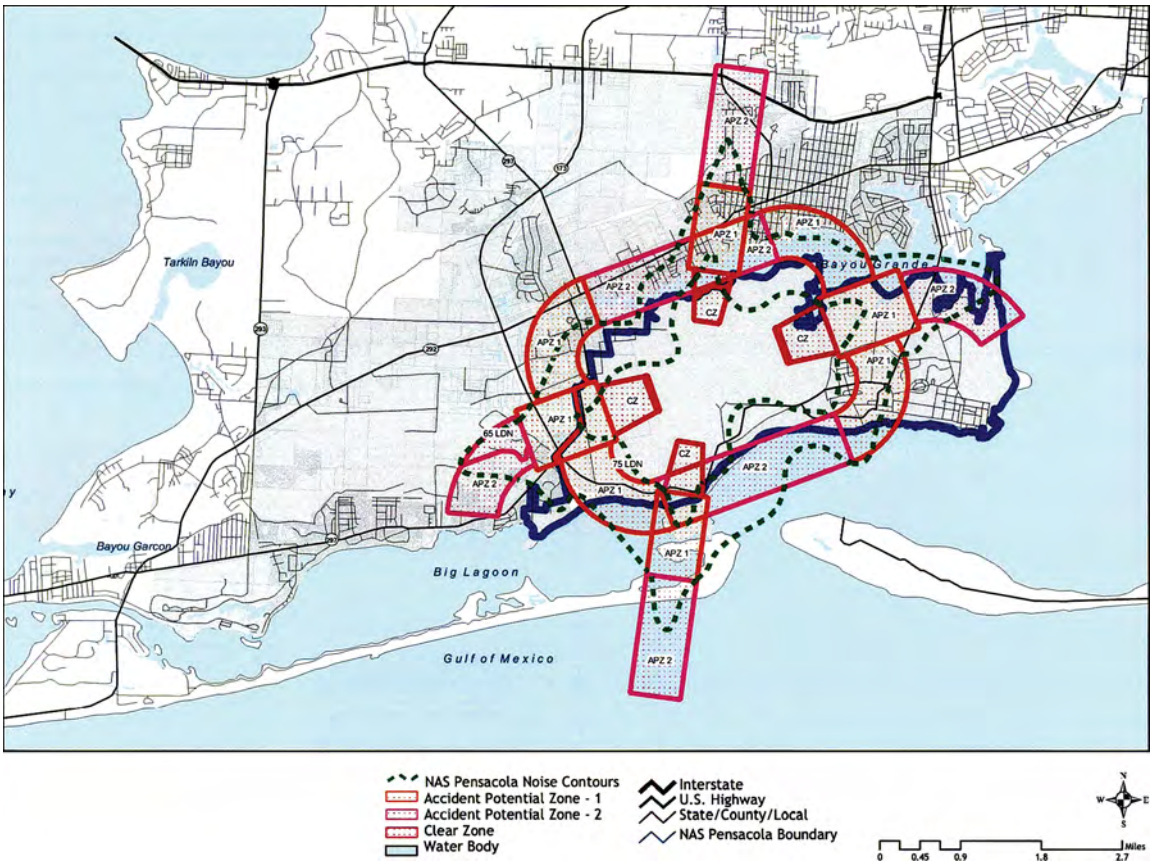

Figure 2.12-4. Map of NAS Pensacola noise contours and accident potential zones (Source: Escambia County JLUS - NAS Pensacola AICUZ).

- Sound insulation appropriate for structures within Noise Zones to help eliminate disruption due to airport operations.
- Clustering of development, which creates more open space.
- Incentives such as density bonuses for utilizing clustering techniques, and designating areas in conservation easements which guides development and promotes open space.

For a while, Escambia County had concern regarding the disclosure notification process. Peterson noted that it is very hard to enforce disclosure requirements and impress upon real estate agents the need to produce disclosure documentation prior to the sale of the property. Therefore, the JLUS study identified and recommended that realtors must put the disclosure in the property's advertisement to notify potential buyers that they are in an APZ or AIPD area surrounding the military installation. Recently, the County Board of Commissioners overturned the Board of Realtors request to eliminate the policy regarding disclosure notification and has made a more stringent policy for enforcing disclosure notification.

One initiative that prompted the JLUS study was the continued development pressure surrounding the military installation. The BRAC legislation has increased the community's willingness to embrace land use planning surrounding military installations. Since BRAC was instituted, encroachment has been one of the top five reasons for military base closures. Many communities have cooperated in the JLUS process to "BRAC proof," or prevent the local military facility from closure and ensure the facility is adequately protected. One recent area of concern was a proposed residential development directly off the end of the runway near Blue Angel Lake. This area is situated in the flight path where the Blue Angels and other Navy demonstration teams fly F-14s and

F-18s. Fortunately, through coordination of the JLUS, the community and the military installation were successful in dealing with this example of development pressures and have worked to maintain open space needed for safety.

Escambia County Comprehensive Plan

The Escambia County Comprehensive Plan is intended to provide orderly growth management throughout the county and is designed to maintain and improve the quality of life for all citizens within the county. One of the key features defined in both the comprehensive plan and the land development code (discussed further in the following section) are the allowable densities and intensities permitted within the county. These same density and intensity guidelines are also supported in the NAS Pensacola JLUS.[10]

Escambia County Land Development Code

In creating the land development code for the County, the Escambia County Board of Commissioners has considered several key issues including:

- The type of operations conducted and proposed to be conducted at the various airports/military installations throughout the county;
- The nature of the terrain within areas of concern;
- The current uses of property within and around areas of concern; and
- The uses within various areas and recommendations from the 2005 JLUS addressing military installations that are vital to the county.

Other items considered by the County Board of Commissioners in the creation of the land development code was the inherent risk for occupants and owners of property in proximity to the installation, noise impacts incompatible with residential uses and certain commercial and industrial uses, and obstructions that impair the utility of airports/military installations. The Board of Commissioners recognizes that hazards and risks should be minimized in the interest of long-term viability of the military installations and the public health, safety, and welfare of county residents.

As established with the JLUS and the Land Development Code, the Navy will be notified and provide comment regarding the following land use changes within the study area:

- Rezoning;
- Conditional use;
- Nonconforming uses;
- Variance;
- Development review committee cases;
- Administrative appeal;
- Temporary use of a mobile home for medical purposes;
- Height-restricted areas; and
- Uses interfering with aircraft, i.e., creation of dangerous lighting, smoke or glare, electronic interference, sanitary landfills, obstruction marking and lighting, installation of marking and lighting.

Outlined within the Land Development Code are the overlay districts established during the JLUS process and the permitted uses and use restrictions. Also included are allowable densities for each district and noise zone. Additional detail on the permitted/prohibited uses for each district is found in Appendix A.

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[10] Escambia County Comprehensive Plan.

Naval Air Station Pensacola/Escambia Joint Land Use

The AICUZ program identifies circles that encompass the military installation and describes APZ, clear zones, and noise contours, creating buffers (circles) around the AIPD. These areas are similar to civilian airport overlay zoning districts; the AIPDs are utilized to identify areas surrounding the military base that regulate and promote compatible land uses and acceptable densities identified by the military, as well as the local community. There are two areas of influence within the AIPD, inside the AICUZ, and outside the AICUZ:

1. Inside the AICUZ noise continuation, disclosures, land use controls, and density changes are utilized to regulate incompatible land uses; and
2. Outside the AICUZ is utilized as a buffer between the AIPD and surrounding developments.

Equivalent military noise contours are illustrated in the AICUZ. Every facility has an AICUZ document that details the progressive noise modeling that recognizes not only the noise aspects, but the APZs and land use activities that would be acceptable with the military. The DoD reinforces the findings that come out of the AICUZ. The JLUS is an extension of the AICUZ process. The AICUZ is a military product created for the military. The JLUS is a project for the community.[11]

Community Involvement

The JLUS includes public involvement as a part of the process, and supports positive community relations. The JLUS that was completed encompassed stakeholders including outlying airports, military installations, and residents within and outside of the JLUS area. At the beginning of the JLUS process, a committee was appointed that consisted of community representatives, including heads of the realtors associations, heads of the developers associations, as well as many other citizen groups and citizens. The JLUS process requires both public workshops and public hearings. In order to ensure that all residents surrounding the air base and outlying airports were informed and educated about the land use planning process, individual invitations were sent to every address within the AIPD area as well as the outlying airports/airfield residents.

Effective communication has proven successful in the relationship between Escambia County and the military. This enables them to support compatible development around the base, and also plan for future development. Escambia County invites the military base commander and his staff to participate in planning efforts to ensure compatibility, and safety for both NAS Pensacola and surrounding residents. Before the military engages a community in a JLUS, the military requires the community to do a resolution of the governing body indicating that they will participate in the study, provide 10% of the cost, as well as sign a good faith agreement to implement the recommendations from the JLUS. This is all achieved through collaboration, cooperation, and consensus building between all the parties involved.

After adoption of local land use codes, the military continues to be provided an opportunity to comment on future land use amendments, comprehensive plan amendments, rezoning, and board of adjustment decisions. The county attributes the good relationship and success of the JLUS to the ability to work with the military and the county's willingness to have the military's participation in all aspects of county's land use planning and zoning efforts. The Navy has a representative at all of the county board meetings to provide military comment on land use issues that surround NAS Pensacola. The county feels that having representation at the board meetings, as well as direct

[11] Interview comments from Office of Economic Adjustment (OEA) staff members Mike Davis and Richard Tenga, Pensacola Project Manager.

interaction with county planning staff, is a good asset and promotes the importance of the JLUS and protection of the NAS Pensacola base.

Another part of the JLUS process is the ongoing education for the community and the military base. The education component is tailored for the community to emphasize the benefits the military installation provides from an economic aspect and why it is important to protect both the local residents, as well as the air base itself. The local residents take pride in the military base as the home of the Blue Angles and the original naval pilot training facility and have the willingness to protect the naval base from incompatible land uses that would hinder the success of the NAS Pensacola base.

There are no formal citizen groups or participation from the county. The staff continues to be cut due to budget constraints for the city and county, limiting the amount of time county staff can dedicate to additional meetings and groups outside of the regular commission meetings. The county utilizes the development review committee as much as possible to assist with the implementation and continued monitoring of development activity within the study area.

Economic Impact

The county, citizens, and the Navy view the JLUS/AIPD districts as a partnership between all of the stakeholders that provides for the protection of the citizens, pilots, and the naval base. This, in turn, stimulates continued growth and development of the community through economic stimulation and jobs.

Today, the NAS Pensacola and its associated facilities within Escambia and Santa Rosa counties, employ more than 16,000 military and 7,400 civilian personnel.[12] It is a major employer for the county, the surrounding cities, and surrounding townships. It also provides additional employment generated from the surrounding airfields which act as relievers and training facilities throughout the county. The NAS Pensacola base has a strong presence within the Pensacola community, and would like to continue the excellent relationship with the county. It is the county's primary objective to protect the largest economic engine and employer within the Pensacola panhandle region.[13]

Fortunately, the air base has not experienced any obvious economic impacts from incompatible construction or other related projects, even with continued growth in the area surrounding the base.

Conclusion/Analysis

This case study highlights the importance of active communication with community members, citizens, governmental bodies, airport association groups, etc. In this instance, this communication has been instrumental in protecting the naval base (NAS Pensacola) from incompatible land uses. Establishing and maintaining a proactive dialog, both formal and informal, regarding airport development is essential. This facilitates open discussion where citizens and governmental bodies can offer comment and receive education on current and future operational needs and requirements of the naval base, as well as discuss community activities and plans.

Continued education and information exchange can lead to unified support for the Airport, and breed community pride. The residents of the NAS Pensacola community are vested in the naval

[12] Naval Air Station Pensacola website.
[13] Interview comments from Eva Peterson, Senior Urban Planner with Escambia County.

base, and have a sense of ownership and pride as the home of the Blue Angels. Residents are aware of the importance of keeping NAS Pensacola free from the encroachment of incompatible land uses, in order to keep it viable and protected.

Cooperation on all levels can lead to a unified vision and similar goals for the base and the community. The involvement of both the DoD and the state of Florida ensure compatibility with military expectations and expectations of the State. The level of cooperation found in the NAS Pensacola community would not exist without the collaboration between the military base, the DoD, the state of Florida, and the community residents.

APPENDIX A

Escambia Land Development Code

- The AIPD includes the APZ and noise zones and extend outward from those zones at varying distances specific to the installation and its use, as well as the area that lies between the boundaries (Figure 2.12-5).
- AIPD includes the current APZ and noise contours of 65 Ldn and higher, as well as other areas in proximity to the airfield.

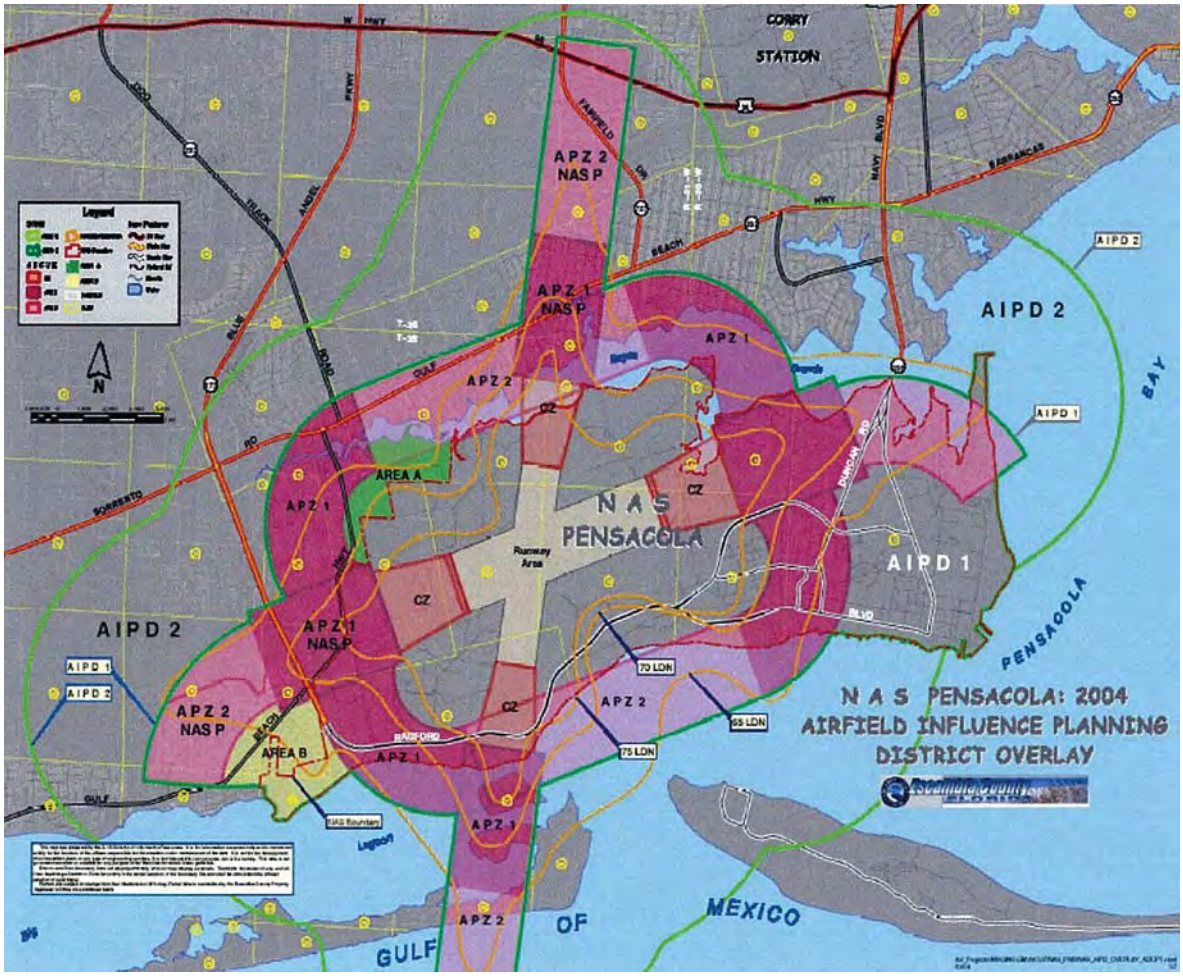


Figure 2.12-5. Map of NAS Pensacola planning district overlay (Source: Escambia County JLUS – NAS Pensacola AIPD).

- Prohibited: Concentrations of population. No use is allowed that concentrates, within a structure on a regular basis, more that 25 people per acre. This limitation applies to: sports stadiums, amphitheaters, auditoriums, clubhouses, churches, schools, hospitals, assisted living, and other medical facilities; hotels and motels, restaurants and other eating and drinking establishment built to such a scale that gatherings of more than 25 people per acre would be expected on a regular basis.
- Prohibited: Parks and Recreational Facilities. Outdoor sports facilities, parks and recreation areas are prohibited.
- Allowed: Certain recreational, agricultural, manufacturing, service, trade, and industrial uses are allowed.
- Allowed: Restrictions on Residential Development. Residential development is limited to detached, single-family dwelling; including mobile homes if allowed in the underlying zoning district, at maximum densities defined within the AIPD (Table 1.12-2).
- Density Limitations: Density limits established in the area designated as AIPD 1 are absolute, meaning that the minimum size for any lot is the inverse of the maximum permitted density (Table 2.12-3).
- Rezoning: Rezoning to a commercial district to obtain a higher density is not permitted. Rezoning is allowed, but density is limited to the maximum density allowed in the APZ or AIPD.
- AIPD 2 includes the area that lies outside the AIPD 1, but is close enough to the airfield to impact or be impacted by airfield operations.
- Density Limitations: Density limits are not absolute; meaning clustering, planned unit development and density transfers, when such a program is developed, are permitted.
- Rezoning: Rezoning is allowed only to a zoning district that allows three d.u./acre or less.

Table 2.12-2. Density limitations on residential development.

CZ (Clear Zone)	0 d.u./acre
APZ-1 (NASP)	0 d.u./acre
APZ-1 (All Others)	1 d.u./2.5 acres
AIPD-1 Area "A" (NASP Only)	0 d.u./acre
AIPD-1 Area "B"	3 d.u./acre
APZ-2 (NASP)	2 d.u./acre
APZ-2 (All Others)	3 d.u./acre

Table 2.12-3. Maximum density per acre in AIPD 1.

AIPD 1	Aviation Characteristics	Maximum Density per Acre
CZ (Clear Zone)	Areas at the end of the airfield runways	0
A (Area A)	An area of special concern between the west and north runways that abuts the NASP property line and includes a portion of APZ-2 south of Bayou Grande	0
APZ-1 (NASP Accident Potential Zone 1)	Immediately in line with NASP north and west runways (includes a small area of APZ-2 in Garcon Swamp abutting the APZ-1 off the west runway of NASP)	0
APZ-1 (Accident Potential Zone 1)	All other APZ-1s	0.4 (1d.u./2.5ac)
B (Area B)	All other APZ-1s West of NASP between the base boundary and the southerly curve of APZs 1 and 2	3 Not Absolute
APZ-2 (NASP Accident Potential Zone 2)	Immediately in line with NASP north and west runways	2
APZ-2 (Accident Potential Zone 2)	All other APZ-2s	3

Some of the general requirements for the AIPD districts include the following:

- Avigation easements are utilized to maintain flight operations over specific properties while still allowing the owner to develop the property in a compatible manner.
- Noise zones consider the type of noise level reduction/sound attenuation measures for property within the 65 DNL (Table 2.12-4).
- Real estate disclosure notice that is filed with a parcel of property in perpetuity.
- Height limitations as described in the appropriate AIPD district or the underlying zoning whichever is more restrictive.
- Hazards to Air Navigation Prohibited: No structure or obstruction shall be constructed or altered in such a way as to cause a minimum obstruction clearance altitude, a minimum descent altitude or a decision height to be raised, or be considered a hazard to air navigation by Federal Aviation Administration aeronautical study (7460-1) or conflict with Title 14 of the Code of Federal Regulations Part 77.
- Structures in Excess of 200 Feet AGL: Any new structure or obstruction in excess of 200 feet above ground level shall receive an airspace evaluation from the FAA prior to development approval, by filing an FAA Form 7460-1.[14]

Table 2.12-4. Relationship of noise zones to maximum density limitations.

Noise Zones	Maximum Density Per Acre
Noise Zone 3	3
Noise Zone 2	3
Noise Zone 3	3

[14] Escambia County Land Development Code.

APPENDIX B

Real Estate Disclosure Form

REAL ESTATE DISCLOSURE FORM INSTRUCTIONS AND REMITTAL ADDRESSES

(1) Written notice that real property to be sold or leased is within an established Airfield Influence Planning District and/or noise zone shall be disclosed to the purchaser/lessee as soon as possible after the start of the transaction. Inclusion of the Airfield Influence Planning District and/or Accident Potential Zone and Noise Zone, together with the name of the applicable base, should be included in the advertisements for the property. However, disclosure of this information is required in writing no later than at the signing of the contract for sale or lease.

As proof of compliance with this disclosure requirement, the owner and the buyer or lessee shall execute the attached disclosure form. However, a "blanket disclosure," i.e., a copy of the lessor's original execution of the form, may be used in subsequent lease transactions so long as each subsequent lessee signs a disclosure form.

(2) The determination as to whether the real property lies within an Airfield Influence Planning District, Accident Potential Zone and/or Noise Zone shall be made by the Planning and Zoning Department upon the written request of the property owner or agent and shall be provided within five business days. The request must include the street address as to the leased property and both the street address and the legal description contained in the deed for such real property in the event of a sale.

Alternatively, the information may be obtained by accessing the Escambia County Web Page (www.myescambia.com). Open the drop-down "Quick Links" menu at the top of the page. Click the link " Access GIS Maps" and follow the instructions. (If you experience problems navigating the site, please contact the GIS Department at (850) 595-3598.)

(3) After the closing of a sale, a copy of the fully executed disclosure form shall be filed with the deed in the official records of Escambia County, Florida. For both a sale and a lease, a copy of the executed disclosure shall be sent to either:

For Naval Air Station Pensacola Real Estate Disclosure Area:

Naval Air Station Pensacola
Attention: AICUZ Officer
c/o Commanding Officer
190 Radford Blvd.
Pensacola, Florida 32508-5217

Or, for NOLF Saufley and NOLF Site 8 Real Estate Disclosure Area:

Aviation/Community Planner
JPATS Coordinator
Operations Code 31
Naval Air Station Whiting Field
7077 USS Lexington Court
Milton, FL 32570-6016

Or, for Pensacola Regional Airport Real Estate Disclosure Area:

Airport Director
Pensacola Regional Airport
2430 Airport Blvd., Suite 225
Pensacola, FL 32504

AIRPORT ENVIRONS
REAL ESTATE SALE/LEASE DISCLOSURE

Pursuant to Section 58-2(d) of the Escambia County Code of Ordinances, any owner of real property who sells or leases that real property within the established Airfield Influence Planning Districts (AIPDs) or noise zones surrounding local military installations or within the established Real Estate Disclosure Area surrounding Pensacola Regional Airport, as described in Article 11 of the Land Development Code, is required to disclose to any buyer or lessee that the property is subject to varying degrees of accident potential and/or noise from aircraft. For properties within the AIPDs or military noise zones, Article Eleven requires that the notice be proved in all advertising materials and/or brochures concerning the sale or lease of the property, but no later than the signing of a contract for sale or lease. For properties within the Real Estate Disclosure Area surrounding the Pensacola Regional Airport, Article 11 requires that the notice be given as soon as practicable, but no later than the signing of a contract for sale or lease.

To: _____
(Buyer or Lessee)

The Property at: _____
(Street Address & Zip Code)

****

(Following to be completed by Seller or Landlord)

Is located within an AIPD for the following Airfield:

_____ NAS Pensacola
_____ NOLF Saufley
_____ NOLF Site 8

Is located adjacent to the following Airport:

_____ Pensacola Regional Airport

Is located within the following Noise Zone:

Military Noise Zone
_____ Noise Level 1 [65 – 70dB Day-Night Average Sound Level (Ldn)]
_____ Noise Level 2 (70 – 75dB Ldn)
_____ Noise Level 3 (Greater than 75db Ldn)

Pensacola Regional Airport Noise Zone
_____ Noise Level A [65-70dB Day-Night Average Sound Level (Ldn)]
_____ Noise Level B (70 – 75db Ldn)
_____ Noise Level C (Greater than 75dB Ldn)

Is located within the following AIPD Zone:

_____ AIPD-1 (AICUZ Accident Potential Zones)
_____ AIPD-1 – Area "A"
_____ AIPD-1 – Area "B"
_____ AIPD-2

****

CERTIFICATION:

AS TO SELLER/LANDLORD:

Signature	Witness
Printed Name	Printed Name
Signature	Witness
Printed Name	Printed Name
Date:	Date:

AS TO BUYER/LESSEE:

Signature	Witness
Printed Name	Printed Name
Signature	Witness
Printed Name	Printed Name
Date:	Date:

VOLUME 2, CHAPTER 13

O'Hare International Airport, Chicago, Illinois

Introduction/Airport Overview

O'Hare International Airport (ORD) is owned by the city of Chicago, and the management, planning, design, operations, and maintenance are the responsibility of the Chicago Department of Aviation. The airport is located approximately 17 miles northwest of Chicago's Central Business District (CBD), in Cook and DuPage Counties, all of which are considered to be regional benefactors of the airport.

The airport consists of 7,300 acres of property, and as part of the O'Hare Modernization Program (OMP), the city of Chicago will acquire an additional 433 acres of property adjacent to the current facility. The airport is currently using four terminals, which service its seven runways (Figure 2.13-1). Domestic and International operations along with cargo tonnage are summarized in Table 2.13-1.

Figure 2.13-1. Aerial view of O'Hare International Airport.

Repeated requests for an interview were declined; therefore, the project team was unable to meet with any staff at ORD. However, the project team did meet with stakeholders and officials with the O'Hare Noise Compatibility Commission (ONCC). As a result, this case study encompasses information regarding the airport itself, but has a strong focus on the ONCC and the role this organization plays with the airport and surrounding communities.

History of the Airport

ORD was originally constructed in the early 1940s and was first named Orchard Place Airport/Douglas Field. The airport, initially utilized for manufacturing aircraft during World War II, began commercial passenger flights in 1955 when Chicago Midway International Airport became too small and over-crowded to accommodate the increasing aviation demands. ORD's international terminal was constructed in 1958, however, the majority of the domestic passenger traffic did not move from Midway International Airport until the expansion at ORD was complete in 1962. Since that time, ORD has continued to grow to a point where today

Table 2.13-1. O'Hare International Airport.

	Domestic Operations	International Operations
Air Carrier	627,258	82,048
Cargo	11,752	8,948
Commuter	175,676	5,028
General Aviation	13,164	0
Helicopters	248	0
Miscellaneous	2,851	0
Total Aircraft Operations	*830,949*	*96,024*
	Domestic Cargo Tonnage	**International Cargo Tonnage**
Freight	435,395.6	1,039,015.1
Express	67,238.1	88,064.7
Mail	29,368.4	31,659.7
Total	*532,002.1*	*1,158,739.5*

YTD December 2007
Source: AirportIQ 5010

the facility is one of the busiest in the United States and is working to reinvent itself with the O'Hare Modernization Program (OMP).

Governance

As noted, the airport is owned by the city of Chicago and managed by the Chicago Department of Aviation. The airport property resides within Cook and DuPage Counties and is bounded by a number of local municipalities, with approach and departure areas encompassing even more municipalities. This complex collection of local entities provides a diverse mix of interest groups which must be involved in the development and operation of the airport.

Prior to the creation of the ONCC, various community groups had been formed that were interested in being everything from watch-dog groups to advocates for development of the airport. For example, the Suburban O'Hare Commission (SOC) was formed in 1981 by local government officials surrounding the airport declaring that the airport had grown beyond its prudent size and therefore was exposing citizens to intolerable levels of noise, toxic air pollution, and safety hazards. The village of Arlington Heights, a local municipality in proximity to ORD, had been approached multiple times to join the SOC organization and declined the invitation each and every time. The SOC had been involved in multiple law suits regarding the airport; however, the village of Arlington Heights, while concerned about noise impacts, did not want to pursue any additional litigation. Arlington Heights, and other municipalities, felt there was another way to work with the airport and protect citizens from the escalating noise, air pollution, and safety hazards being experienced. This desire to work cooperatively began the development of the ONCC.[1]

O'Hare Noise Compatibility Commission

The ONCC was established in 1996, and is dedicated to reducing aircraft noise in the communities surrounding ORD. The ONCC was created by the city of Chicago's Mayor Richard Daley on a limited term basis. The ONCC's special appointment was set to expire in 2005. However, in 2004, the ONCC requested a 5-year extension that was granted and will now expire in 2010. It was noted by Village of Arlington Heights Mayor Arlene Mulder that in 2009 the ONCC will likely look to the City of Chicago to extend the appointment of the ONCC until 2016, which will be the anticipated full build out date of the OMP. The FAA has written the ONCC into the record of decision (ROD) for the environmental review project as the agency to oversee all of the sound insulation mitigation as part of the environmental impact statement; therefore, ensuring the commission's appointment until project completion.[2]

The ONCC membership has grown since 1996 to include 26 municipalities, Cook County, and 15 school districts that represent 40 communities around the airport.

Current community and school members include:

- Arlington Heights
- Barlett
- Bellwood
- Chicago
- Des Plaines
- Elmwood Park
- Franklin Park
- Harwood Heights
- Hoffman Estates

[1] Interview comments from O'Hare Noise Compatibility Commission Mayor Arlene Mulder.
[2] Interview comments from O'Hare Noise Compatibility Commission Mayor Arlene Mulder.

- Itasca
- Maywood
- Melrose Park
- Mount Prospect
- Niles, Norridge
- Northlake
- Oak Park
- Palatine
- Park Ridge
- River Grove
- River Forest
- Rolling Meadows
- Rosemont
- Schaumburg
- Schiller Park
- Stone Park
- Wood Dale
- Cook County
- School Districts: 59, 63, 80, 81, 84, 84.5, 85.5, 86, 87, 88, 89, 214, 234, 299, and 401.

The Mission statement of the ONCC is:

> To assist in developing meaningful methods of reducing the impact of aircraft noise on our surrounding neighborhoods through home and school sound insulation, and to reduce wherever possible, aircraft noise at its source.

The ONCC is guided by the following vision statement:

> The O'Hare Noise Compatibility Commission will build and maintain coalitions of communities and citizens dedicated to the reduction of aircraft noise at and near O'Hare International Airport, and thereby enhance the quality of life for area residents.[3]

The ONCC strives to replace confrontation with cooperation, by bringing together the FAA, the city of Chicago, the airlines, suburban communities; FAA air traffic controllers (ATC), and pilots to reduce the impact of aircraft noise on the surrounding communities. This has resulted in a decrease in aircraft noise every year since the commission's inception, as well as, an increase in the spending on the sound insulation programs. Mayor Mulder states that one of her favorite quotes regarding the mission of the ONCC is that, "We want to trade the court room for a board room." She also noted that the only solution for airport and community planning efforts is to establish personal relationships that are built on trust, such as the relationships built between the ONCC, the FAA, the City of Chicago, the citizens, and the airport.

The ONCC is based upon an intergovernmental agreement between the City of Chicago, and every community member and school district who are members of the ONCC. The ONCC currently has 40 members, which represent a diverse number of municipalities, school districts, and counties in proximity to the airport. Airport improvements and developments must be approved by the ONCC, and also the city of Chicago, to promote compatibility and consensus among all the involved stakeholders. This assists with the flow of information, education, and planning efforts, which have benefited both the surrounding communities and the airport.

Discussion of Compatibility Issues and Responses

When discussing existing and future compatibility issues, three basic areas were discussed in an effort to assess current concerns. These areas include safety, airspace, and noise related issues. During the interview with Mayor Arlene Mulder, Chairperson of the ONCC, Brian Gilligan, Executive Director of the ONCC, Joseph Annunzio, Village of Niles Attorney and ONCC representative, and Tim Angell, city of Des Plaines Deputy Director and an ONCC representative, the project team was able to assess the role of the ONCC, and review the benefits it brings both to the community and to the airport.

[3] O'Hare Noise Compatibility Commission website.

Many of the residential areas surrounding the airport were built in the 1960s and are not adequately insulated for sound resulting from the amount of commercial air traffic being experienced at the airport today. When faced with mounting noise concerns, Arlington Heights conducted their own noise study in the late 1980s to assess the impact of aircraft noise on their community. It was found that at that time, the airport was not doing anything to mitigate or limit aircraft noise impacts. The runway configuration directed aircraft departures directly over their village, impacting the quality of life for residents, as well as impacting schools and businesses within the community. In addition, with the development of additional cargo operations, they began experiencing increased nighttime operational impacts. The village was concerned why their community was unaware of the development and expansions taking place at the airport.

Mayor Mulder noted that it became obvious that airport planning and community planning were both occurring independently of each other and there was no discussion of future growth or land use concerns. Therefore, communities were impacted by the airport's operational needs while the communities were planning and developing potentially incompatible land uses. It was recognized that the heart of the problem was the fact that the stakeholders were not talking to each other and discussing land use planning or future needs to promote compatible land use planning for both the airport and surrounding communities.

With the inception of the ONCC, the local municipalities have been able to become more actively engaged in the planning process and affect change within their local communities, as well as the airport. This has been accomplished by an extensive outreach program. For example, the ONCC holds approximately 30 public meetings annually, and operates through three standing committees including:

- The Technical Committee;
- The Residential Sound Insulation Committee; and
- The School Sound Insulation Committee.

The total amount spent by the two sound insulation committees since they began implementation of their programs totals approximately $440 million, which has insulated 6,770 homes and 115 schools.

The city of Chicago's Airport Noise Monitoring System (ANMS) measures noise at 30 sites around the airport, and the ONCC reports the results on a monthly basis to the public. The 2006 noise levels at the airport were reported by the ONCC to have decreased due to quieter aircraft, greater adherence to the nighttime O'Hare Fly Quiet Program, and other technological and operational improvements. In addition, an Ad Hoc committee of the ONCC drafted a model sound insulation ordinance, which surrounding communities were encouraged to adopt into their existing building codes to make homes and commercial locations quieter. As noted, the majority of the issues noted in this interview were concentrated on noise, due to the primary focus of the ONCC. There may also be safety and airspace issues; however, due to the inability to interview ORD staff, those topics are not discussed in the report (Figure 2.13-2).

Litigation

There has been one law suit related to land use around ORD. In 1989 the U.S. Supreme Court let stand the State Supreme Courts ruling by throwing out a law suit by a homeowner who believed airplane noise had lowered the value of the property, affirming that State Courts have jurisdiction over noise control standards.

Figure 2.13-2. Aerial view of Chicago O'Hare International Airport and adjacent land uses.

Aircraft Accidents

ORD has experienced a few aircraft accidents on airport property and in the approach zones to the airport that have been documented since the 1960s. A couple of these accidents are directly related to incompatible land uses, as the aircraft have crashed into objects in the flight path upon takeoff.

Existing Studies, Planning, and Regulations

There are several planning studies and planning efforts which should be mentioned that have land use ties, and each are discussed below. These three items are all guided by the underlying airport master plan.

O'Hare Modernization Program (OMP)

The OMP is intended to reconfigure the airport's existing intersecting runways in a parallel layout, resulting in reduced delays and increased capacity, which will allow the airport to meet the region's future aviation demands. In addition, a new terminal facility with more airline gates and parking is being developed to accommodate the increased passenger demands. The airport will need to acquire through the Land Acquisition Plan, approximately 430 acres of additional property in order to accomplish the criteria detailed in the OMP. The cities impacted by the land acquisition are Chicago, Des Plaines, Elk Grove, and Bensenville. So far, 552 parcels in the southwest region, and 41 parcels in the northwest region have been acquired.

Noise Compatibility

Fly Quiet Program

The *Fly Quiet Program* was started in June 1997 by Mayor Richard Daley and is designed to reduce nighttime noise impacts for residential areas that lie in either the approach path or departure path of aircraft utilizing the airport. The intent is for aircraft to use preferred departure runways, flight paths, and operating procedures that encourage airlines/pilots to reduce impact on local residents. In addition, the program encourages the use of the O'Hare Ground Run-up Enclosure (Hush House), which assists in the reduction of noise impacts from aircraft engine noise during the routine testing and maintenance that occurs during the nighttime hours.

The *Fly Quiet Program* outlines a preferential runway use plan to minimize the impacts of nighttime noise for area residents and is utilized between the hours of 10:00 p.m. to 7:00 a.m. This program is strictly voluntary and is not mandatory due to possible safety concerns that may arise. The Program also recommends a nighttime arrival procedure between the hours of 10:00 p.m. to 7:00 a.m. where aircraft should not descend lower than 4,000 feet when turning on final approach into the airport. It was also noted that pilots should limit the use of thrust reversers during that same time period to also minimize noise impacts. Signs have been placed at multiple locations on the airfield that remind pilots of the *Fly Quiet Program* noise abatement procedures.[4]

There are approximately 37 permanent monitoring stations throughout the surrounding communities that track the acoustical impacts for aircraft flight tracks. Additional monitoring stations will be placed as the airport changes and reconfigures the runway alignments and flight paths, as part of the new OMP.[5]

Land Acquisition

The city of Chicago opened the O'Hare Land Acquisition Program office in July of 2002. The program follows the guidelines outlined by the Federal Uniform Relocation Assistance and Real Property Acquisition Act, guaranteeing renters and property owners certain rights. The city's goal is to acquire property through voluntary negotiations with property owners, but can also use the right of eminent domain when necessary. The O'Hare Land Acquisition Program plans to acquire approximately 430 acres of land for the airport in four communities for the implementation of the OMP (Figure 2.13-3). These communities include Chicago, Des Plaines, Elk Grove Village and Bensenville.

Vision 100 Land Use Funding Program Section 160 Funds

The Vision 100 – Century of Aviation Reauthorization Act, was signed into law December 13, 2003, and provided a new element for land use compatibility planning. The city of Des Plaines took advantage of these funds to address planning and zoning issues.

Angell noted that the Vision 100/Section 160 funding has enabled the city to contract with nationally recognized consultants that can aid the city in implementing progressive zoning and planning tools that can produce redevelopment more compatible with the OMP. Without the funding, the city might not have been able to select first-tier consulting firms with the experience and expertise needed to help Des Plaines articulate zoning and long-range planning prin-

[4] O'Hare Noise Compatibility Commission website.
[5] O'Hare Noise Compatibility Commission website.

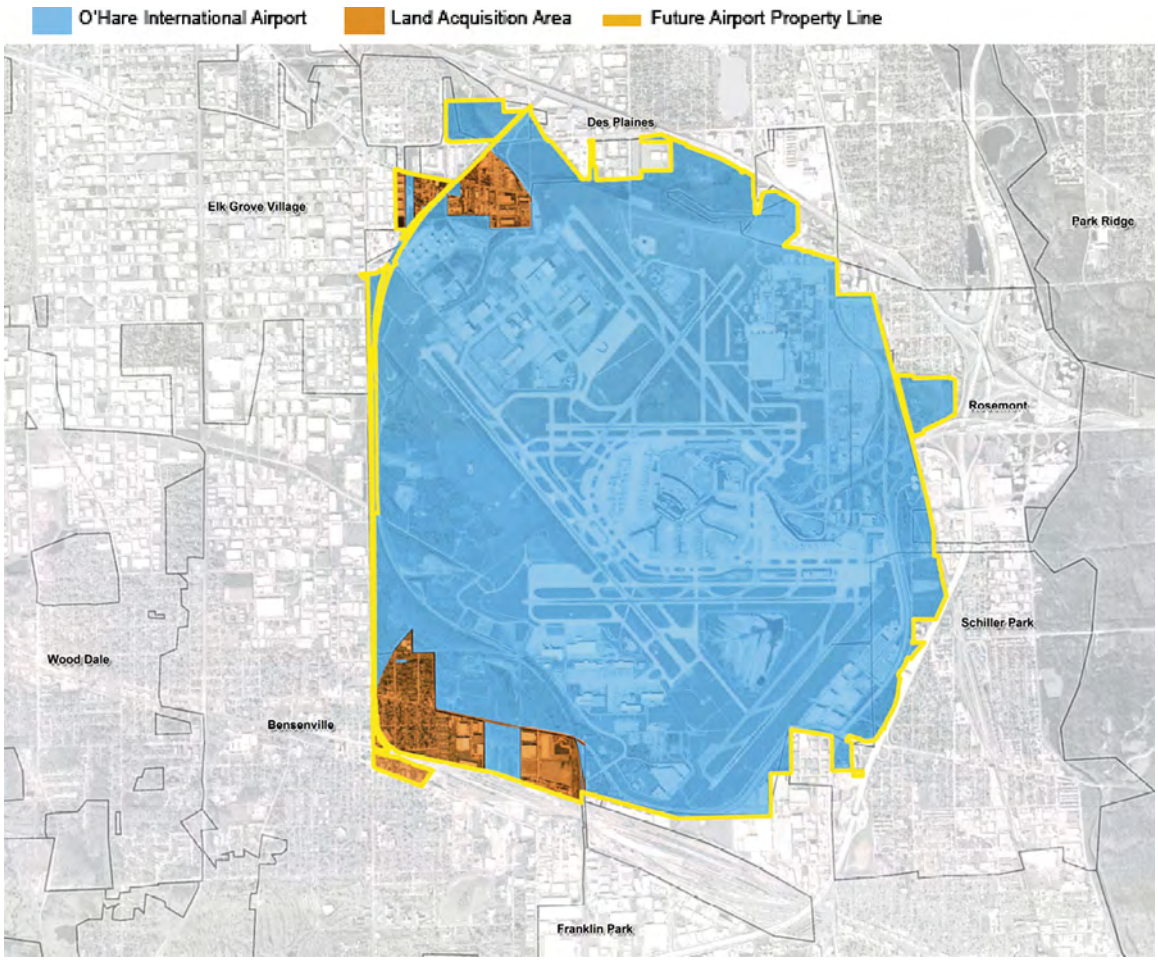


Figure 2.13-3. Map encompassing future Airport land acquisition and Airport boundaries (Source: City of Chicago website).

ciples critical to address the numerous issues associated with the airport's current and future operations.

Community Involvement

Public awareness is a key component for compatible land use planning. It is important for the community to understand the benefits of having the airport in their community and the importance of meeting future growth and capacity needs. Once community value is established, the public has a tendency to support airport development. Effective communication facilitates the relationship between ORD, the ONCC, and surrounding communities. It is the responsibility of the airport and local jurisdictions to communicate with each other regarding any operational changes or development that could affect one another. This gives advance notice to residents of changes at the airport and helps to ensure that no incompatible land uses are present, or are encroaching upon the airport.

Mayor Mulder acknowledges that there will always be opposition, but good, local leadership helps to decrease this opposition by educating and informing citizens. She believes that if the airport is upfront and honest with surrounding communities, it is easier for the residents to embrace the development and change.

The ONCC has outfitted a vehicle called the Community Outreach Vehicle (COV) with the technology to demonstrate aircraft noise issues such as aircraft noise monitoring, an interactive aircraft noise demonstration system, and video presentations. In addition to the COV, the ONCC utilizes their website (www.oharenoise.org) to inform and educate area residents regarding airport operations. They also use video productions (i.e., *Aircraft Noise Reduction: The O'Hare Story*), quarterly newsletters, school outreach programs, and speaking engagements that present the basic information about aircraft noise.

The ONCC recognizes the environment of ORD is changing due to the OMP. The areas that experience airport-related noise are shifting and moving. Therefore, the intent of the ONCC is to educate and inform all surrounding communities regarding land use compatibility, as well as mitigate and minimize airport operational impacts upon the surrounding communities. Mayor Mulder notes that there has to be communication, understanding, mitigation, and joint planning to sustain compatibility with airport environs.[6]

Economic Impact

Maintaining the viability of the airport is important to the local community, as well as the nation, due to the role ORD plays in the national aviation system. The OMP outlined the economic benefits of the airport, which currently generates 45,000 jobs and $38 billion in economic activity per year. Once the modernization program is complete, the airport is expected to create an additional 195,000 jobs and another $18 billion of annual economic activity.

Conclusion/Analysis

This case study deals specifically with the importance of community involvement and effective communication. The ONCC acknowledges the importance of active communication as being crucial to keeping the airport and surrounding communities engaging with each other. This allows opportunities for open discussion and comment on current and future needs of the airport, along with community concerns and activities.

The ONCC places a high emphasis on continuing education for residents affected by airport operations, and informing surrounding communities on land use compatibility. Their goal is to minimize and mitigate airport operational impacts on the surrounding communities without hindering airport operations. In addition, the commission strives to replace confrontation with cooperation, and the courtroom for a board room where issues and concerns can be discussed openly.

The ONCC provides an opportunity for affected communities and districts to join, and be represented in a unified approach to deal with incompatible land uses, especially noise, as an independent agency from the management of the O'Hare International Airport.

[6] Interview comments from O'Hare Noise Compatibility Commission Mayor Arlene Mulder.

APPENDIX A

Model Sound Insulation Ordinance

MODEL SOUND INSULATION ORDINANCE
FOR INCORPORATION INTO THE RESIDENTIAL
BUILDING CODE

SECTION 1. TITLE AND PURPOSE. The Model Sound Insulation Ordinance. In order to promote good health, safety and general welfare of residential property users, regulating construction to accommodate the need for sound insulation is necessary. Sound insulation is required to protect the residential user from vehicular noise, aircraft noise, train noise and other noises that unreasonably interfere with the general welfare of the residents.

SECTION 2. INTERIOR NOISE LEVELS. Residential structures must have sufficient sound insulation/architectural treatment to keep the effect of external noise sources at no more than 45 dB within the structure.

SECTION 3. LOCATION OF STRUCTURES. The placement of all existing and proposed residential structures shall be shown as located on a sound overlay map for use by the public.

SECTION 4. AREAS OF SOUND TREATMENT. The following areas within a residence must be addressed:

a. Windows - Tight fitting windows with an STC rating of 40 to 44

b. Doors - Prime doors must be pre-hung solid-core doors

c. Interior Walls - At least 5/8 inch drywall

d. Interior Ceilings - At least 5/8 inch drywall

e. Insulation - R-13 for walls; R-25 for ceilings

SECTION 5. HEATING, VENTILATING AND AIR CONDITIONING (HVAC). HVAC systems must be equipped with ventilation ducts connected to the outside so that fresh air may be mixed with existing interior air.

SECTION 6. CERTIFICATE OF COMPLAINCE REQUIRED. Construction drawings shall be submitted to the (City, Town, Village) Building Department for review and certification that the proposed materials and construction techniques appear to be satisfactory for the desired acoustical treatment and in conformance with all applicable code provisions. Subsequent to the completion of the structure but before occupancy, a Certificate of Occupancy shall be issued by the (City, Town, Village) when field inspection indicates that the construction is in accordance with approved design.

DISCLAIMER – This model ordinance is to be used only as a guide and not intended to be adopted as written. It is imperative that any such ordinance that is to be adopted by a municipality be done so only with the consultation and advice of local counsel.

APPENDIX B

Village of Arlington Heights Ordinance

AN ORDINANCE AMENDING CHAPTER 23 OF THE ARLINGTON HEIGHTS MUNICIPAL CODE.

WHEREAS, the Village of Arlington Heights is a home rule unit pursuant to the provisions of Article VII, Section 6 of the Constitution of the State of Illinois; and

WHEREAS, the Village has authority and power to regulate for the protection of the public health and welfare; and

WHEREAS, pursuant to the provisions of 65 ILCS 5/1-3-1, the corporate authorities of the Village have authority to prescribe by ordinance the regulation of buildings and construction; and

WHEREAS, Chapter 23 of the Arlington Heights Municipal Code has been in existence since 1956 and was later codified in 1965, and on May 3, 1965, was adopted by the President and Board of Trustees as Building Regulations to establish standards for regulating buildings and their construction, alterations and upkeep; and

WHEREAS, since 1965 several amendments have been made to the text contained in Chapter 23 of the Arlington Heights Municipal Code through the adoption and amendments of Model Codes promulgated by such Model Code Organizations such as SBOC (Suburban Building Officials Conference), BOCA (Building Officials and Code Administrators), CABO (Council of American Building Officials) and ICC (International Code Council); and

WHEREAS, model codes address minimum requirements for health, safety and welfare, thus leaving local jurisdictions with the option to amend the model codes' provisions where found as befitting to the local jurisdiction; and

WHEREAS, the model building codes have provisions governing sound transmission control, but are limited in scope and apply only to the interior environment of buildings and do not adequately address some high impact airborne sound and noise from exterior sources beyond the building envelope; and

WHEREAS, exterior sounds and noises, including some that are more intrusive than others, have effects and sources that cannot always be prohibited nor ignored and will continue to exist and affect humans of all walks of life; and

WHEREAS, exterior sounds and noises infiltrating into buildings through the building envelope can impact building users' quality of life and have long lasting health, psychological and sociological effects on users of buildings; and

WHEREAS, Building Regulations are intended to regulate all facets of building safety for users of buildings and structures,

NOW, THEREFORE, BE IT ORDAINED BY THE PRESIDENT AND BOARD OF TRUSTEES OF THE VILLAGE OF ARLINGTON HEIGHTS:

SECTION ONE: That Chapter 23, Article XIV, Penalty, of the Arlington Heights Municipal Code be and is hereby renumbered Article XVII.

SECTION TWO: That Chapter 23 of the Arlington Heights Municipal Code be and is hereby amended by adding a new Article XIV to read as follows:

Article XIV Sound Insulation Code

Section 23-1401 Title. This Ordinance shall be known as the Arlington Heights Sound Insulation Code and shall be in addition to and not limited by the provisions of any state or federal legislation that impacts the building envelope, it being the intent of the President and Board of Trustees to adopt the most restrictive provisions that require sound insulation, construction, architectural and/or acoustical treatment to minimize the effects within buildings from infiltrating external noise sources and to attain the decibel levels prescribed for Acceptable Intrusive Noise Levels.

Section 23-1402 Purpose. The purpose of this Code is to promote good health, safety and general welfare of the users of all buildings in matters pertaining to sound insulation, by regulating construction, alterations/remodels, all use-changes/conversions, repairs and property maintenance upkeep of buildings and structures used by humans. The intent of this Code is to provide protection from exterior sound levels exceeding 75 DNL, and where applicable to minimize the impact of interior air-borne noise and the impact of structural-borne noise.

Section 23-1403 Partial invalidity and other provisions. This Sound Insulation Code shall not cancel or nullify noise ordinances already in place prior to the adoption of this ordinance. Nothing in this Code prevents the additional use of rows of dense tree zones, barrier walls and other noise-screening methods for shielding buildings, structures and outdoor spaces; however, all such noise-screening methods shall not replace requirements prescribed in this Code for buildings.

Section 23-1404 Applicability. The Sound Insulation Code shall apply to all buildings, structures and areas used by humans in accordance with the following:

a. For Building Envelope: The building envelope shall be designed and constructed to provide insulation protection from exterior sound levels exceeding 75 DNL as follows:

   1. New construction, change of use and conversions. All new buildings and structures shall be provided with sound insulation for the entire building envelope.

   2. Additions to existing buildings. The building envelope of all additions shall be provided with sound insulation; but the building envelope of the existing building, where work is not being done, shall not be required to comply with the Sound Insulation Code.

   3. Alterations/remodels at 50% or less. For alterations and remodels, where the value of work is not more than 50% the market value of the existing building or where the scope of work is not more than 50% the area or volume of the existing building, only those areas being altered or remodeled along the building envelope

shall be required to have sound insulation; but the remainder of the building or structure shall not be required to comply with the Sound Insulation Code.

4. Alterations/remodels at more than 50%. For alterations and remodels where the value of work is more than 50% the market value of the existing building or where the scope of work is more than 50% the area or volume of the existing building, the entire building envelope shall be provided with sound insulation.

5. Repairs. Sound insulation shall only be required for those portions of the building envelope under repairs.

6. Replacements. Sound insulation shall be required for replacement of building components within the building envelope.

7. Property maintenance upkeep. Upon discovery of maintenance defects within the building's envelope, the property owner shall be required to provide sound insulation for the defective portions of the building envelope. See also Section 23-1417.

b. For interior partitions, floors and interior building components. Interior partitions, floors and other interior building components used to separate tenants, occupants or units within a multi-level or multi-use structure shall be designed and constructed to minimize the transfer of interior air-borne sound/noise and structural-borne sound/noise into adjacent tenant spaces and units used by the individual tenants. Such interior partitions, floors and the other components shall be designed and constructed to provide the same insulation as required for the exterior building envelope or as required by Sections 23-1414 and 23-1416, whichever is more restrictive for the use.

1. New construction, change of use and conversions. Interior partitions, floors and other components of all new buildings and structures shall be provided with sound insulation that shall minimize the transfer of interior air-borne noise and structural-borne noise.

2. Additions to existing buildings. Interior partitions, floors and other components of all additions shall be provided with sound insulation that shall minimize the transfer of air-borne noise and structural-borne noise where such components are located adjacent to the sources of air-borne and structural-borne noises; but the interior components within the existing building, where work is not being done, shall not be required to comply with the Sound Insulation Code.

3. Alterations/remodels at 50% or less. For alterations and remodels, where the value of work is not more than 50% the market value of the existing building or where the scope of work is not more than 50% the area or volume of the existing building; only those exterior component areas being altered or remodeled and the interior components adjacent to the sources of air-borne and structural-borne noises shall be required to have sound insulation; but the remainder of the interior

of the building or structure shall not be required to comply with the Sound Insulation Code.

4. Alterations/remodels at more than 50%. For alterations and remodels where the value of work is more than 50% the market value of the existing building or where the scope of work is more than 50% the area or volume of the existing building; all exterior components and all interior components adjacent to sources of air-borne and structural-borne noises shall be provided with sound insulation.

5. Repairs. Sound insulation shall only be required for those portions of the interior components under repairs, if such portions are adjacent to sources of air-borne and structural-borne noises.

6. Replacements. Sound insulation shall be required for the replacement of interior components within the building's interior, if such replacements are for components adjacent to sources of air-borne and structural-borne noises.

7. Property maintenance upkeep. Upon discovery of maintenance defects within the building's interior components, the property owner shall be required to provide sound insulation for the defective portions of the building's interior, if those portions are adjacent to sources of air-borne and structural-borne noises. See also Section 23-1417.

c. Responsibility of property owner and tenants concerning existing buildings. Nothing in this Code shall render the Village of Arlington Heights and its Officers as responsible for any non-compliant existing building. It shall be the duty of every property owner to ensure that their exterior building envelope affords adequate protection against exterior noise and their effects on humans. It shall be the duty of every tenant to notify the property owner of noise intrusion above the levels prescribed in this Code.

d. Special requirements for all construction work sites. In addition to the provisions of Section 23-110, Contractors shall comply with the following:

1. Prior to issuance of any permit, the contractor or the permittee shall indicate on a written form the types of construction equipment proposed to be used on the job site and their anticipated dBA noise levels. The written form shall be submitted to the Building Department, prior to the issuance of any permit for the job site.

2. Sound barriers shall be installed around the site where such construction equipment is listed for generating any noise in excess of 70 dBA, where the construction site is adjacent to any outdoor noise-sensitive areas and/or to any building with the indoor noise-sensitive uses listed in Section 23-1414.

3. Sound barrier walls and their erections shall comply with Section 23-1419.

Section 23-1405 Exceptions. Sound insulation requirements shall not apply to detached sheds, detached garages, carports, decks and patios, gazebos, attached or detached playhouses for children, and detached accessory structures provided that such accessory structures are not used to generate sound levels in excess of 70 dB; but, where the construction and assembly for these exempt structures involve noises described in Sections 23-1419, the provisions of Sections 23-1404 and 23-1419 shall apply to the site for the construction or assembly of such structures.

Section 23-1406 Permits. A permit, in accordance with the provisions of Section 23-105, shall be required for installation of materials for sound insulation protection. Where there are exemptions from permit requirements, such exemptions shall not be deemed to grant authorization for any work to be done in any manner in violation of any provisions of the Arlington Heights Municipal Code.

Section 23-1407 Design and Construction Compliance. Construction drawings containing design and construction techniques for the required acoustical treatment shall be submitted to the Building Department for review. The drawings shall also contain the statement required by Section 23-1418, by the architect/engineer of record attesting to compliance with this Code. Subsequent to the completion of the structure or completion of the scope of work but before final inspections, occupancy or use, or as required by Section 23-1418, a permanent certificate shall be posted and filed in accordance with the provisions of Sections 23-1408 and 23-1410.

Section 23-1408 Hazards. Construction and installation of sound insulation and acoustical treatments shall not leave the building or property in a hazardous condition.

Section 1409 Inspections. Inspections shall be made in accordance with the approved sets of plans and documents submitted for permits. Occupancy and use of the building or space shall be approved only after field inspections indicate that the construction and installation of all components are in accordance with the approved drawings and the provisions of this Code.

Section 23-1410 Permanent Certificate required. A permanent certificate shall be posted inside the electrical distribution panel, and a copy of the certificate shall be sent to the Building Department for filing. The certificate, to be made available by the Building Department, shall be completed by the builder, contractor or permittee. Where construction work was supervised by a registered design professional, the registered design professional shall complete the certificate. The certificate shall list the STC ratings of all the building envelope components as designed and as installed. Where the scope of work also includes meeting the required STC ratings for interior air-borne and structural-borne sound, the STC ratings of such interior components shall also be listed on the permanent certificate.

Section 23-1411 Definitions. Where terms are defined in the model codes adopted by the Village of Arlington Heights, such terms shall have the meanings ascribed to them as in those codes. The following words and phrases used in this Article shall have the following meanings:

a. A-Weighting. A method used to alter the sensitivity of a sound level meter with respect to frequency so that the instrument is less sensitive at frequencies where the human ear is less sensitive; also written as dBA.

b. Acceptable Intrusive Noise Levels. The maximum dBA level of intrusive noise within any given interior space or situation, from the exterior of a space or use, and deemed for use in design and construction of buildings and spaces within the Village of Arlington Heights.

c. Building Component. Exterior or interior portion of the building including frame wall, stucco/frame wall, brick veneer wall, masonry wall, windows, exterior doors and sealants.

d. "Criteria for human exposure to sound". Spectrum of sound perception in humans ranging from 0 dB to 120 dB. At conversation level, the typical voice measures 55 dB at a distance 5 feet (1.5 m) away. Intrusive noise begins at 60 dB; Annoying noise begins at 80 dB. The range of human hearing from 20 Hz to 20,000 Hz, and most sounds for humans is communicated between 200 Hz and 8,000 Hz, where Hz represents the frequency or the scientific measurement of sound waves produced by a noise source passing a given point per second.

e. dBA. Sound pressure level as measured in decibels on the "A" scale of a sound level meter manufactured in accordance with the specifications of the American National Standards Institute, Inc. (ANSI), Type 2, ANSI-SI.4(1971), calibrated within two hours of being used for measurement. Unless otherwise noted, measurements shall be deemed to be made in the slow response mode of the meter. See also "A-Weighting".

f. Decibel. A unit of level (dB) denoting the ratio between two quantities which are proportional to power; the number of decibels is 10 times the mathematical logarithm of this ratio.

g. DNL. The sound exposure level for a 24-hour day calculated by adding the sound exposure level obtained during daytime (7 am to 10 pm) to 10 times the sound exposure level obtained during nighttime (10 pm to 7 am), and used nationwide for environmental impact assessments.

h. Energy (Conservation) Codes. Refers to the State Energy Code, effective April, 2006, for Commercial buildings, and by default, the 2006 International Energy Conservation Code; also refers to Sections N1101 through N1103.6 of the International Residential Code as amended in Article III of this Chapter for One-and-Two-Family Dwellings in the Village of Arlington Heights.

i. Exterior Building Components. Parts of the building envelope used for sound insulation.

j. Fenestration. Skylights, roof windows, vertical windows (fixed or moveable), opaque doors, glazed doors, glazed block, and combination opaque/glazed doors. Fenestration also includes products with glass and non-glass glazing materials.

k. Ground-borne Noise. Noise caused by vibrations of surfaces due to ground-borne vibrations traveling through successive solid media such as soils, rocks, soil layers below grade, building foundations and structure. Sources of ground-borne vibrations include construction equipment, steel-wheeled trains and traffic on rough road surfaces; their approximate perceptible range 50 VdB to 100 VdB. Ground-borne noises have the tendency of sounding louder than broadband air-borne sounds that have the same A-weighted level.

l. Indoor Noise-Sensitive Areas. All bedrooms (including hotels/motels), Places of worship, schools, hospitals/nursing homes, libraries, public meeting halls, concert halls, auditoriums/theatres, recording/broadcast studios, and museums/historic buildings.

m. Infiltration. The uncontrolled inward air leakage into a building system caused by pressure effects of wind or the effect of differences in the indoor and outdoor air density or both. Performance standards indicate that a one-inch square hole or a 1/16-inch crack 16 inches long reduces a 50 STC wall rating to 40.

n. Interior Building Components. Shall refer to interior walls and partitions, floors, and other elements through which air-borne and structural-borne noises are transmitted.

o. Impact Insulation Class (IIC). A descriptor similar to STC and when measured by using a small machine with five hammers on a single camshaft, the machine raises and drops a 1.1 pound (0.5 kg) mass 1½ inches (40 mm) to the floor in successive, uniform impacts; the noise generated from this process is measured from the room or space below and the descriptor is used to indicate the insulation needed to control the sound of footsteps and other impact sound/noise from being radiated in the structure of a building. Without impact insulation, impacts are transmitted directly to the structure and their effects are similar to knocks on a door. The procedure for conducting IIC testing is prescribed under ASTM E 989 "Determination of Impact Insulation Class" and under ASTM E 1007 "Standard Test Method for Field Measurement of Tapping Machine Impact Sound Transmission Through Floor-Ceiling Assemblies and Associated Support Structures."

p. NRC. Noise Reduction Coefficient; is the average measure of how absorptive a material is to sound at frequencies of 250 Hz, 500 Hz, 1000 Hz and 2000 Hz; the industry standard of measurement ranges from 0 (no absorption) to 1.00 (perfect absorption).

q. Outdoor Noise-Sensitive Areas. Parks, historic sites, amphitheatres, recreational areas, playgrounds and cemeteries.

r. R-Value. The insulation measurement used in Energy Codes; it is the inverse of the time rate of heat flow through a body from one of its bounding surfaces to the other surface for a unit temperature difference between the two surfaces, under steady state conditions, per unit area. The higher the R-Value, the greater the insulating power.

s. Receiver. A stationary far-field position at which noise or vibration levels are specified.

t. Sound barrier. An effective noise-screening method, when used to break the line-of-sight between the noise source and the receiver. The barrier, usually a sound attenuation wall, when long enough and high enough to screen out the noise source, can reduce noise levels at the receiver. See Section 23-1419 for construction site requirements for sound barriers.

u. Sound Transmission Class (STC). A descriptor used to measure a material's ability to reduce sound. STC is equal to the number of decibels a sound/noise is reduced as it passes through a material. The procedure for testing STC is prescribed under ASTM E 336 "Standard Test Methods for Measurement of Airborne Sound Insulation in Buildings". The significance of STC is that if an external noise level is 85 dB and the desired internal level (based on Acceptable Intrusive Noise-Levels) is 45 dB, a partition or wall with STC of 40 or more will be required. The higher the STC number rating, the better the sound insulation provided. Higher STC ratings are indicative of good sound insulating materials. The STC ratings in this Code are for field STC ratings and not STC laboratory ratings. See 23-1416.

v. U-Value. The coefficient of heat transmitted (air to air), using Energy Codes, through a building component or assembly; and is equal to the inverse value of the R-Value. The lower the U-Value, the greater the insulating power.

w. VdB. A measurement of the vibration velocity level for ground-borne vibration and ground-borne noise.

Section 23-1412 Controls for Building Envelope Components. The building envelope shall consist of basement walls and exterior walls, floor, roof and any other building element or building component that enclose the space being used. Fenestration and acoustically weakest points within the building envelope shall be considered as part of the building envelope, and shall also be required to meet the sealing requirements and/or the STC ratings prescribed in this Code. Exterior Sound Insulation shall be provided to minimize the effects of exterior sounds/noises including those listed in Section 23-1415.

a. Exterior Walls and Components.

1. Exterior Walls. At a minimum, all exterior walls shall be designed and constructed to have STC ratings of not less than 55 in addition to any added insulation, assemblies and acoustical treatments required to maintain the indoor sound levels of Section 23-1414. In addition to the provisions in the Energy Conservation Codes for R-Values and U-Values, and in Articles III and IV of this Chapter of the Arlington Heights Municipal Code, higher sound attenuation can be provided by use of any of the following and/or their combinations:

a) Increased mass of vertical wall boards and/or interior vertical/sloped surfaces defining the exterior wall.

b) Use of air space between wall boards and/or interior vertical/sloped surfaces defining the exterior wall, and/or increase R-Values for insulation required by Energy Code.

c) Increased width of air space between wall boards and/or interior vertical/sloped surfaces defining the exterior wall; six inches can reduce noise by an additional five dBA.

d) Use of wider spacing between studs, for reducing effects of exterior noise up to five dBA, shall be permitted if larger studs such as 2 x 6 or larger spaced 24 inches on center or if 2 x 4 studs are doubled at 24 inches on center in lieu of 16 inches spacing.

e) Increased width of air space between wall boards and/or interior vertical/sloped surfaces defining the exterior wall and the placement of staggered studs within such increased air space.

f) Use of resilient attachments to studs to raise STC rating by up to five dB.

g) Use cavity walls and/or fill cavity spaces with acoustical blankets, mineral or rock wool, fiberglass, hair felt fibers within increased width of air space between wall boards and/or between interior vertical/sloped surfaces defining the exterior wall.

2. Fenestration within exterior walls. Windows shall be tight-fitting and shall have STC ratings above 40. Doors shall have heavier solid core wood that is well sealed and provided with vinyl seal around the edges, and shall have STC ratings above 35. Higher sound attenuation can be provided by use of the following and/or their combinations:

a) Thicker glass for windows, ½ inch glass in lieu of 3/16 inch glass to increase STC rating by up to 10 dB.

b) Thicker glass laminated with tough transparent plastic that is both noise and shatter resistant.

c) Use of double-glazed windows that have:

1) Increased air space width of not less than 2 inches;
2) Increased glass thickness;
3) Proper use of sealants;
4) Use of slightly dissimilar thickness of glass panes;
5) Use of slightly non-parallel glass panes;

d) Gasket-stops and/or drop bar threshold closers at the bottom edges of exterior doors.

e) Additional use of Acoustic Storm Doors with STC rating above 30.

f) Provide sealants around door frames; see also Section 23-1417.

g) Provide sealants around window frames; see also Section 23-1417.

3. Other openings and Leaks within exterior walls.: Leaks, cracks, other openings, pointed edges and joints shall be sealed to reduce the infiltration of air or exterior sound into the building or space. Cracks, holes and joint defects during construction shall be sealed prior to occupancy or use. Sources of infiltration of air or exterior sound can include, but are not limited to the following:

a) Joints around window frames;

b) Area pockets between window meeting rails;

c) Area pockets through window pulleys or window mechanisms;

d) Length around missing sealants or putty;

e) Area pockets around sill/foundation joints;

f) Basement and cellar windows;

g) Around lighting fixtures;

h) Around stairs and porches adjacent to exterior walls;

i) Around door frames;

j) Cracks in floorboards;

k) Around baseboards;

l) Around electrical outlets;

m) Holes and cracks in foundation walls;

n) Cracks in siding or veneer;

o) Siding in contact with corner-board joints;

p) Siding in contact with trim joints;

q) Openings in rakes and cornices;

r) Chimney and siding joints;

s) Holes at walls for cables (electrical service entrance, telephone and TV cables);

t) Exhaust fans and dryer vents.

b. Roof-Ceiling Assembly and Components.

1. Roofs. At a minimum, all roof assemblies shall be designed and constructed to have an STC rating of not less than 40 in addition to any added insulation, assemblies and acoustical treatments required to maintain the indoor sound levels of Section 23-1414.

a) Acoustically weak roof-ceiling assemblies such as those with beamed ceiling shall be provided with additional acoustical treatment. Modification of beamed ceilings by use of additional layers of fiberglass, suspended ceilings or other noise resistant materials shall be deemed to comply with the provisions of this Code.

b) Ceilings shall be designed and constructed with STC rating of not less than 45.

c) For STC above 40, it shall be permissible to use shingle roof with attic, ½ inch gypsum wall board ceiling framed independently of roof where in compliance with the Energy Conservation Code.

2. Fenestration in roofs. Windows and skylights in roofs shall be installed as tight-fitting and shall have STC ratings of not less than 40. Roof hatches and all other openings shall be designed and constructed such that the composite STC rating of the roof and all openings shall be not less than 35.

3. Openings and Leaks within roof assembly. Leaks, cracks, other openings, jointed edges and joints shall be sealed to reduce the infiltration of air or exterior sound into the interior of the roof-ceiling assembly. Cracks, holes and joint-defects during construction shall be sealed prior to occupancy or use. Sources of infiltration of air or exterior sound can include the items listed in Section 23-1412 a3. Vents shall be treated with baffles.

c. Floors Assemblies and Components.

1. Floors. Floors shall be designed and constructed to minimize the effects of external noise sources as follows:

a) Where floors are located above roadways, driveways, fire lanes, garages and exterior areas; or floors cantilevered over exterior spaces; such floors shall be constructed to minimize the effects of exterior noise and any

vibration superimposed on the floor as required by Sections 23-1414 and 23-1415.

b) Where floors are located above interior sources of noise and vibrations; or floors cantilevered over any source of interior noise or vibrations; such floors shall be constructed to minimize the effects of the interior noise or vibrations as required by Sections 23-1414 and 23-1416.

c) In addition to providing protection for sounds and noises, protection shall be provided against structural vibrations where applicable. Installation of a solid concrete slab that is at least six inches thick or installation of a floating floor slab consisting of a wood or concrete slab that is separated by resilient materials and/or resilient anchors isolating the surface slab from the structural slab and the surrounding walls or structural elements prone to vibrations; shall be deemed to be in compliance with this Code.

2. Openings in floors. Openings in the floors described above shall be constructed to minimize the infiltration of noise. Floor-ceiling assemblies separating between tenants, separate dwelling units and users within the interior of buildings shall comply with requirements in Section 23-1416.

3. Leaks within floors. Leaks, cracks, other openings, jointed edges and joints shall be sealed to reduce the infiltration of air or exterior sound into the floor space. Cracks, holes and joint defects during construction shall be sealed prior to occupancy or use. Sources of infiltration of air or exterior sound can include the items listed in Section 23-1412.a3. Floor-ceiling assemblies separating between tenants, separate dwelling units and users within the interior of buildings shall comply with requirements in Section 23-1416.

d. Building Air and Ventilation Systems. Installed heating, air, ventilation and humidifier systems shall be provided with the necessary acoustical treatments to minimize the exchange of noise between rooms of separate units and separate dwelling units irrespective of the direction of air movement. Duct noise for centralized systems shall be reduced to a minimum acceptable level as prescribed for the uses in Section 23-1414. Ventilation ducts shall be connected to the outside to enable the mixture of fresh air with existing air. It shall be permissible to use acoustical treatments to absorb metal ducting carrying sonic vibrations, where such treatments include the use of a length of flexible duct near the point of origin.

1. Lining of ducts. For centralized systems where the whole or a sufficient length of the ducts between rooms are lined with sound-absorbing materials, such systems shall be deemed to provide reduction in noise.

2. Location of fans associated with vents. Where fans associated with vents are located at the external ends of ducts and away from interior of rooms, such locations shall be deemed to provide reduction in noise.

Section 23-1413 Controls for Interior Components. Interior components shall include interior walls, partitions, floors, vents, pipes and other elements that can transmit interior air-borne noise and structure-borne noise. Penetrations or openings in walls, partitions and floor-ceiling assemblies for piping; electrical devices; recessed cabinets; bathtubs; soffits; or heating, ventilating or exhaust ducts shall be sealed, lined, insulated or otherwise treated to maintain the required ratings for STC, and IIC for floor-ceiling assemblies. Doors, hatches, access openings, windows and other openings permitted, within such walls, partitions and floor-ceiling assemblies shall maintain any fire-resistance ratings required by Articles III and IV of this Chapter, and shall be tight-fitting to their frames and sills; joints shall be properly sealed with approved sealants.

a. Interior walls and partitions. In addition to any fire-resistive construction required by Articles III and IV of this Chapter, Interior walls and partitions between adjacent tenants, dwelling units, separate units or uses shall be constructed to meet STC ratings required in Section 23-1416.

    1. Air-borne sound. Walls and partitions separating tenants, dwelling units, other units from each other or from public or service areas and walls and partitions, separating adjacent tenants or uses in Sections 23-1414 and 23-1416, shall have STC ratings of not less than the ratings for use-types in Section 23-1416. The STC rating shall be as when tested in accordance with ASTM E 90.

    2. Structure-borne sound. Walls and partitions where constructed, shall be limited from transmitting vibrations from floor systems to adjacent spaces; separate tenants and separate units by use of floor systems in Section 23-1413b or by any other system that can be tested for reduction in transmission of structure-borne sound.

b. Floors. In addition to any fire-resistive construction required by Articles III and IV of this Chapter, Floor-ceiling assemblies between adjacent tenants, dwelling units, separate units or uses shall be designed and constructed to meet the STC and IIC ratings required in Section 23-1416.

    1. Air-borne sound. Floor-ceiling assemblies separating tenants, dwelling units, other use-type units from each other or from public service areas and such assemblies separating adjacent tenants or uses in Sections 23-1414 and 23-1416, shall have STC ratings of not less than the ratings required in Section 23-1416. The STC rating shall be as when tested in accordance with ASTM E 90. Penetrations or openings in floor-ceiling assemblies shall be in accordance with Section 23-1413.

2. Structure-borne sound. Floor-ceiling assemblies separating spaces as set forth in Section 23-1413b1 shall have IIC ratings of not less than the ratings required in Section 23-1416. The IIC ratings shall be as when tested in accordance with ASTM E 492. Impact insulation required for effective IIC ratings shall also be accomplished by preventing vibration energy from being transmitted into the structure.

   a) For wood frame, concrete metal deck, or reinforced concrete flooring it shall be permissible to use a thick padding underneath the carpet as a method for minimizing the impact and transfer of vibration energy.

   b) A "locally reacting floating floor" system, such as one using a ceramic tile over cork, that allows impact force to be transmitted to the structure through an elastic material acting as a damper within an intermediate area, and ensures that the impact is also controlled by using a spring isolation pad deflection as the isolator, shall be deemed to reduce the effects of vibrations.

   c) A "resonantly reacting floating floor" system, that includes a rigid layer above the spring isolation pad to dissipate vibration energy through dampening and stiffness, such as one constructed using gypsum topping over an isolation pad, shall be deemed to reduce the effects of vibrations.

   d) For five additional points to the STC/IIC, it shall be permissible to use a standard 10-inch (254 mm) floor joist system, with 3½-inch (89 mm) or thicker un-faced glass fiber insulation in the joist cavity.

   e) For ten additional points to the STC/IIC, it shall be permitted to use resilient channel, or Resilient Sound Insulation Clips, where STC rating of 50 or better is required.

   f) For four additional points to IIC ratings, it shall be permissible to use two layers of gypsum wallboard on resilient channel instead of a single layer of gypsum wallboard.

   g) To attain STC rating of 52 or better, it shall be permissible to use a total combined mass of the sub-floor and ceiling layer that is greater than five psf (239 Pa).

   h) It shall be permitted to apply impact-insulation products as follows:

      1) A topping thickness for a resonantly reactive system shall be 1½ inches (38 mm) for crack prevention; a ¾ inches (19 mm) layer shall be provided for a one-hour fire-resistance rated assembly when used directly over the sub-flooring. The added mass from the topping shall also be deemed to add to the STC rating.

2) In order to attain STC rating of 52 without a ceiling system below, a concrete slab floor of six inches (152 mm) shall be permissible.
3) It shall be permissible to use an impact system without gypsum topping in a concrete floor system that meets the STC rating requirements.

i) For wood frame flooring construction, hard surface flooring areas shall be required to include the addition of an impact insulation layer. For a 10-inch (254 mm) wood frame construction, where the finish flooring consists of a mixed-hard surface system throughout such as with tile and engineered wood flooring system or equivalent:

1) It shall be permissible to use 1½ inch (38 mm) gypsum topping over an insulation pad on the floor system, un-faced glass fiber insulation in the joist cavities, and a single layer of wallboard mounted on resilient channels on the ceiling below with glass fiber insulation; this floor assembly shall be deemed to comply with Section 23-1416B. An additional wallboard layer, including a 0.4-inch (10 mm) cork sheeting and modified drainage mats that are field-tested or laboratory-tested and where installed below the ceiling shall be deemed to improve the performance of the floor assembly. This method of flooring shall be permissible for use in individual rooms or spaces such as kitchens, halls, and bathrooms, by using the isolation pad under the gypsum topping below the hard surface area; or where a dam is placed to allow the gypsum topping to float without being held by the adjacent space, the isolation pad may be left out in other areas of the dwelling unit or the remainder of the floor; and permits the use of a single layer of 0.6 inches (16 mm) gypsum wallboard mounted on resilient channel below the ceiling.
2) It shall be permissible to use ¾ inches (19 mm) gypsum topping on the subfloor if the finishes are mixed between the carpet and hard surfaces.

j) Floor finishes using the different systems of impact insulators are permissible if the systems use two layers of 0.6 inches (16 mm) gypsum wallboard on the ceiling below with resilient channels for compliance with Table 23-1416B.

1) Ceramic tile or marble consisting of 0.4 inch (10 mm) cork sheeting.
2) Sheet vinyl or vinyl composite tile (VCT) as a hardboard two-sheet system.
3) Engineered wood flooring using felt pads.
4) For a "tongue-and-groove" wood flooring system in a wood frame assembly, plywood, gypsum wallboard or gypsum topping shall be

permissible for compliance with Section 23-1416B.

5) For concrete flooring with six inch (152 mm) thickness that yields STC rating of 52, the addition of four-inch (102 mm) airspace, glass fiber insulation, and a single layer of gypsum wallboard shall be deemed to attain STC ratings of 58. For this, additional treatment for compliance with IIC ratings set forth in Section 23-1416 shall be as follows:

   i. Ceramic tile or marble, consisting of 0.4 inches (10 mm) cork sheeting.

   ii. Sheet vinyl or vinyl composite tile (VCT) as a hardboard two-sheet system.

   iii. Engineered wood flooring as fiberboard.

   iv. "Tongue-and-groove" flooring with ¾ inch (19 mm) thickness, using isolation board with "wood-nailers."

Pipes and vents. All water pipes and all vents shall be installed in such a manner as to minimize the transmission of noise to and within any indoor noise-sensitive areas of the building or space.

1. Pipes. All water pipes to and from sinks, toilet facilities and laundry facilities shall be installed with sound-deadening acoustical materials to prevent the transfer of noise to adjacent tenant spaces, adjacent dwelling units and to other Indoor noise-sensitive areas of other units.

   a) All voids around pipes shall be packed with rock wool or equivalent sound-deadening materials, and all pipes shall be wrapped at all points of contact with any wood or steel members, and strap hangers.

   b) All insulation materials wrapped around pipes shall possess flame-spread ratings and smoke-development ratings as required by the Building Official.

2. Vents. It shall be permissible to use baffle boxes around non-motorized or non-powered interior or exterior vents to reduce the external noise. Noise-reduction mechanisms for interior or exterior motorized or powered vents shall be designed by a professional mechanical contractor or a registered design professional with expertise in such designs.

d. Details for ensuring attainment of high STC/IIC ratings. Construction details for lighting penetrations, vents and pipes, wall systems and floor systems, the use of resilient channels and "resilient sound insulation clips," resilient caulking, and other details for the control of noise through paths in framing shall be used by the contractor or executor of work. The use of sealants shall include the following:

1. Acoustical Sealants. Acoustical sealants shall be installed around the perimeters of all acoustically insulated partitions.

2. Application of Sealants. At least two continuous beads of sealants shall be used at the top and bottom of metal stud tracks and other framing members where their interface with substrate is defined.

3. Penetrations through assemblies. All penetrations through acoustical assemblies, including but not limited to electrical receptacle boxes, light fixtures, sprinkler heads, ductwork and pipes shall be sealed, except for penetrations through fire-resistant rated construction where the penetrations are required to be fire-stopped.

Section 23-1414 Acceptable Intrusive Noise Levels for Interior Spaces. Every building and space shall be designed and constructed with materials and construction methods to minimize the effects of external noise sources within the interior of the building or space. The STC ratings of exterior components shall be such that effects of exterior sound/noise set forth in Section 23-1415, within interior spaces for the "criteria for human exposure to sound" shall be at least five dB less than the intrusive levels stated below. (For example, to attain 35 dBA indoors, where exterior is 85 dBA, minimum STC shall be 50). Uses/situations not listed below shall be at no more than 45 dBA.

Table 23-1414 A

Building/Space, Occupancy Use [a] Or Situation	**dBA**	**NR***
Apartments/Condominium/flats, living areas	45	35
Apartments/Condominium/flats, sleeping areas	35	25
Banks	50	40
Churches/places of worship	35	25
Cinemas/Movie theatres	35	25
Classrooms	35	25
Concert Halls	30	20
Conference Rooms	30	20
Court Rooms	35	25
Council Chambers	35	25
Department stores/Retail/Mercantile uses	55	50
Hospital wards	35	25
Hotels/Motels, residential portions/bedrooms	35	25
Houses/Townhouses, living areas	45	35
Houses/Townhouses, sleeping areas	35	25
Lecture rooms	35	25
Libraries, book loan areas	45	35
Libraries, book reference areas	40	30
Music rooms	30	20
Offices, private	40	30
Offices, public areas	50	40
Open-air theatres	40	30
Radio studios	30	20
Restaurants	50	40
Recording studios	30	20
Shops	55	50
Telephone rooms	50 - 55	40 - 45
Television studios	35	25
Theatres	30	20
Typing pools	55	50
Working areas of commercial kitchens/canteens etc	60	55

*** NR** = Noise Rating used for plotting "Noise Rating" curves and graphs with "Sound Pressure Levels" (the dBA levels above) in order to provide a range of intrusive noise ceilings (noise limits) over six frequency bands (125 Hz, 250 Hz, 500 Hz, 1000 Hz, 2000 Hz and 4000 Hz, which are within the normal human voice range) between 0 Hz to just beyond 4000 Hz.

a. The Acceptable Intrusive Noise Levels for spaces or uses not included above, but described in the Occupancy Load Table of Section 1004.1.1 of Article IV of this Chapter, shall be as determined by the registered design professional and shall be not more than 45 dBA.

Section 23-1415 Constructed Details Shall Minimize the Effects of Outdoor Noise. Every building and space shall be designed and constructed to minimize the effects (as shown in Table 23-1415B) of exterior outdoor noise within the interior of the building or space. Table 23-1415A,

though not all inclusive, indicate some minimum outdoor noise levels generated from noise sources for which exterior building envelopes shall be designed and constructed to meet the requirements of 23-1414. The minimum DNL level for design and construction of buildings in the Village of Arlington Heights shall exceed 75 dB; nothing in this Code prevents the Registered Design Professional or the contractor from assigning higher Noise levels and higher STC ratings required to maintain the building's interior at the sound levels prescribed in 23-1414.

Table 23-1415 A

Noise Source/Activity	Noise Level (dBA) *
Auto horn within 3 feet	120
Thunder clap	120
Construction equipment	See Section 23-1419
Garbage truck	100
Heavy truck within 50 feet	90
City traffic	90
Motorcycle	85
Freeway traffic	70
1,000 cars per hour, traveling at 40 mph	65 (daytime)
100 cars per hour, traveling at 40 mph	65 (night)
Siren at 100 feet Fire Engine siren Ambulance siren Police sirens	140 120 120 120
Railway noise Railway horn (within 100 feet)	80 dB and above 96 dBA
Lawn mowers	95 dBA to 120 dBA
Gas Weed-Whacker	100 dB to 105 dB
Electrical Lawn mowers	68 dB and above
Leaf blowers Gasoline-powered leaf blowers	65 dBA to 103 dBA Up to 110 dBA to 112 dBA
Chain saw (during cutting)	Up to 116 dBA
Power saw	95 dBA to 115 dBA
Generators (within 21 feet)	60 dBA to 80 dBA
Air-condition unit	75

Table 23-1415 B

Noise Level (dB)	Effect of noise on Humans
140 and above	Painfully loud and very dangerous (pain at 125)
120	Need to exert maximum vocal effort, dangerous
110	Extremely loud (hazardous for 30 minutes)
100	Very loud (hazardous for 2 hours)
90	Very annoying, (hazardous for 8 hours)
80	Annoying
70	Telephone use becomes difficult
60	Intrusive

Section 23-1416 Proposed Construction shall reduce transmission of interior noise. Building and spaces shall be designed and constructed to reduce the transmission of interior air-borne noise and structural-borne noise. Table 23-1416A, though not all inclusive, indicates examples of minimum interior noise levels generated from sources of noise, measured at distances* that a person would typically be from the source, for which interior building components can be designed and constructed to minimize interior air-borne and structural-borne noise. Tables: 23-1416B, 23-1416C and 23-1416D; indicate the minimum STC/IIC ratings required for interior spaces and uses.

Table 23-1416A

Device used indoors/activity indoors	dBA at distance of use*
Air Compressor/Indoor shop tools	90 to 95
Air Heating System (forced hot air)	42 to 55
Air Popcorn popper	78 to 85
Alarm Clock	60 to 80
Background music	50
Bathroom exhaust fan	54 to 55
Clothes dryer	56 to 58
Clothes washer	65 to 70
Clubs and discos	91 to 96
Coffee grinder	84 to 95
Dance floors	85 to 100
Dishwasher	63 to 66
Electric can opener	81 to 83
Food processor	93 to 100
Food processor	93 to 100
Garbage disposal	76 to 83
Hairdryer	80 to 95
Handheld electronic games	86 to 91
Handheld electronic games	68 to 76
Home interior (average)	50 (but, see Table 23-1414A)
Home stereo	85 to 115
Jazzercise class/aerobics etc	90 to 92
Kitchen exhaust fan (high)	69 to 71
Microwave	55 to 59
Printer	58 to 65
Radio playing in background	45 to 50
Sporting events; referee whistles	95 to 100; 103 to 107
Stereo (maximum output)	100 to 110
Vacuum cleaner	84 to 89

* Although sound level is perceived as decreasing by 6 dB each time the distance from the source is doubled, limitations by using longer distances in lieu of high dBA levels are not enforceable therefore the maximum level shall be assumed for sound attenuation purposes.

Table 23-1416B: STC Ratings and their performance requirements

STC Range Laboratory Rating	STC Range Field Rating	Required results in adjacent interior spaces in Arlington Heights, (Comments)
26 to 30	20 to 22	Most sentences spoken are clearly understood in the adjacent space. (Not approved for use in the Village of Arlington Heights)
30 to 35	25 to 27	Many phrases and some sentences understood without straining to hear. (Not approved for use in the Village of Arlington Heights)
35 to 40	30 to 32	Individual words and occasional phrases clearly heard and understood. (Not approved for use in the Village of Arlington Heights)
42 to 45	35 to 37	Medium loud speech clearly audible, occasional words understood. (Not approved for walls/partitions in the Village of Arlington Heights)
47 to 50	40 to 42	Loud speech audible, music easily heard. (Not approved for walls/partitions in the Village of Arlington Heights)
52 to 55	45 to 47	Loud speech audible by straining to hear; music can normally be heard but can be disturbing.
57 to 60	50 to 52	Loud speech essentially inaudible; music can normally be heard faintly but bass notes can be disturbing.
62 to 65	55	Music can be heard faintly, bass notes "thump", power wood-working equipment can be clearly audible.
70	60	Music can still be heard but very faintly, if music is played loud
Above 75	Above 65	Effectively block most air-borne noise sources

STC ratings shall be such that to attain Acceptable Intrusive Noise level of 35 dBA indoors, when the exterior noise is 85 dBA, the minimum STC required shall be 50.

All STC ratings used in the Village of Arlington Heights shall be based on the field-tested values.

For construction in interior spaces, acoustical treatment and/or materials with high NRC ratings shall be permitted to be used for composite insulation protection, in addition to the minimum STC rating stated, so as to improve the sound attenuation.

See Table 23-1416C.1, Table 23-1416C.2 and Table 23-1416C.3 for additional requirements for interior spaces and uses.

Table 23-1416 C.1: Floor-ceiling Assemblies' STC* and IIC Insulation for adjacent units in Multifamily, Hotel/Motel and Condominiums

Unit #1	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Corridor above
Unit #2	BEDROOMS (below)					LIVING ROOMS (below)					KITCHENS (below)						FAMILY ROOMS (below)			Bath-room below	Corridor (below)
STC	55	57	58	60	55	57	55	55	58	55	58	52	55	55	55	50	60	58	55	52	50
IIC	55	60	65	65	65	55	55	60	62	60	52	55	55	55	60	55	50	52	55	52	50

*STC ratings shall also apply to walls separating the adjacent rooms/uses from separate dwelling units; it shall be permissible to use acoustical finish materials with NRC ratings of 0.20 or more in addition to the prescribed STC

Table 23-1416 C.2: Floor-ceiling Assemblies' STC* and IIC Insulation for adjacent units in Two-Family Dwelling Units stacked and Up to Four units

Unit #1	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Corridor above
Unit #2	BEDROOMS (below)					LIVING ROOMS (below)					KITCHENS (below)						FAMILY ROOMS (below)			Bath-room below	Corridor (below)
STC	52	54	55	56	52	54	52	52	54	52	55	52	50	52	52	48	56	54	52	50	48
IIC	52	57	62	62	62	52	52	57	60	57	50	52	52	52	58	52	48	50	52	50	48

*STC ratings shall also apply to walls separating the adjacent rooms/uses from separate dwelling units; it shall be permissible to use acoustical finish materials with NRC ratings of 0.20 or more in addition to the prescribed STC

Table 23-1416 C.3: Floor-ceiling Assemblies' STC* and IIC Insulation for adjacent uses in Single-Family Dwellings, Townhouses and attached Row-housing

Unit #1	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Family Room above	Corridor above	Bed-room above	Living Room above	Kitchen above	Bath-room above	Corridor above
Unit #2	BEDROOMS (below)					LIVING ROOMS (below)					KITCHENS (below)						FAMILY ROOMS (below)			Bath-room below	Corridor (below)
STC	48	50	52	52	48	50	48	48	52	48	52	48	46	48	48	46	52	52	48	48	46
IIC	48	53	58	58	58	48	48	53	56	53	46	48	48	48	54	48	46	48	50	48	46

*STC ratings shall also apply to walls separating the adjacent rooms/uses from separate dwelling units; it shall be permissible to use acoustical finish materials with NRC ratings of 0.20 or more in addition to the prescribed STC

Table 23-1416D: STC required in Commercial Spaces[a,c]
(Materials[d] and construction details for STC rated assemblies shall be used with 23-1414)

Room occupancy/use or situation with the noise source	**Adjacent receiver space**	**STC** require[e]
Executive private office rooms, doctor's suites, Personnel offices, Executive Conference and board rooms, Confidential office areas, etc.	Adjacent offices, and other related spaces	50 to 55
	Corridors and public spaces	Not less than 60
Normal offices, regular staff meeting rooms, semi-private offices, other general uses classified under Group B use group in Article IV.	Adjacent offices, and other related spaces	45 to 50
	Corridors and public spaces	50 to 55
Large general business offices, banking floors	Corridors, lobby areas and public spaces, customer area	45
Shop and laboratory offices in manufacturing labs or test areas	Adjacent offices, test areas, corridors	45
Mechanical equipment rooms, machine rooms,	Any space or use	Not less than 60
Mercantile, Retail stores, shopping areas	Any space or use	45
Schools and its related spaces	Any adjacent spaces	Note: a
Theatres, concert halls, lecture halls, Radio/TV studios, other Acoustically sensitive uses	Any adjacent spaces	Note: a
Parking garages and automobile repair shops, etc (See Note "b")	Any adjacent use	Not less than 60

Notes:

a. Design and construction requirements shall be determined by the registered architect or the consulting registered design professional for the project.
b. Design and construction shall take into account insulation from vibration and vibration noise.
c. Criteria for any spaces or uses not included in this Table 23-1416D or other Tables in this Code shall be as determined by the registered architect or the consulting registered design professional for the project.
d. Materials with high NRC ratings shall be permitted to be used for composite insulation protection in addition to the minimum STC rating stated.
e. It shall be permissible to assume that to attain 35 dBA levels indoors, when exterior is 85 dBA, minimum STC required shall be 50.

Section 23-1417 Minimum requirements for existing buildings: Existing buildings and structures shall, within their life-cycles, be maintained to meet the following minimum standards.

It shall be the duty and responsibility of every property owner to ensure that their building is adequately protected against exterior noise levels and their effects on humans and property.

a. Standards for existing single-family residential buildings. Insulation requirements for energy conservation shall be permitted to be used to count toward sound insulation required for exterior building components, as follows:

Source (Existing)	To count for Existing Building Components (R-Values)				
Energy Type	**Attic Floor**	**Exterior Wall**	**Floor Over Heated Space**	**Crawl Space Wall**	**Interior Basement Wall**
Natural Gas	R-49	R-18	R-25	R-19	R-11
Heat Pump	R-49	R-18	R-25	R-19	R-11
Fuel Oil	R-49	R-18	R-25	R-19	R-11
Electric Res	R-49	R-22	R-25	R-19	R-19

All parts of the building components shall maintain the R-Values stated above. The existing building shall be deemed to be not compliant with this Code where deficient in meeting the R-Values stated above, or if the STC ratings of the existing exterior envelopes are less than 45 as shown in Table 23-1417B.

b. Standards for existing commercial buildings. Existing commercial buildings shall be deemed to be non-compliant with this Code where their exterior wall STC ratings are less than 45 as shown in Table 23-1417B. With the exception of existing multi-family condominiums and apartments, existing commercial buildings that are less than 5,000 square feet shall be permitted to use R-Values of 23-1418a for exterior sound insulation.

c. General housekeeping items for maintenance, repair and replacements. The building components for sound insulation in every building or structure shall be maintained as non-defective, repaired when required, and replaced where defective. General housekeeping items related to Section 23-1412a3 shall apply to all buildings and structures used by humans, but shall only require permits when total cost of materials and labor exceeds $1,000.

1. General housekeeping items related to upkeep of exterior doors shall be such that it shall be required to install weather-stripping in existing buildings to limit the air infiltration or air leakage for infiltration (not to exceed 0.3 cfm) of exterior sound; common types shall be "spring-metal" type, "adhesive-backed spring vinyl," "tubular gasket," "wood-and-foam composite" type, "metal-backed felt" type and "adhesive-backed foam strip;" any of which shall be permitted to be used as door treatments for:

a) Door-side treatments. Use of "spring-metal" type, foam strip, tubular gasket, "wood-and-foam composite" type, "adhesive-backed spring vinyl."

b) Door-bottom treatments. Use of "rubber or plastic blade," rubber gasket, "spring-metal" type or a "do-it-yourself" inner-tube rubber slipped into a groove routed in the saddle beneath the door.

2. Replacement of exterior doors, windows, skylights shall be of doors, windows and skylights that shall meet or exceed the required STC ratings; permits shall only be required when the total cost of materials and labor exceed $1,000.

d. Alternative compliance methods for existing single-family residential buildings. It shall also be permissible to use the pamphlet publication "Sound Insulating Your Home", published under the O'Hare Residential Sound Insulation Program, as an alternative compliance method for modifying existing single-family-residential buildings.

Section 23-1418 Statement of Design Compliance and Construction/Installation Compliance. Statement of Design Compliance shall be made on forms developed by the Building Department and shall be completed by a registered design professional, and submitted at the time of permit application. Statements of Construction/Installation Compliance shall be made on forms developed by the Building Department and shall be completed by the contractor or permittee, and submitted to the Building Department at the time, prior to requesting inspection for the phase of work related to the sound insulation component items. The statement of Design Compliance, together with the Statements of Construction/Installation Compliance, shall be used by the contractor or permittee to generate the certificate that is required by Section 23-1408. Inspections without the Statement of Construction/Installation Compliance shall constitute a failed inspection and shall be subject to a re-inspection fee.

Section 23-1419 Construction Work Sites. Construction work sites adjacent to any outdoor noise-sensitive areas or adjacent to any building or structure with indoor noise-sensitive areas and uses listed in Section 23-1414, where equipment or activities generate ground-borne vibrations, ground-borne noise above 50 VdB and/or where air-borne noise levels of equipment or activities shall exceed 70 dBA shall be screened from the noise sources with a sound barrier wall that meets the following requirements:

a. Noise barrier walls shall be made of any outdoor weather-resistant solid material that shall meet a minimum sound transmission loss requirement.

b. Materials permitted under this Code shall include 16-gauge steel, 1-inch-thick plywood, brick or concrete wall; all materials shall have a surface density of not less than 3 pounds per square foot.

c. Barrier walls shall be capable of supporting its own weight or shall be designed and constructed with foundations/anchorage for ensuring stability of the barrier wall.

d. Barrier walls shall be placed within the metes and bounds of the property, and shall not encroach on any adjacent property or encroach into the public-right-of-way.

e. Gaps between barrier wall panels shall be sealed to maximize the effectiveness of the barrier wall.

f. The contractor or permittee shall apply for a separate permit, at no charge, for the installation of the barrier wall and the permit for the building construction shall not be issued until after the barrier wall is installed on the site.

g. The barrier wall shall be deemed to meet the requirements for fencing under Section 23-110, Building Operations.

h. The barrier wall shall be considered as a temporary structure for the duration of the construction project.

i. It shall be permissible to use additional ground-noise absorption techniques such as berms, to minimize the impact of ground-borne noise and ground-borne vibrations.

j. The installation of noise barrier walls and materials shall not be deemed to grant permission to violate any of the provisions of Section 23-110.

k. The noise barrier wall shall be of such height as required by Section 23-1419n2.

l. The noise barrier wall, when erected on the lot lines shall be not more than 12 feet in height where permissible by the Village Zoning Ordinance.

m. The noise barrier wall shall be maintained and shall be free from any graffiti for the entire duration of the construction project. The contractor of record or the permittee shall be responsible for removing any graffiti and repairing any damages to the wall.

n. The contractor or permittee shall furnish a list, in accordance with Section 23-1404 d3, of the various types of construction equipment and their factory-listed noise dBA levels. The examples of construction equipment and their noise emissions in Table 23-1419n is provided as a guide only, as the actual field tested noises could exceed the dBA values listed in Table 23-1419n. The contractor or permittee is responsible for equipment, activities on the work site and the resulting impact of such activities on adjacent properties or neighborhoods.

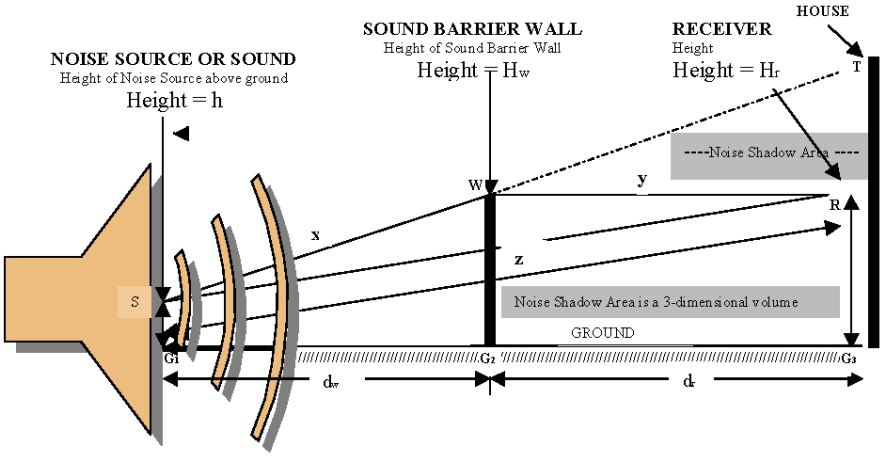
Table 23-1419n: Construction Site, Equipment, Activities and Noise Emissions

Construction Equipment's Noise Emission or Activity	Typical Noise Level dBA (50 feet from* source)
Abrasive blasting	105 to 110
Air Compressor	81
Backhoe	80
Ballast Equalizer / Tamper	82 / 83
Blasting from construction project (activity)	100
Bulldozers and other heavy machinery	93 to 100
Chain saw operations	Up to 125; idle at 91 to 98
Compactor	82
Concrete joint cutter	99 to 102
Concrete Mixer	85
Concrete Pump	82
Concrete Vibrator	76
Crane	90 to 96
Crane: derrick / mobile	88 / 83
Demolition work (activity)	Up to 117
Earth tamper	90 to 96
Front-end loader	86 to 94
Generator	81
Grader	85
Grade all	67 to 94
Hammer	87 to 95
Heavy equipment operation (activity)	95 to 110
Heavy trucks moving on site (activity)	90
Impact wrench	85
Jack hammer	88; 102 to 111
Loader	85
Needle guns	Up to 112
Paver	89
Pile driver – impact / sonic	101 / 96
Pneumatic chip hammer	103 to 113
Pneumatic tool, other	85 and above
Pump	76
Rail saw	90
Rock drilling (activity)	98 and up to 115
Roller	74
Saw	76
Scarifier	83
Scraper	89
Shovel	82
Spike driver	77
Tie cutter / handler / inserter	84 / 80 / 85

*Each time the distance from the noise source doubles, noise may be perceived to be reduced by 6 dB, but using Codes to limit the actual location of noise source could hamper construction activities, work schedules and the estimated completion dates; therefore this Code prescribes the use of barrier walls [23-1419n2] around the site.

1. Nothing in this Article prohibits the contractor or permittee from erecting the temporary wall within 50 feet of the noise source that can later be moved to the boundaries of the site as work later progresses beyond the scope for use of noise generating equipment or activities. However the design, including but not limited to materials and locations, of such temporary walls and their configurations shall be submitted on a drawing for permit issuance, prior to the erection of the walls. For the purposes of this Article, it shall be permissible to construct walled enclosures around especially noisy activities or around clusters of noisy equipment. Where the legal boundary of the site is more than 50 feet from any outdoor noise-sensitive areas or more than 50 feet from any indoor noise-sensitive areas or uses listed in Section 23-1414, it shall be permitted to construct the barrier wall to be not more than six feet in height.

2. The height of the noise barrier wall shall be determined as follows: Height (H_b) > 5 feet and as determined from the calculations below and Table 23-1419n2



Determining the height of the Barrier Wall (H_w):
Ground/grade levels: G_1 (at Noise Source), G_2 (at bottom of Barrier Wall), G_3 (at Receiver's position)
$G_1G_2 = d_w$ = horizontal distance from Noise Source to the bottom of barrier wall;
$G_2G_3 = d_r$ = horizontal distance from Barrier Wall to the Receiver's position;
$G_1G_3 = D$ = horizontal distance from Noise Source to the Receiver's position;
Position S = height level of Noise Source; height of Noise Source above ground = h
Position W = top of Barrier Wall (yet to be determined); distance $G_2W = H_w$ represents height of Barrier Wall
Position R = Location of receiver (at exterior of building envelope; varies from ground to stories above grade)
Distance SW = x; Distance WR = y; Distance SR = z

The Noise Shadow Area shall include the entire length of the Barrier Wall facing the Receiver and the outer regions defined by WG_2G_3T, where the Noise Levels are reduced because of the Barrier Wall's height (H_w).
The Barrier Wall shall be required to reduce the Site Noise by a factor approximately equal to the "P";
where P is the "Path Length Difference": P = (x + y) – z; the greater value of P, the more the noise is reduced.
Using:

$x = [d_w^2 + (H_w - h)^2]^{½}$ $y = [d_r^2 + (H_w - H_r)^2]^{½}$ $z = [(D)^2 + l(H_r - h)l^2]^{½}$

Therefore the height of the Barrier Wall (H_b) will be based on how much noise level is to be reduced.

The height of the barrier wall shall depend on:

a) By how much dBA the site noise is to be reduced at the receiver end defined as the nearest adjacent building's envelope or the nearest outdoor noise-sensitive area. The dBA at the nearest adjacent building's envelope shall be not more than 75 dBA. Since the Village only allows a maximum dBA reduction of 24 dBA through use of barrier walls, it shall be permissible to add berms and/or other noise absorption features to the interior noise-source side of the barrier wall.

b) The height of the noise source above the ground level.

c) The distance from the noise source to the barrier wall.

d) The distance from the nearest adjacent building envelope (receiver) to the noise source.

e) The distance from the nearest adjacent building envelope (receiver) to the location of the barrier wall.

f) Calculations, such as in item h.

g) The numerical value of the "path length difference" (P), using Table 23-1419n2

Table 23-1419 n2: dBA reduction values for Ideal Solid Sound Barrier Wall

Path-Length Difference (feet) P = (x + y) – z	Octave Band Center Frequencies (Hertz) with corresponding dBA							
	31	63	125	250	500	1000	2000	4000
0.01	5	5	5	5	5	6	7	8
0.02	5	5	5	5	5	6	8	9
0.05	5	5	5	5	6	7	9	10
0.1	5	5	5	6	7	9	11	13
0.2	5	5	6	8	9	11	13	16
0.5	6	7	9	10	12	15	18	20
1.0	7	8	10	12	14	17	20	22
2.0	8	10	12	14	17	20	22	23
5.0	10	12	14	17	20	22	23	24
10.0	12	15	17	20	22	23	24	24
20.0	15	18	20	22	23	24	24	24
50.0	18	20	23	24	24	24	24	24

Higher noise frequencies are attenuated more effectively with Barrier Walls than lower noise/sound frequencies, Site Noise from lower
Frequencies shall be attenuated using Barrier Walls and other methods that will reduce the impact of ground-borne noise and vibrations.

At a minimum, the Barrier Wall shall be at least five (5) times wider than it is high; but for effectiveness wall shall enclose the site.

For the same height of Barrier Wall (H_w) and distance D, the value of P = (x + y) – z is always greater when the Barrier Wall is closer to the Noise Source

For maximum sound absorption, Barrier Walls shall be constructed of solid, non-porous materials such as steel, wood, composition boards,
Additional sound absorption materials can be used on the Noise-Source side of the Barrier Wall

h) For a site with noise-Source at four feet above ground and 20 feet horizontally from the adjacent neighbor's exterior wall (receiver), if the barrier wall is to be placed 10 feet from the noise-source of 96 dBA; and that provisions be made for 23 dBA reduction at 4,000 Hz and 22 dBA at 1,000 Hz, etc. at four feet (window level) above grade , by using Table 23-1419n2 the corresponding value of P is 2.0, thus allowing calculations for H_w (barrier wall height) as follows:

$x = [d_w^2 + (H_w - h)^2]^{½}$ $y = [d^2 + (H_w - H_r)^2]^{½}$ $z = [(D)^2 + |(H_r - h)|^2]^{½}$

$x = [10^2 + (H_w - 4)^2]^{½}$ $y = [10^2 + (H_w - 4)^2]^{½}$ $z = [(20)^2 + |(4 - 4)|^2]^{½}$

$x = [100 + (H_w - 4)^2]^{½}$ $y = [100 + (H_w - 4)^2]^{½}$ $z = [400 + |(0)|^2]^{½}$

Since d_w = 10 feet; h = 4 feet; d_t = 10 feet; D = 20 feet; H_r = 4 feet above grade; P = 2.0

Since P = (x + y) – z; therefore P + z = (x + y) = 2.0 + $(400)^{½}$ = 2.0 + 20.0 = 22.0 = (x + y)

$$22.0 = [100 + (H_w - 4)^2]^{½} + [100 + (H_w - 4)^2]^{½}$$

Using algebraic equations,

$$22^2 = [100 + (H_w - 4)^2] + 2[100 + (H_w - 4)^2]^{½} + [100 + (H_w - 4)^2]$$

Therefore, H_w can be solved.

3. General assessment criteria for construction noise (1-hour time duration).

Table 23-1419 n3

Land Use	Day/Night* (dBA)
Residential	90/80
Commercial	100/100
Industrial	100/100

* Used for assessment purposes only; Average dBA of all equipment/noise activities on the site for 1 hour

4. Detailed assessment criteria for construction noise (8-hour daily; 30-day average).

Table 23-1419 n4

Land Use	Day/Night* (dBA)	30-day average (dBA)
Residential	80/70	75
Commercial	85/85	80
Industrial	90/90	85

* Used for assessment purposes only; Average dBA of all equipment/noise activities on the site for a 30-day period

5. Effects of high noise levels and responsible party. It shall be the duty of the contractor or permittee to be aware of the effects of high noise levels on humans

and their quality of life. Table 23-1419n5 is provided as a guide to the contractor or permittee to ensure that every effort is made by the responsible party to minimize the noise impact from construction sites. By obtaining a permit in the Village of Arlington Heights and proceeding with the work, the contractor shall be deemed to be responsible for mitigating all construction site noise and their effects on adjacent properties and users. For the purposes of this Article, the person executing the work is the responsible party.

Table 23-1419n5

Noise Level (dB)	Effects of Noise on humans (recommended duration of constant noise)	Effects of Vibration Noise (where applicable)
180	Irreversible hearing loss (Not permitted in Arlington Heights)	Some damages to building and property
140	Painfully loud (Not permitted in Arlington Heights)	Damage to building and property
120	Need to exert maximum vocal effort (115 dB limited to no more than 15 minutes)	Possible damage to buildings
110	Extremely loud (Not recommended for more than 30 minutes)	Possible damage to buildings
100	Very loud (Not recommended for more than 2 hours) (105 dB limited to no more than 1 hour)	Possible cosmetic damage to fragile buildings
90	Very annoying (hearing damage after 8 hours) (95 dB limited to no more than 4 hours)	Difficulty with tasks such as reading computer screen
80	Annoying	80 dB to 85 dB; residential annoyance
70	Telephone use becomes difficult	
60	Intrusive	50 dB threshold of human perception for vibrations

SECTION TWO: That the Director of Building is hereby authorized to create such forms, informative brochures and pamphlets, and make available copies of bulletins and such information concerning usable products and materials, such as will be of assistance to the general public.

SECTION THREE: That Article XIV of Chapter 23 of the Arlington Heights Municipal Code shall be subject to future modifications and enhancements as future technological improvisations become available for use in sound insulation.

SECTION FOUR: That any design and construction details having variations from the technical provisions of this ordinance shall be reviewed by the Arlington Heights Building Code Review Board to determine equivalent compliance with the intent of this ordinance.

SECTION FIVE: This ordinance shall be in effect from and after February 1, 2007. The Village Clerk is hereby authorized and directed to publish this ordinance in pamphlet form in a manner provided by law.

AYES:

NAYS:

PASSED AND APPROVED this 18th day of December, 2006.

_____
Village President

ATTEST:

_____
Village Clerk

Code Amendments:23 Sound Insulation

APPENDIX C

Sound Insulating Your Home

City of Chicago
Richard M. Daley, Mayor

Sound Insulating Your Home

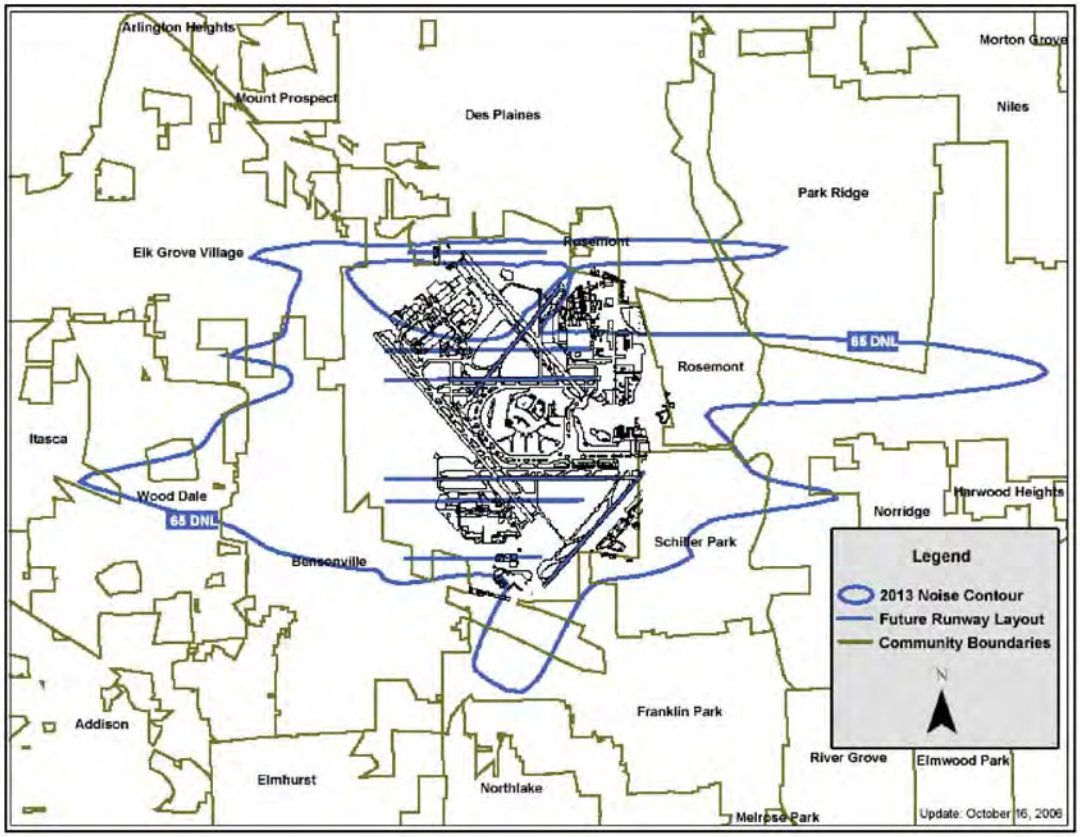
O'Hare Residential Sound Insulation Program

Nuria I. Fernandez
Commissioner
City of Chicago, Department of Aviation

Arlene J. Mulder
Chair, O'Hare Noise Compatibility Commission
Mayor, Village of Arlington Heights

Residential Sound Insulation Program

CHICAGO AIRPORT SYSTEM



Welcome

The City of Chicago Department of Aviation and the O'Hare Noise Compatibility Commission (ONCC) are pleased to present you with this guidebook on sound insulating your home. The genesis for development of this guidebook came in response to requests from residents in municipalities near the airport that desire to insulate their homes to reduce the impact of aircraft and other noise sources. This booklet is the product of research and review by the City's Department of Aviation, Airport Owners Representatives, the City's consultant to the Residential Sound Insulation Program, and the ONCC's Residential Sound Insulation Committee.

The ONCC was created by Chicago Mayor Richard M. Daley in 1996 to bring a fresh, non-confrontational approach to addressing jet noise issues at O'Hare International Airport. Creation of the ONCC resulted from an unprecedented commitment to share decision-making with regional leaders in implementing effective and permanent noise reduction programs. The ONCC's membership as of 2007 consists of:

Arlington Heights	Northlake	School District 63
Bartlett	Oak Park	School District 80
Bellwood	Palatine	School District 81
Chicago	Park Ridge	School District 84
Des Plaines	River Forest	School District 84.5
Elmwood Park	River Grove	School District 85.5
Franklin Park	Rolling Meadows	School District 86
Harwood Heights	Rosemont	School District 87
Hoffman Estates	Schaumburg	School District 88
Maywood	Stone Park	School District 89
Melrose Park	Wood Dale	School District 214
Mount Prospect	Cook County	School District 234
Niles	School District 59	School District 299
Norridge		School District 401

Through its Committees and programs, the ONCC brings to the same table all the parties that are most able to reduce aircraft noise including: city and suburban leaders, the Federal Aviation Administration, the airlines, pilots and air traffic controllers. Together, we are working on solutions to reduce the impacts of aircraft noise.

We hope you find the information on the following pages useful and comprehensive. To further guide you in your endeavor, a listing of material manufacturers who currently provide sound-attenuating products to the program is provided on the inside of the back cover. Please contact them for material specifications and local distributors. The Department of Aviation and the ONCC appreciate the opportunity to provide this information and look forward to continuing our efforts to improve the quality of life for O'Hare's neighbors.

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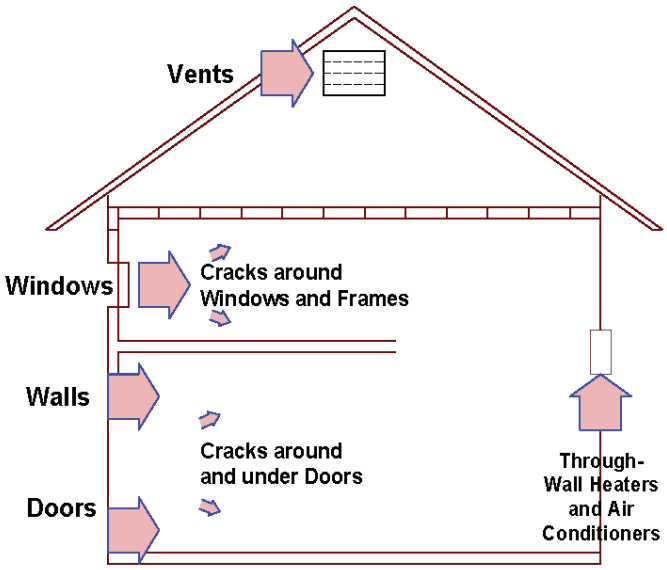
Introduction

Noise enters your home in the same way air enters – through cracks and openings in your home's exterior. Sound insulating your home is merely sealing up the points of air entry and in some cases increasing the mass through which noise must travel. The City of Chicago has been conducting a Residential Sound Insulation Program (RSIP) since 1996. Under this program, homes are selected for the RSIP based on their locations within a noise contour.

A noise contour is generated by compiling all the aircraft flight information for an entire year. This information is entered into a computer that calculates noise levels, and generates a noise contour map which displays the day/night average noise level (DNL) in the areas surrounding the airport. A ten decibel penalty is added to all flights between 10 PM and 7 AM due to the additional disturbance of nighttime activity. This computer-generated noise contour must then be reviewed and accepted by the Federal Aviation Administration before it can be used as the basis of the RSIP. For a single-family, owner-occupied home to be considered for inclusion in the City of Chicago's RSIP, it currently must be located within the 69 DNL or greater noise contour.

This book outlines some of the things you can do to your home to decrease the effects from aircraft noise. You may be able to do some of these things yourself rather inexpensively. However, some items are more difficult and may require the work to be performed by professionals. In some cases, we have provided a brief overview of guidelines for installation. ***Please understand, however, this is not an installation procedure manual.***

The following graphic shows some of the points of entry for air and noise:



Three Major Paths For Noise Transmission:

Gaps and Cracks
Windows and Doors
Walls and Vents

Windows

Old, loose-fitting windows that may rattle when a plane goes overhead or a truck or train passes are probably the greatest source of noise transmission in a home since the windows are in every room. Quality windows, installed in accordance with sound reduction construction procedures, will give you the greatest benefit. If you do not wish to purchase new windows, adding storm windows or merely sealing your existing windows will help alleviate some air and noise transmission.

Replacement Windows

The windows being used in the City of Chicago's Residential Sound Insulation Program are acoustically-rated windows with an STC (sound transmission class that denotes a material's ability to resist sound transmission) rating of 40 to 44, depending on the home's proximity to the airport. The combination of the glass layers, glass thickness and the air spaces between the glass give the windows the acoustical rating. There are few window manufacturers that make "acoustic" windows. Genuine acoustic windows are tested by an accredited laboratory to obtain a certified Sound Transmission Class (STC) rating. When looking for acoustic windows, be sure to request a window with a minimum STC rating of 40.

The Chicago area has several manufacturers of good-quality thermal pane windows that will provide some noise relief. If you purchase thermal pane windows that do not have the storm windows built into the window unit, you should make sure they have wood or metal frames. Windows with wood or metal frames tend to be more compatible with storm windows. Vinyl windows typically are not as compatible with separate storm windows.

Storm windows with laminated glass provide better protection from noise than a non-laminated pane of glass. Increasing glass thickness also improves acoustical performance. Be sure to check with your window manufacturer concerning compatibility regarding storm windows and your existing window units. ***Placing a storm window over any existing window may cause damage to either the storm or prime window.***

As important as the quality of the window itself is the method of installation. Most window installers do not install windows following sound reducing techniques. To obtain the full acoustical benefit, all voids around the windows must be filled with insulation and wood blocking, and the perimeter of the windows must be thoroughly caulked so no air can leak through. Since this is not a typical window installation, you may want to have your purchase agreement with the window company state that the windows will be installed in accordance with the details included in this booklet - Detail W1 if you have frame walls or Detail W2 if you have brick walls. This will give you the greatest sound reduction benefit from your new windows.

Storm Windows

The combination of glass and air spaces increases the acoustical rating of window units. The addition of storm windows over your existing windows will increase the acoustical rating. It should be noted that storm windows should not be installed over vinyl-framed windows. The heat build-up from the sun between the panes of glass may cause the vinyl to warp. Acoustical storm windows are usually constructed with 3/16" or ¼" laminated glass.

Maintenance to Existing Windows

Windows that rattle are a source of air and noise infiltration. Replace any pieces of glass containing cracks. Apply a thin bead of clear silicone caulk around the glass to secure the glass to the frame. Apply caulk around the window frame to prevent air and noise from leaking in around the window.

Skylights

Sound is decreased when it has to travel through mass. By adding a skylight, the mass of the shingles, roof decking and insulation are replaced with a sheet of glass. Typically, skylights are a substantial source for sound transmission. Adding a storm window unit to an existing skylight will reduce some noise transmission. There are some storm window manufacturers that make units which mount on the inside of the existing skylight. There are also a limited number of window companies that sell complete acoustically-rated skylight replacement units. Follow the manufacturer's instructions regarding proper installation to ensure the best performance.

Doors

Doors are another common source for noise and air infiltration. A prime door and a storm door act much like the thermal pane windows and storm windows in that the combination of the doors with the air space in between increases the acoustical integrity of the unit. The installation of new doors with weatherstripping, a new threshold and a bottom sweep will give you the greatest benefit; however, any of the following modifications will give you some decrease in noise and air infiltration. Acoustically rated prime doors, or doors that carry an STC rating around 40 or higher, can be very expensive. If cost is a concern, or if you purchase a door with an STC rating below 40, install a prime and storm door combination.

Replacing Prime Doors

Pre-hung wood solid-core doors should be used. Steel or metal doors are generally not acoustically acceptable because they are constructed of a thin outer layer of metal filled with cork or foam, and do not have sufficient mass to provide adequate sound reduction. A pre-hung door has less tendency to warp than a solid core door that is installed into an existing frame. The installation technique should include removing the existing door and jamb, filling all voids around the door with wood blocking and insulation, and installing the prehung unit. *(See Details D1 and D3 on pages 21 and 23 for the proper method of installation.)* Weatherstripping should be applied around the top and side frames, and a sweep installed on the bottom of the door.

Two critical aspects to look at when choosing a prime door are: (1) the seals and (2) the weight or mass of the door. The better the seals and the greater mass the door has, the better the door will perform against noise. When looking at the seals of the prime door, make sure there is good contact between the weatherstripping on the door frame and the top and sides of the door itself. Make sure the door sweep is made of a durable material and that it makes solid contact with the threshold. Check to make sure that there is no light infiltration along any of the perimeter seals. *(Refer to details D1 and D3 on pages 21 and 23.)*

Replacing Storm Doors

As with prime doors, the acoustical performance of a storm door is also dependent on the door's seals and mass. There are acoustically-rated storm doors available from several manufacturers. However, if you're willing to sacrifice some acoustic reliability for a more cost-effective alternative, a solid core storm door that has a minimum of 3/16" laminated glass is preferred. Once the storm door is completely installed, there should be no light penetration around the perimeter of the door. *(Refer to Detail D2 on page 22.)* Keep in mind that a storm door only has acoustical benefit when the storm window is in place. Consider self-storing glazing units if you occasionally want to use the screens for ventilation purposes.

Weatherstripping Existing Doors

A properly weatherstripped door will provide resistance when you close the door. It is important that weatherstripping be applied on both the prime and the storm doors. Most hardware stores and lumber yards carry weatherstripping intended for homeowner installation. We recommend that the weatherstrip be of sufficient thickness to compress at least 3/8" when the door closes against it. To check existing weatherstripping, close the door from the inside and carefully inspect the entire perimeter of the door where it meets the frame and sill. There should be no light visible. If there is, the weatherstrip must be adjusted until no light is visible or new weatherstripping should be installed. *(See Detail D3 on page 23.)*

Door Installation and Maintenance

Cracks in doors should be filled, sanded and covered with paint or an exterior grade stain sealer. When installing new prime doors, make sure there is no spacing or gaps greater than ½" between the door frame and the existing wall framing (rough opening). Gaps less than ½" wide should be filled. A method that provides good insulation and sound attenuation includes using fiberglass wrap insulation, polyethylene foam backing rod and caulking. All of these materials should be available at your local hardware store.

Sidelights

If your existing sidelights are not in vinyl frames, add an additional layer of glass to the existing sidelights – preferably a pre-fabricated storm unit. Manufacturers of acoustic storm doors typically manufacture matching storm units for sidelights. Otherwise, mounting a minimum 3/16" thick interior tempered laminated glass panel in a custom wood frame approximately 2" from the existing sidelight will also help. If you choose to build your own storm unit, mount the storm on the inside of the existing sidelight. If purchasing a unit, follow the manufacturer's installation instructions for either interior or exterior applications.

Wall Modifications

Many times paneling is installed directly to wall studs. This commonly is found in home additions. On exterior walls, paneling alone is not a sufficient wall mass, and noise will be readily transmitted into the home. There are different sound-insulating modifications, depending on the noise contour (DNL) in which the home is located. Wall board should be fastened to studs as follows: 1 ¼" length screws for first layer and 1 ⅝" length screws for the second layer. Please reference your home's location in the DNL contour located inside the front cover of this handbook for specification recommendations.

Below 75 DNL

Remove paneling, install blanket (batt) insulation (R13 or 3 ½" thick fiberglass) in the walls, install one (1) layer of ⅝" thick gypsum board (drywall) vertically attaching them to the studs, tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the walls sanded and painted or wall-papered.

Above 75 DNL

Remove paneling, install blanket (batt) insulation (R13 or 3 ½" thick fiberglass) in the walls, install two (2) layers of ⅝" gypsum board vertically, attaching them to the studs and offsetting the top layer at least 10" from the bottom layer, tape the top layer's joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the wall sanded and painted or wallpapered.

Over 80 DNL

Remove paneling, install blanket (batt) insulation (R13 or 3 ½" thick fiberglass) in the walls, install one (1) layer of ½" cement board then one (1) layer of ⅝" gypsum board vertically, attaching them to the studs and offsetting the top layer (gypsum board) at least 10" from the bottom layer (cement board), tape joints of top layer using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped. The paneling may then be reinstalled or the walls sanded and painted or wallpapered. Cement board and gypsum board can also be applied over existing gypsum board in high noise-impacted areas to alleviate transmission of exterior noise. *(If cement board cannot be located, you can use board that is made for the installation of ceramic wall tile.)*

Ceiling Modifications

Ceiling modifications should be done under two conditions: 1) when a home has an acoustic tile ceiling in a room that does not have a floor above it, and 2) on the top floor in homes in very highly impacted noise contours (75+ DNL).

Modifications to Ceilings with Acoustical Tile

The acoustic tile used in most homes decreases noise within the room. However, it is very thin and exterior noises will enter the room due to the lack of mass. If the room has an attic above it, place at least 8" of R25 fiberglass insulation on the attic floor and replace the existing ceiling tiles with acoustically rated tiles with a CAC (another sound trans-mission rating) of no less than 40 and an NRC rating of at least 55. Keep in mind, however, that even the best suspended ceiling tiles do not block as much noise as ⅝" gypsum board (drywall).

If there is no attic above the ceiling, the acoustical tile must be removed and a ⅝" gypsum board ceiling must be installed. Attach the gypsum board to the roof joists and place blanket (batt) insulation above the gypsum board. Rafter vent channels should be used to make sure that air can circulate between the insulation and the roof deck. Tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped.

If you want to use suspended ceiling tile as a finish material, it is recommended that at least one layer of ⅝" gypsum board be installed above the ceiling tile.

Modifications to Gypsum Board Ceilings In the 75+ DNL Noise Contour

If there is an attic above the room, install at least 8" of R25 insulation to the attic floor and place ¾" plywood over the insulation. In rooms with existing drywall ceilings, install a second layer of ⅝" drywall with 1 ⅝" length screws fastened into the ceiling joists above. *(See Detail C1 on page 24.)* In rooms with existing acoustic tile ceilings, two (2) layers of ⅝" gypsum board should be installed, offset by at least 10". (The first layer should be attached to the ceiling joists above with 1 ¼" length screws and the second layer should be attached to the ceiling joists above with 1 ⅝" length screws.) Tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped.

If there is no attic above the room, install one (1) layer of ½" cement board over the existing drywall ceiling with 1 ⅝" length screws fastened into the ceiling joists and one layer of ⅝" gypsum board offset by at least 10" also fastened into the ceiling joists with 2 ½" to 3" length screws. Tape joints using paper reinforcing tape and an all-purpose joint compound. Be sure that all corners and edges are taped.

Insulation

Adding mass to voids between walls and on attic floors will help diminish noise. *(See Detail I1 on page 25.)* Insulation helps absorb noise.

Walls

Frame homes require insulation in exterior walls for energy efficiency, as well as to decrease exterior noise infiltration. Fiberglass blown-in insulation can be installed from the interior or exterior of the home. In most cases, homeowners will hire an insulation contractor to perform this work. Holes are drilled into the wall near the top and bottom of the wall between each pair of studs. A hollow wand is inserted into the holes through which insulation is blown into the wall. (One hole in the center of the wall can be used; however, you must make sure the wand is long enough to reach to top and bottom of the wall cavity.)

Attics

The floor of the attic should have at least 8" of R25 insulation. The addition of ½" or ¾" plywood over the insulation will increase the mass. Attic insulation can be either blown-in or blanket (batt) fiberglass insulation.

Vents

Attic Vents

You need vents for air circulation. Vents are holes in the exterior of your home through which noise has a direct entry route. Baffle boxes are partial enclosures built around vents to reduce some noise. Just like a muffler on your car's exhaust pipe, baffles act as mufflers to absorb some noise. It is not recommended to install baffles or modify your home's ventilation system without first consulting a professional mechanical contractor, architect or building code inspector. *(Refer to details V2, V3 and V4.)*

Kitchen Exhaust Vents

There are two main types of kitchen exhaust fans, each requiring different sound insulating modifications:

1) Through-Wall Exhaust: Remove exhaust fan, insulate wall and patch interior drywall. The exterior can be patched by installing plywood and covering it with the same material as the exterior of the remainder of the home, or by installing plywood and reattaching the existing fan cover. Install a ductless range hood, if permitted by code, or a ducted exhaust hood as detailed in Item 2 below. (Note: Ductless range hoods are not permitted per code in Arlington Heights.)

2) Ducted Exhaust: All ducted exhausts should extend to an exterior location. Modifications need to be made only if the ductwork to the exterior is predominantly straight and does not have any elbows (90 degree turns). To reduce sound transmission, the ductwork in the attic should be extended to exhaust out of the eave of the house. Care should be taken to not have any elbow (90° turns) and to keep the ductwork as straight as possible to avoid the collection of grease in the ductwork, which could develop into a fire hazard.

It is not recommended to install a baffle over a motorized or powered vent.

HVAC Modifications

The acronym HVAC stands for heating, ventilating and air conditioning. The ventilation portion of this section is the major cause of air and noise infiltration. Mechanical systems often require vents that are openings to the exterior of the home.

Central Air Conditioning

The installation of central air conditioning to the entire home will attain the most noise reduction in the summer since it gives you the ability to keep doors and windows closed.

Through-Wall Heaters and Air Conditioners

Normally, these devices are found in room additions because it was less expensive when building the addition to put small, independent units in than to extend existing ductwork and upgrade the entire home's mechanical system. However, both of these items require vents through which air and noise have a direct route into your home. The preferred treatment would be to remove these devices, fill the wall cavity with insulation and patch the exterior and interior to match existing materials. This may be an option when it comes time to replace your current furnace or air conditioning condenser. There are also ductless air conditioning and combination heating/air conditioning units that require a far smaller penetration through the exterior wall. Installation of these units would require patching the wall as stated above.

Return Air

Many times, homes with central air conditioning still require the use of window air conditioning units on the upper floor due to poor air circulation. In the majority of cases, this is due to the upper floor having only supply ductwork and no return-air ductwork. The cost of installing return-air ductwork varies greatly, depending on the construction of the home. In some instances, return-air ductwork can be installed in a wall and tied into the existing ductwork for the lower floors. It may be valuable to call a few heating contractors and get proposals on the cost of installing return-air ductwork where none exists. The methods used by different contractors and the costs associated with such methods make it advisable to get more than one proposal.

Whole-House Exhaust Fans

These fans are found in attics away from view; however, the fan sits in a hole in your ceiling through which air and noise enter your home. It is recommended that these fans be removed and the opening patched with materials matching the existing ceiling. If you want to keep your fan, a plywood box with doors can be built around the fan. The doors would then have to be manually opened before the fan is turned on.

Miscellaneous

Mail Slots

Though mail slots allow minimal noise infiltration compared to vents, doors and windows, they are holes in walls through which air and noise enter. You can remove the interior and exterior mail slot fixtures, stuff the mail slot cavity with batt insulation and patch both sides to match the existing wall finish. Alternatively, the existing mail slot fixture can remain if the mail slot cavity is filled with insulation and both slot doors are caulked shut.

Carbon Monoxide Detectors

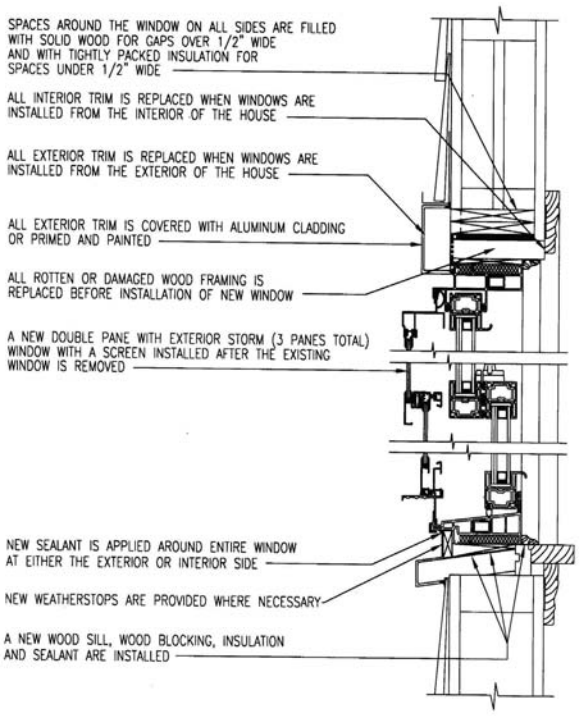
The sound-insulation process essentially reduces or eliminates air infiltration and natural ventilation. This means your home will become more airtight, making you more susceptible to your home's normal emissions from such things as gas appliances and furnaces. It is a good idea to install a carbon monoxide detector to monitor the CO levels in your home. Be sure to follow the manufacturer's installation instructions.

Glass Block Windows

Glass block windows often have a small vent or louvered window in them. This is a community code requirement for air circulation. Unfortunately, there is nothing that can be done to sound insulate the small vent or louvered window. They best remedy would be to replace the glass block window with an operable acoustical window.

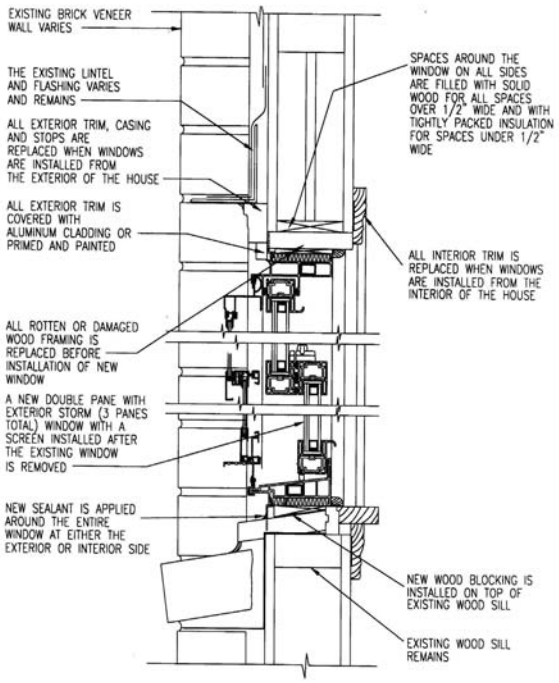
Fireplaces

Fireplaces provide a direct route for air and noise to enter your home. Installing tight-fitting glass doors in lieu of a fireplace screen will lessen the air infiltration when the fireplace is not in use.



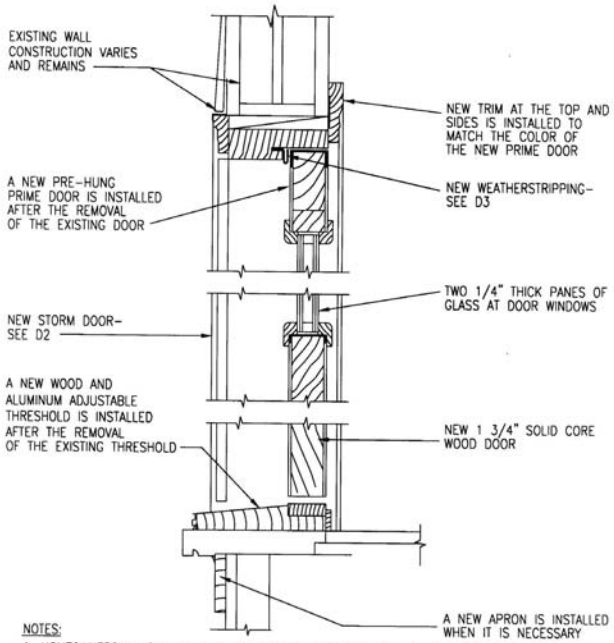
W1 WINDOW DETAIL
NEW ACOUSTICAL WINDOW IN FRAME HOME

W1



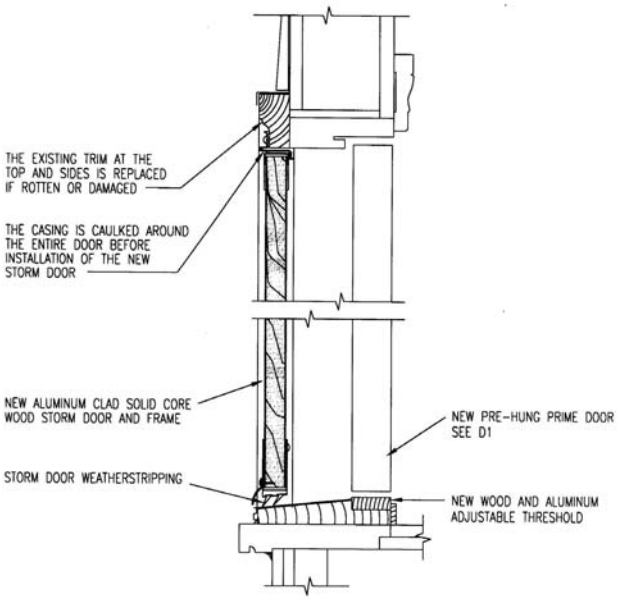
W2 WINDOW DETAIL
NEW ACOUSTICAL WINDOW IN BRICK HOME

W2



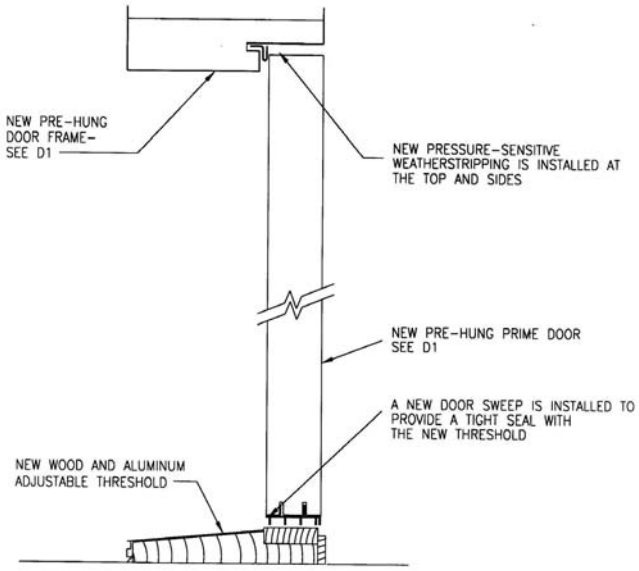
D1 DOOR DETAIL
NEW PRE-HUNG PRIME DOOR

D1



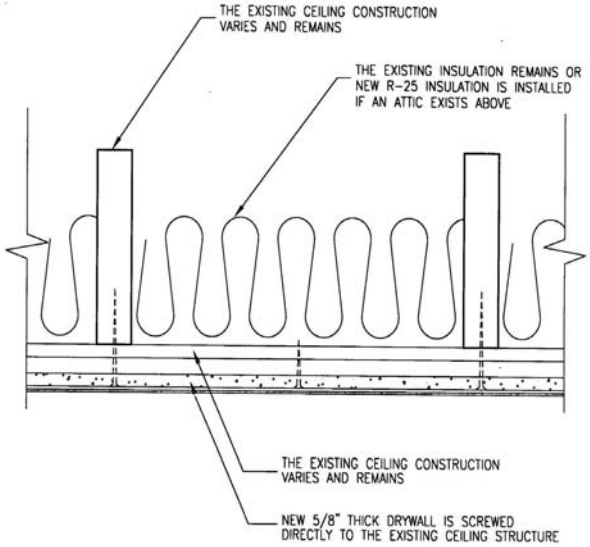
D2 DOOR DETAIL
NEW STORM DOOR

D2



D3 DOOR DETAIL
NEW WEATHERSTRIPPING IN NEW PRE-HUNG DOORS

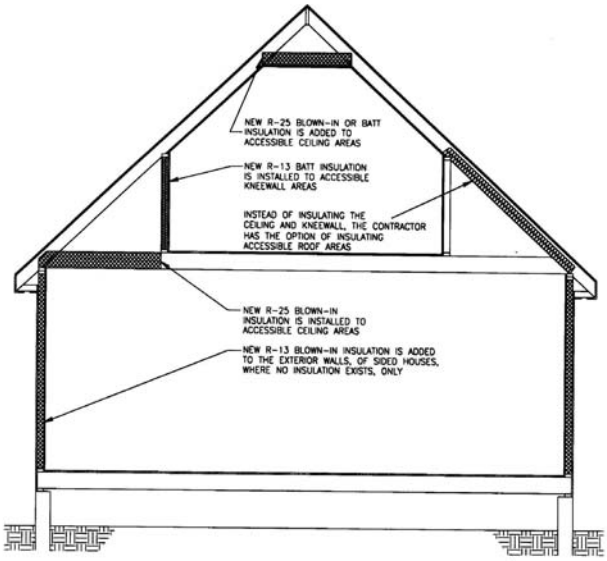
D3



C1 CEILING DETAIL

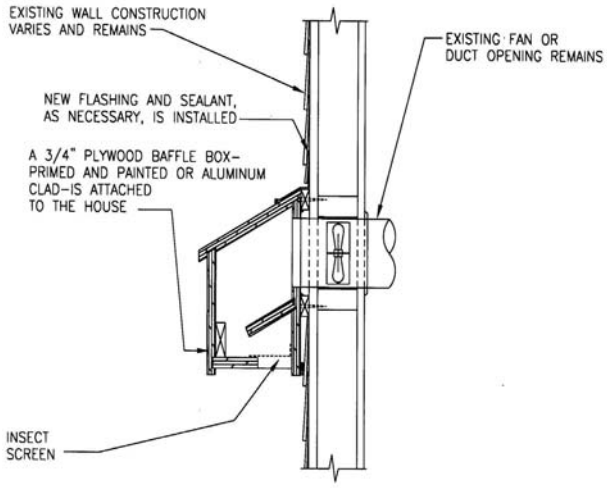
NEW DRYWALL OVER EXISTING CEILING

C1



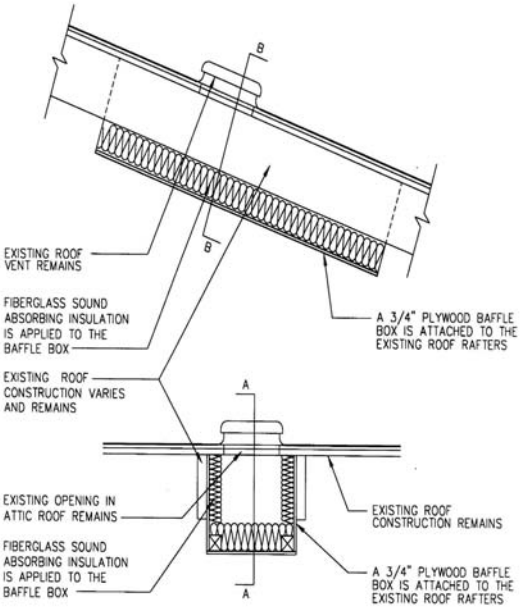
I1 INSULATION FOR TYPICAL HOME
DIAGRAMMATIC ONLY (NO SCALE)

I1



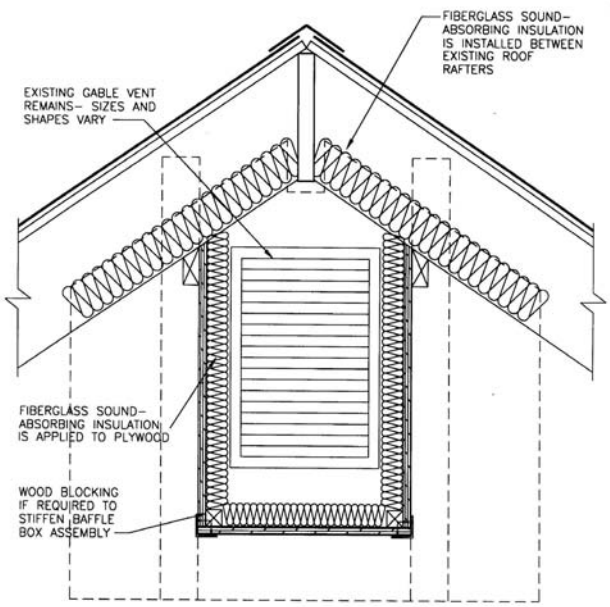
V1 VENT DETAIL
NEW WALL VENTILATION BAFFLE

V1



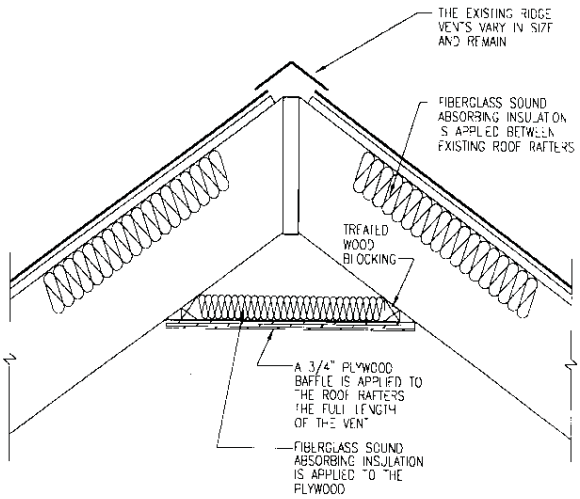
V2 VENT DETAIL
NEW ROOF VENT BAFFLE

V2



V3 VENT DETAIL
NEW GABLE VENT BAFFLE

V3



V4 VENT DETAIL
NEW RIDGE VENT BAFFLE

V4

Suppliers for Residential Sound Insulating Products

Windows

Harvey Acoustical Windows
c/o West Roofing and Supply
1797 Winthrop Drive
Des Plaines, IL 60018
847-795-9378
www.harveyind.com

Graham Architectural Products
1551 Mount Rose Avenue
York, PA 17403
800-755-6274
www.grahamarch.com

Sound Solutions Windows & Doors
4532 S. Kolin Avenue
Chicago, IL 60632
773-446-7800

Storm Windows

Mon-Ray, Inc.
8224 Olson Memorial Highway
Minneapolis, MN 55427
800-544-3646
www.monray.com

Peerless Products, Inc.
2403 S. Main Street
Fort Scott, KS 66701
800-279-9999
www.peerlesswindows.com

Sound Control Systems Inc.
A Division of Larson Industries
Brookings, SD 57006
800-334-1328
www.larsondoors.com

Prime Doors

Central Door Distributors, Inc.
150 State Street
Calumet City, IL 60409
708-862-4300
www.centraldoordist.com

Illinois Flush Door
P.O. Box 905
Plainfield, IL 60544
815-436-3113
815-436-3114

Hess-Armaclad, Inc.
P.O. Box 127
Route 997
Quincy, PA 17247
800-541-6666
www.hesswindows.com

Lynden Door, Inc.
P.O. Box 528
177 W. Main Street
Lynden, WA 98264
360-354-5676
www.lyndendoor.com

Illinois Flush Door
P.O. Box 905
Plainfield, IL 60544
815-436-3113

PEM Millwork of Minnesota
5671 International Parkway
New Hope, MN
763-541-1133

Storm Doors

Hess-Armaclad, Inc.
P.O. Box 127
Route 997
Quincy, PA 17247
800-541-6666
www.hesswindows.com

Mon-Ray, Inc.
8224 Olson Memorial Highway
Minneapolis, MN 55427
800-544-3646
www.monray.com

Sound Control Systems Inc.
A Division of Larson Industries
Brookings, SD 57006
800-334-1328
www.larsondoors.com

Patio Doors

Graham Architectural Products
1551 Mount Rose Avenue
York, PA 17403
800-755-6274
www.grahamarch.com

International Window Corp.
5625 E. Firestone Boulevard
South Gate, CA 90280
562-928-6411
www.intlwindow.com

Window Technologies, Inc./
Century Manufacturing, Inc.
4620 Andrews Street
North Las Vegas, NV 89031
800-654-7027
www.windowtech.com

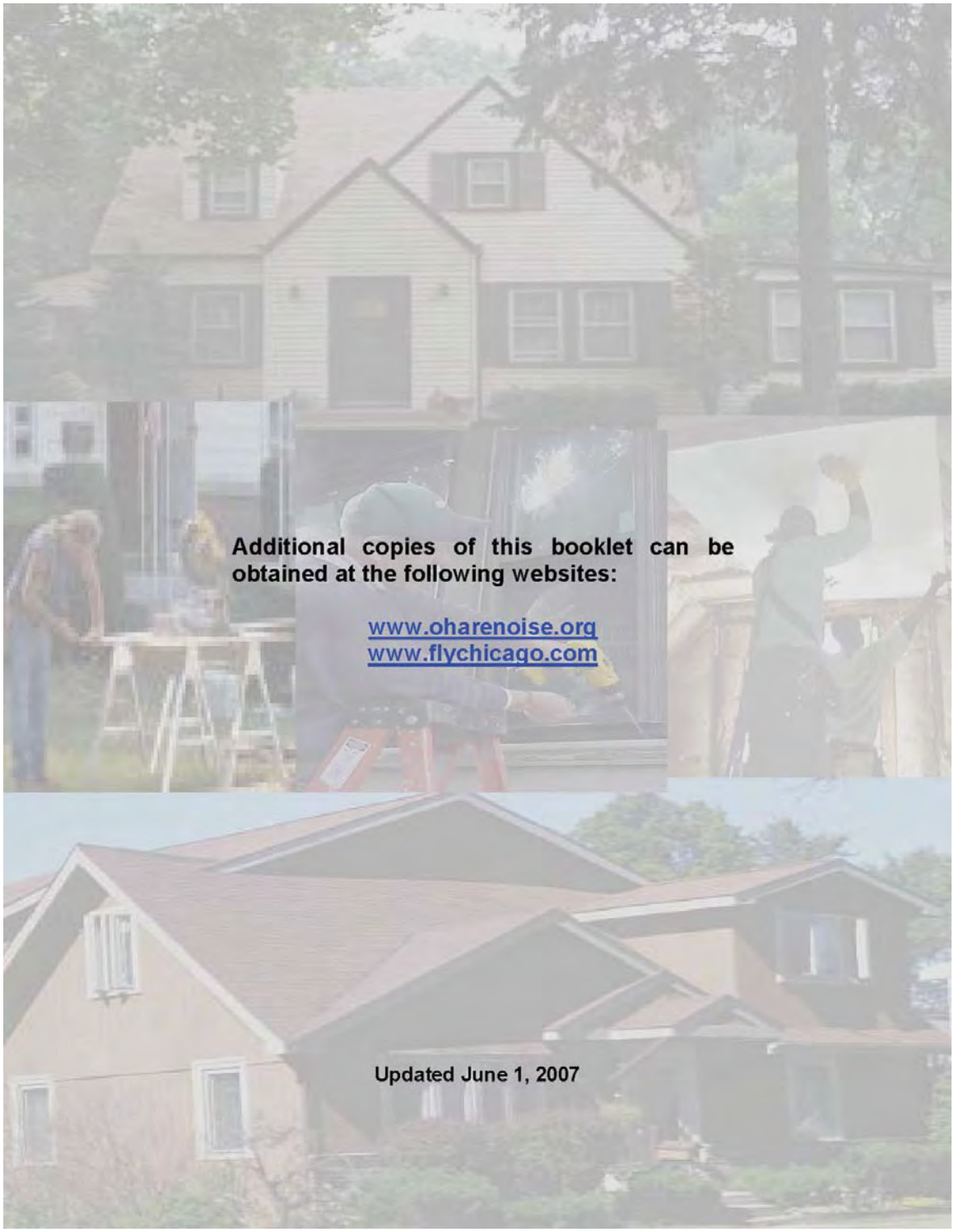
Sliding Storm Doors

Mon-Ray, Inc.
8224 Olson Memorial Highway
Minneapolis, MN 55427
800-544-3646
www.monray.com

Peerless Products, Inc.
2403 S. Main Street
Fort Scott, KS 66701
800-279-9999
www.peerlesswindows.com

Sound Control Systems Inc.
A Division of Larson Industries
Brookings, SD 57006
800-334-1328
www.larsondoors.com

The above manufacturers have acoustical products that meet the specifications of the City of Chicago's Residential Sound Insulation Program and can put you in contact with local distributors.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www.oharenoise.org
www.flychicago.com
Updated June 1, 2007

Randall Airport, Wallkill, New York

Introduction/Airport Overview

Randall Airport is a privately owned, public use general aviation airport / residential airpark owned by the Aerodrome Development Corporation (ADC) and operated by Charles Brodie. Randall Airport was opened to the public in 1946. The airport is situated in the town of Wallkill, New York, 75 miles from New York City (Figure 2.14-1). The airport serves the town and village of Goshen, as well as the city of Middletown and the town of Wallkill. The airport adjoins the town of Wawayanda, which borders the city of Middletown, city of East Middletown, and the city of Mechanictown in Orange County, all of which are considered to be regional benefactors of the airport.

Charles Brodie, President of ADC and Airport Manager, notes that the airport has 72 based aircraft including airplanes, hang gliders, ultralights, and hot hair balloons; however, the *AirportIQ 5010* website indicates a much smaller number of based aircraft as shown in Table 2.14-1. Table 2.14-1 also identifies the number of annual aircraft operations at Randall Airport.

The majority of aircraft activity at the airport is generated by single-engine aircraft, with an occasional twin-engine aircraft landing at the airport. Brodie stated that he believes Randall Airport is truly a NextGen System Airport because aircraft such as the Beech Duchess and Eclipse jet utilize the airport without problems with shorter runway length compared to current corporate aircraft which typically need longer runway length. Table 2.14-2 identifies the major features of Randall Airport, management organization, and services offered.

Figure 2.14-1. Aerial view of Randall Airport.

History of the Airport

Prior to the ADC's purchase of the airport, it was privately-owned with similar uses. Randall Airport was originally founded by Sam Randall in 1936. Construction of the airport's infrastructure and opening of the airport did not take place until 1946. At that time, the airport was a small turf strip. Sam Randall purchased the land from area farmers to build the airport. According to Brodie, one of the original property owners whose land was purchased for the development of

Table 2.14-1. Randall Airport.

Based Aircraft	
Single-Engine Airplanes	19
Multi-Engine Airplanes	0
Jet Airplanes	0
Helicopters	0
Gliders	19
Military	0
Ultra-Light	4
Total Based Aircraft	42
Aircraft Operations	
Commercial	0
Air Taxi	0
General Aviation Local	17,000
General Aviation Itinerant	5,500
Military	0
Ultra-Light	4
Total Aircraft Operations	22,504

*Operations for a 12-month period ending August 6, 2006
Source: AirportIQ 5010

Table 2.14-2. Randall Airport profile.

MAJOR FEATURES

Airfield
- Runway 8/26: 2,810 feet long, 60 feet wide; Asphalt
- Runway Lighting: Medium Intensity runway edge lights

Property
- Existing: 231 acres
- Property encompasses airfield, building area, and runway protection zones

Navigational Aids & Instrument Approach
- Airport:
- Runway:
  - Runway 8/26: Medium Intensity 2 – Light Precision Approach Path Indicator Light
  - Runway 8: VOR, RNAV, GPS approach
  - Runway 26: NDB, VOR, RNAV, GPS approach

Building Area
- Development located on northwest side of Airport
- Apron
- Aircraft Parking Capacity
- Aviation-Related Facilities
- Non-Aviation Related Facilities

MANAGEMENT AND SERVICES

Management
- Airport Management and Maintenance:
  - Aerodrome Development Corporation
  - Airport Manager

Fixed Base Operator (FBO) Services
- Aircraft Fuel (100LL and Jet A)
- Aircraft Parking and Storage
- Flight Training
- Aircraft Rental

the airport is still a supporter and is continually involved in the development and prosperity of the airport today.[1]

Brodie began his interest in Randall Airport not only as a pilot, an aircraft owner and builder, but also as an investment into the aviation community. Brodie purchased the airport in 1984. Originally, ADC hired an airport manager to run the facility and promote the development of "a mixed use airpark." However, due to the mounting financial constraints, Brodie realized the only way for Randall Airport to succeed was to find alternative sources of funding. Since that time, he has worked with the FAA-Airports District Office (FAA-ADO) and the New York State Department of Transportation (DOT) Aviation Services Bureau, to secure the guidance and funding he needed to begin development of the airport. As a privately-owned, public use facility, Brodie was able to obtain federal funding by being designated as a reliever airport to the New York City metropolitan area.

Even with this federal and state funding, the airport has issues which hinder its long term viability. For example, there are residential developments in proximity to the airport adjacent to the ADC property (Figure 2.14-2). The development of residential areas surrounding the airport, including Canterbury Knolls and The Meadows, had already begun by the time Brodie bought the airport in 1984. The Meadows was one of the original developments built around 1972 with smaller lot housing for lower income families. Canterbury Knolls owned the property on the north and south side of Schutt Road. The parcels of property on the north side of the road were developed first. However, due to the collapse of the real estate market, the Canterbury Knolls

[1] Interview comments from Charles Brodie, President, Airport Manager.

development went into bankruptcy twice before the project began again in the 1990s. This allowed Brodie the opportunity to purchase the parcels of property on the south side of Schutt Road and adjacent to airport property from the Canterbury Knolls tax sale to develop the mixed use residential airpark concept.[2]

Brodie noted that every part of the mixed-use residential airpark development that he has planned has been discussed and reviewed with the state for compliance and support. Brodie believes that the New York State DOT Aviation Services Bureau has been extremely helpful in this process. The FAA-ADO has provided Brodie with the needed support and guidance to continue developing the mixed use residential airpark as a compatible use for Randall Airport.

Financial support from the state and federal government has been adequate for Randall Airport to assist with compatible land use needs of the airport, with some limited land acquisition; however, limited local matching funds limits larger scale projects.[3]

Figure 2.14-2. Aerial view of Randall Airport.

Governance

The governance of Randall Airport is unique in that it is privately-owned and operated; however, it is federally obligated due to the funding it receives from the FAA. To receive this funding, the airport must address land use compatibility. This requires the airport to be recognized in the local community and county comprehensive plans, which has been done for many years now.

Brodie acknowledged that airports are political entities and that political support is critical to a local airport. Being a privately-owned airport, many of the more traditional assurances afforded to a publicly-owned airport are absent, such as the right to enact airport zoning or utilizing the power of eminent domain.

New York's governmental structure has strong city and town authority, so it is critical for an airport such as Randall to educate and work with the surrounding villages, cities, and towns to encourage compatible land use activities near the airport. Brodie noted that he has established relationships with the surrounding towns, the host city, and outlying cities such as Goshen and the county. He updates these groups on a regular basis and continues to work with them to protect the airport. He educates these groups regarding the airport's economic and community benefits to demonstrate the importance of the airport to the local community.

Discussion of Compatibility Issues and Responses

When discussing existing and future compatibility issues, three basic areas were documented with Brodie in an effort to assess current concerns. These areas include safety, airspace, and noise related issues. In terms of safety, Brodie noted that the airport experiences some wildlife roosting on site such as Canada Geese during migration periods. The airport practices effective wildlife management techniques by not letting the geese begin to roost by chasing them off site. The

[2] Interview comments from Charles Brodie, President, Airport Manager.
[3] Interview comments from Charles Brodie, President, Airport Manager.

airport is near a golf course, but Brodie hasn't noticed any significant wildlife issues or pattern between the airport and the golf course.

Brodie mentioned that the airport currently has no visual obstructions such as ambient lighting, smoke or steam. He also states that the airport is in an excellent location even though the airport can not expand. Brodie noted that he plans to keep the airport users base as small general aviation and corporate traffic.

It was noted during the discussion that there is some concern regarding the development of a new hospital facility just off the end of the runway. The height of the structure may change operating procedures. However, Brodie is working with the city, county, and developers to create a compatible development without hindering hospital functions.

Randall Airport is currently zoned as Airport Residential (Figure 2.14-3). At this time, Brodie has no plans to change the zoning classification for the airport or the subsequent airpark property. The land retained within the current residential zoning is compatible with the proposed airport mixed use residential airpark. Charles maintains that residential is a compatible land use for airports if properly managed. Therefore, in order to maintain airport compatible development, the airport will have restrictive covenants (which include land use, noise, height, etc.) to alert property owners of their proximity to the airport and the compatible uses allowed within the airport's environs. The mixed use developments are to be airport compatible developments.

As the airport owner, Brodie is currently working with the FAA-ADO and New York State DOT Aviation Services Bureau to acquire avigation easements for land to the south of the airport underlying the Runway 8 approach. It was noted that fee acquisition would be preferred, as there

Figure 2.14-3. Zoning map of Randall Airport, identifying airport and residential zoning (Source: Randall Airport).

are taxation issues that affect privately owned airports which often creates financial constraints on small airports. Cities and towns within the state of New York do not recognize land purchased by the FAA as airport property and, therefore, is taxed at a higher rate becoming less affordable for private airports.

Brodie noted that Randall Airport serves the community, not the county as a whole. There is a county airport that serves the county as a bigger service area with a larger facility. He compares airports to roads and notes that,

> Stewart International Airport (air carrier airport) is like an Interstate, Orange County Airport (regional general aviation airport) is like a State Highway, and Randall Airport (small general aviation airport) is like a community road. All airports are complimentary to each other and support the others function within the nations system of airports. These types of airports do not compete against each other; they just work together to support each other. Each type of airport needs each other and cannot survive without the other.

Litigation

Since incompatible land use can often lead to litigation, it is important to note that to date Randall Airport has not experienced any form of legal proceedings.

Aircraft Accidents

Randall Airport has experienced three accidents since 1990. All three accidents have involved aircraft crashing into trees that lie in the approach to Runway 26. The FAA has provided support and cleared the obstructions from the approaches since the last incident, which has increased the airport's utility; however, additional clearing is still a concern.

Existing Studies, Planning, and Regulations

The planned development around the airport by ADC includes 55 upscale residential homes on airport property, with taxiway access from each home to the airport's facilities (Figures 2.14-4 and

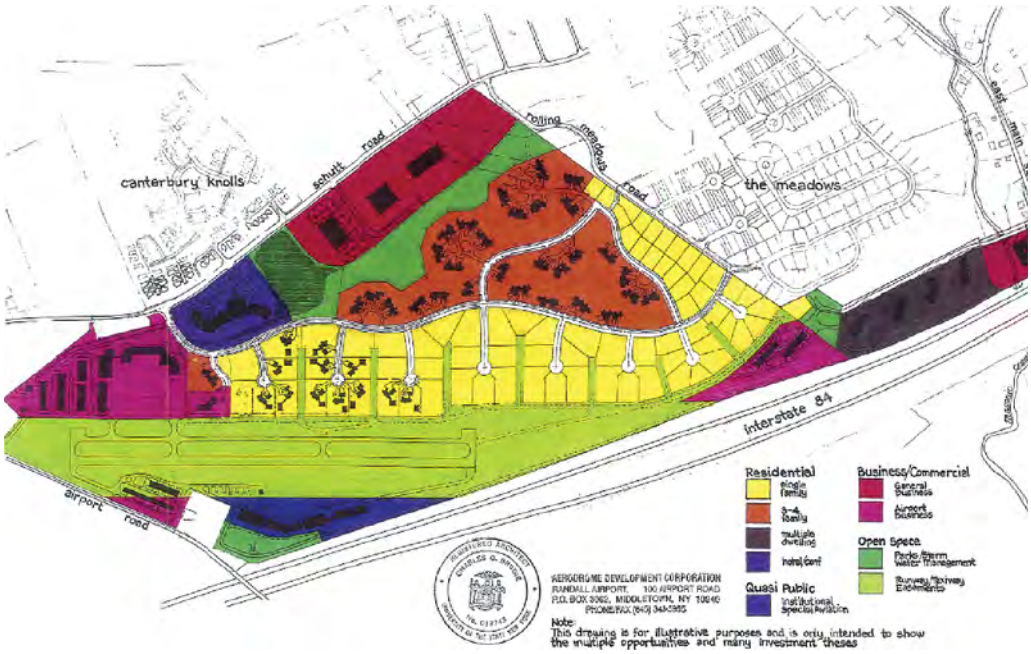


Figure 2.14-4. Plan for residential homes on airport property with direct access to airfield facilities (Source: Randall Airport).

Figure 2.14-5. Aerial view of land to be developed as a residential airpark adjacent to airfield facilities (Source: Randall Airport).

2.14-5). This sort of development is typically discouraged by the FAA, however, Brodie notes that the FAA-ADO has been generally supportive of this proposal. This demonstrates the variation in the interpretation of the FAA design criteria related to residential airparks. Many within the aviation industry support these types of airparks because they place aviation enthusiasts near the airport who are often willing to sign noise disclosure notices and avigation easements, and are generally more compatible neighbors to airports than the general public.

Brodie notes that the airport's plans have been shared with the City of Middletown (host community), the Town of Wallkill, the Town of Wawayanda (adjacent town), and Orange County, New York, since 1984. He keeps informed of growth and development in the surrounding areas due to his networking and established connection in the outlying communities such as the Town of Wawayanda. Many developments would have been built without input or consideration of Randall Airport without this proactive involvement.

Community Involvement

Brodie has taken a proactive approach to educating local residents about the user base of the airport. For example, he often explains that the types of aircraft that currently use or will utilize the airport are becoming quieter than the single engine aircraft currently utilizing the airport. He also stated that many of these conversations take place at open meetings and public hearings allowing him a forum to openly discuss airport operations with the local city council, and area residents.

Brodie stated that he has established both formal lines as well as informal lines of communication with the surrounding jurisdictions. His philosophy regarding the airport is "that if it does not benefit the community or the airport then the airport will not pursue the prospective item (i.e., development, operational modifications, etc.)." This is the way Brodie justifies the importance of the airport to the surrounding jurisdictions. He emphasizes that the airport will be good for all the surrounding communities to stimulate growth and development through accessibility, and he believes that the surrounding jurisdictions have bought into this philosophy, which is demonstrated by the development of an informal "friends of the airport" group.

Brodie notes that he continually educates and communicates with the surrounding municipalities and community residents about how the airport will create economic stimulation and jobs and how the airport will be an economic engine for the surrounding communities. Additionally, it is believed that Randall Airport will benefit from economic stimulation provided by the air carrier airports in the surrounding areas (i.e., Stewart International Airport and John F. Kennedy International Airport). Since smaller aircraft will likely continue to move outward from the larger airports, smaller general aviation airports will continue to grow.

Economic Impact

The Randall Airport Business Plan, developed in 2001, recommends a plan of action that includes four strategic initiatives, all part of the Sponsor's vision:

1. ***New Terminal Area:*** Development of the north-side terminal area, with easy user access for hangars, terminal building, and commercial space.
2. ***New Fixed Base Operator (FBO):*** Attraction of a full service FBO.
3. ***Commercial Development:*** Development of on-airport and adjacent airport property for commercial/retail space, hotel, and other professional business space.
4. ***Residential Airpark:*** Attraction of permanent resident airpark users with direct taxiway access to the airport's facilities, goods, and services.

In addition to the vision, there are a number of key issues addressed within this report:

- Financial performance of the airport;
- Tax abatement;
- Economic impact of the airport;
- Ability to attract FBOs;
- Compatible property development; and
- Rates and charges.[4]

It was noted within the Randall Airport Business Plan that the airport has an economic impact that annually supports:

- 21 jobs;
- $600,000 in incomes; and
- $1.53 Million in total economic output.

If the recommended plan with the residential airpark is implemented, it is estimated to create 207 additional jobs, $6.6 million in additional income and $20.1 million in additional economic output. Additionally, Brodie notes that to date, Randall Airport has not experienced any delays or operational procedural changes resulting in economic loss related to land use issues.

Conclusion/Analysis

Randall Airport is a unique facility since it is a privately-owned, federally-obligated airport with plans to develop into a significant residential airpark. Typically an airport with these types of plans would not be eligible for federal funding, nor would the FAA look favorably upon their development. The current issues the airport has faced such as funding for additional land acquisition, and the ramifications of providing local funds to match the federal funds, is taxing on the airport owner. As these pressures increase, airports like Randall are likely to face decisions related to either closure or the reduction of facilities as encroachment occurs.

[4] March 2001 Randall Airport Business Plan.

Sacramento County Airport System, Sacramento, California

Introduction/Airport Overview

Sacramento County Airport System (SCAS) operates four airports: Sacramento International Airport (SMF), Sacramento Executive Airport (SAC), Sacramento Mather Airport (MHR), and Franklin Field (F72). In addition, the SCAS manages the airport operations at McClellan Airfield (MCC) on behalf of the County's Department of Economic Development.

Sacramento International Airport

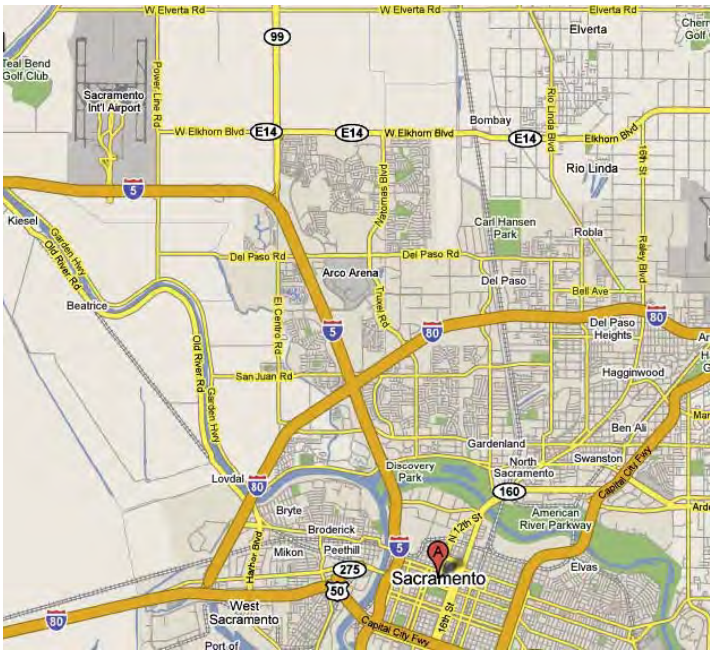
In 1957, Sacramento County began the process of acquiring approximately 6,000 acres to construct and later expand a new commercial service airport, Sacramento Metropolitan Airport (SMF). Critics said the expense was extravagant and the size was based on unrealistic passenger growth of 750,000 per year. SMF opened in 1967, and with five major airline carriers, surpassed the 1 million passenger mark by 1968. In the 1980s, SMF continued to expand with the addition of four new airlines, construction of an in-flight catering facility; a FAA Flight Inspection Field Office, a second air cargo facility, and a second 8,600 foot parallel runway (16L/34R).

During the 1990s, SMF's growth continued with three new airline carriers, construction of a new terminal (Terminal A), a new rental car facility, a new website, and a new name, Sacramento International Airport (still SMF). The consolidated rental car facility, the first in the nation, enabled a single shuttle service for passenger access, reduced terminal congestion, and reduced air quality impacts.

After September 11, 2001, and contrary to many airports across the country, SMF continued to grow, adding three new domestic airline carriers and welcoming the return of Continental Airlines. International service was initiated by a new international airline carrier, which required completion of a new International Arrivals Building to support federal inspection services. In 2004, Terminal A's six-story parking garage opened, which included a sky bridge to Terminal A and the display of public art sculptures.

SMF expects to continue this pattern of growth, and in 2004 completed a new 20-year Master Plan. In July of 2008, construction began on a $1.27 billion dollar Terminal Modernization Program to implement projects initially scoped in the 2004 Airport Master Plan. While planning for future growth, the Airport System also faces several significant constraints on SMF's future growth:

- Limited parking space for overnight aircraft;
- Environmental constraints (habitat preservation, sensitive wetlands, etc.);
- The possibility of expansion of the residential community of Natomas to areas near SMF planned for annexation by the city of Sacramento;



Source: Google Maps

Figure 2.15-1. General location of Sacramento International Airport (SMF).

- The limited capacity of Interstate 5 to carry potential passengers; and
- Current lack of commuter rail transit connecting the airport to the city of Sacramento, the University of California, Davis, and the city of San Francisco until approximately 2017.

SMF is located 12 miles northwest of downtown Sacramento (Figure 2.15-1). SMF's two 8,600-foot parallel runways are fully-instrumented for inclement weather operations. SMF had approximately 180,037 operations in 2007 according to the FAA Air Traffic Tower Count, distributed as shown in Table 2.15-1.

Sacramento Executive Airport (SAC)

The city of Sacramento opened the Sutterville Aerodrome in 1930. In 1941, the city paved and extended the Aerodrome's three runways. During World War II, the U.S. Army Corps took over the facility's operations. After the war, control of the airport was returned to the city and the facility was officially renamed Sacramento Municipal Airport (SAC). By 1955, the city had built a terminal building and hangars and had improved SAC's parking, navigational aids, lighting, and sewer systems. In 1967, Sacramento County became the operator of SAC under a rolling 25-year lease agreement with the city of Sacramento. The airport was renamed Sacramento Executive Airport. That same year, Sacramento County opened the newly constructed SMF. Growing commercial operations and the large aircraft associated with them relocated from SAC to SMF and its longer runways. Today, SAC is Northern California's primary general aviation airport and generates revenue through the businesses and citizens who use the airport's facilities.

SAC is located approximately 7 miles south of the city of Sacramento (Figure 2.15-2). The airport has three runways: 2/20, 12/30 and 16/34 and two helipads. Runway 2/20 is the longest at 5,503 feet with an ILS navigational aid associated with runway 2. Runway 12/30 is 3,836 feet long and runway 16/34 is 3,485 feet long. All runway ends have tree obstruction considerations. SAC had approximately 99,925 operations in 2007 according to the FAA Air Traffic Tower Count, distributed as in Table 2.15-2.

Franklin Field

Franklin Field (F72, formerly Q53) began in World War II as a bomber training site, and in 1947 the County of Sacramento acquired the facility from the federal government under the Surplus Property Act of 1944. Today, Franklin Field remains a public use airport with no air traffic control tower or personnel. The airport has two perpendicular runways with approximately 36,000 operations per year including flight training. Runway 18/36 is 3,240 feet long and runway 9/27 is 3,100 feet long. Franklin Field is located approximately 26 miles south of the city of Sacramento (Figure 2.15-3).

Table 2.15-1. SMF 2007 operations.

Aircraft Category	Total
Air Carrier	124,300
Air Taxi	26,325
General Aviation	27,732
Military	1,680

Sacramento Mather Airport

Sacramento Mather Airport (MHR), a former U.S. Air Force Base, was named Mather Field in 1918 after a World War I second lieutenant who was

killed during pilot training. In 1923, military personnel were deployed to other bases and Mather Field was closed. In 1930, MHR was selected by the Air Corps for tactical exercises. By 1933, the Globe Wrecking Company of Chicago had dismantled and demolished the buildings at Mather Field. In 1935, the 70th Service Squadron began conducting field training and supported the 7th Bombardment Group from Hamilton Field for 10 days. In 1941, due to World War II, MHR was rebuilt and reactivated as an air base. MHR was used for pilot, navigator, observer, and bombardier training, as well as a stopover location for troops, aircraft, and materials destined for Pacific combat duty. Starting in 1958, Mather Air Force Base was home to Strategic Air Command B-52 Wings and operated as a center for interservice and international undergraduate navigator training. Although the Air Force slated MHR for closure in 1988, the airport provided formal long-range, over-water navigator training through the 1990s.

In 1991, the Sacramento County Board of Supervisors began developing a plan to convert MHR to a public use facility. In 1993, the Air Force ceased operations at MHR, and in 1995 MHR was transferred to Sacramento County and opened to the public for air cargo and general aviation services under the management of the Sacramento County Airport System. The former Air Force Base was redeveloped into a number of uses, including Mather Airport, Mather Regional Park, Mather Commerce Center, the Veterans Administration Medical Center, and the FAA's Northern California Terminal Radar Control TRACON facility. The majority of all-cargo carriers operating at SMF relocated to MHR because of limited apron space at SMF, and the need to develop independent sort facilities. MHR's location relative to growing markets along the Interstate 50 corridor was also a consideration.

Figure 2.15-2. General location of Sacramento Executive Airport.

Table 2.15-2. SAC 2007 operations.

Aircraft Category	Total
Air Carrier	1
Air Taxi	3,530
General Aviation	95.761
Military	633

MHR has a 24-hour air traffic control tower, two parallel runways and three helipads. Runway 4R/22L is 11,301-foot long with an instrument precision navigational system accommodating ILS, VOR, DME, and RNAV procedures. Runway 4L/22R is nonprecision at 6,040 feet long. The new master plan includes a new Aircraft Rescue Fire Fighting facility, airfield maintenance facility, and airport administration building. Also included is the extension of runway 4L/22R to 7,200 feet, construction of a new taxiway, and an additional 90,000 sq ft of general aviation hangar space. Mather Airport is located approximately 10 miles east of the city of Sacramento (Figures 2.15-4 and 2.15-5).

MHR averages 277 operations per day and had approximately 87,617 operations in 2007 according to the FAA Air Traffic Tower Count, distributed as shown in Table 2.15-3. The 2003 master plan forecasts that operations would exceed 108,300 annual operations by 2021.

McClellan Airfield

McClellan Airfield (MCC) began operations in 1938 as the Pacific Air Depot, containing administrative buildings, barracks, warehouses, and a hospital. Later in 1938, the base was renamed to Sacramento Air Depot and expanded to repair and overhaul P-38 and P-39 fighter planes. In 1940, a P-40 fighter assembly line was added. In 1941, following the attack on Pearl Harbor, the base began receiving B-26 and B-17 bombers destined for the Pacific Theater. The base was renamed in 1948 to McClellan Air Force Base and continued to repair and overhaul aircraft and acted as the Sacramento Air Logistics Center throughout the Cold War. During

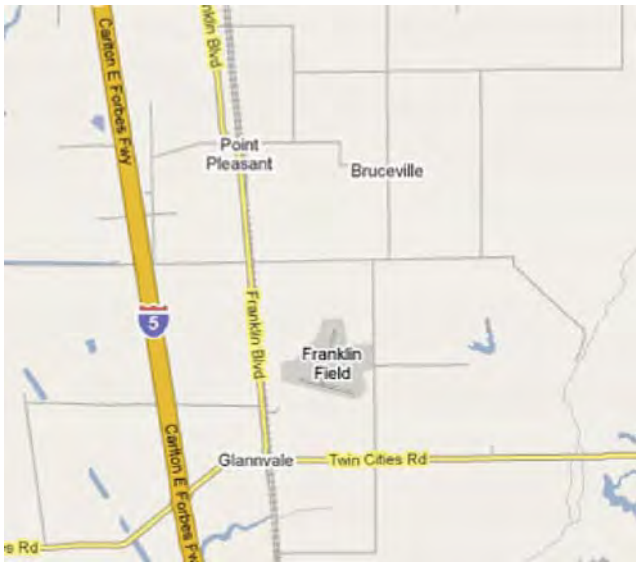


Figure 2.15-3. General location of Franklin Field.

Figure 2.15-4. Mather Airport map.

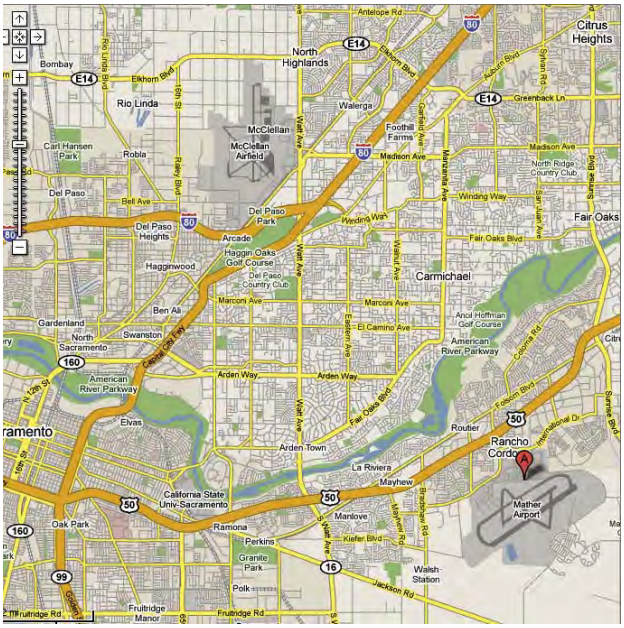


Figure 2.15-5. General location of Mather and McClellan airports.

Table 2.15-3. MHR 2007 operations.

Aircraft Category	Total
Air Carrier	4,998
Air Taxi	11,272
General Aviation	58,331
Military	13.016

the 1950s and 1960s, McClellan hosted the 552nd Airborne Early Warning Wing and received RC-121 and EC-121 Warning Star aircraft operations. Throughout the 1980s and 1990s, McClellan continued to operate maintenance facilities for F-111, FB-111, EF-111 and the A-10 Thunderbolt II aircraft and continued electronic logistics for military aircraft, equipment, and supplies.

McClellan's closure was announced in 1995 as part of the BRAC Commission. The base grounds were heavily polluted with chemicals associated with aircraft maintenance, fire training areas, landfills, and storage tank leaks. The EPA listed McClellan as a Superfund site in the 1980s and cleanup is expected to continue through 2015. In 2001, McClellan was closed as an Air Force Base and conveyed to the Sacramento County Department of Economic Development, who owns the facility and contracts with the Sacramento County Airport System for airfield management and planning and noise monitoring services. However, the airport is not part of the Sacramento County Airport System. The Department of Economic Development converted the surrounding areas beyond the airfield into an airport compatible business park with mixed-use tenants including the U.S. Coast Guard Air Station Sacramento, other aircraft operators and maintenance providers, the National Guard commissary, and the Aerospace Museum of California.

McClellan is located approximately 7 miles northeast of the city of Sacramento (Figure 2.15-5). MCC has a single runway with an uncontrolled tower with full precision navigational aids for VOR, DME and ILS.

Land Use Compatibility

Sacramento County developed an Airport System Policy Plan in 2001. This plan assessed the region's air service demands and the capacity accommodated by each county-owned airport. The Air Service Region includes Sacramento, El Dorado, Placer, Yuba, Sutter, and Yolo counties, and large portions of Amador, Colusa, Nevada, and Solano counties.

The Sacramento Area Council of Governments (SACOG) serves as the Airport Land Use Commission for this air service region. SACOG periodically updates Land Use Compatibility Plans (formerly known as Comprehensive Land Use Plans or CLUPs) typically after new airport master plan updates are completed. SACOG welcomes all member parties and stakeholder groups to participate in updating CLUPs and assists in guiding the region's cities and counties development toward compatible land uses. Though Placer County is not a member of SACOG, a portion of McClellan's noise contours and flight paths are within Placer County; therefore, SACOG's update of the McClellan's CLUP has included outreach to Placer County and the City of Roseville. Figure 2.15-6 and Figure 2.15-7 illustrate current airport noise contours for SMF and SAC, respectively. Mather's last CLUP update was in 1994, and the 2004 master plan is still in environmental review, so a CLUP update has yet to occur. In the interim, the County has adopted an intermediate land-use step, the Airport Planning Policy Area, which includes CLUP considerations, but without reviewing all future alternatives. The Airport Planning Policy Area maps display both noise contours and areas regularly overflown by aircraft over 75,000 pounds at or below 3,000 feet altitude. The SCAS utilizes the California Department of

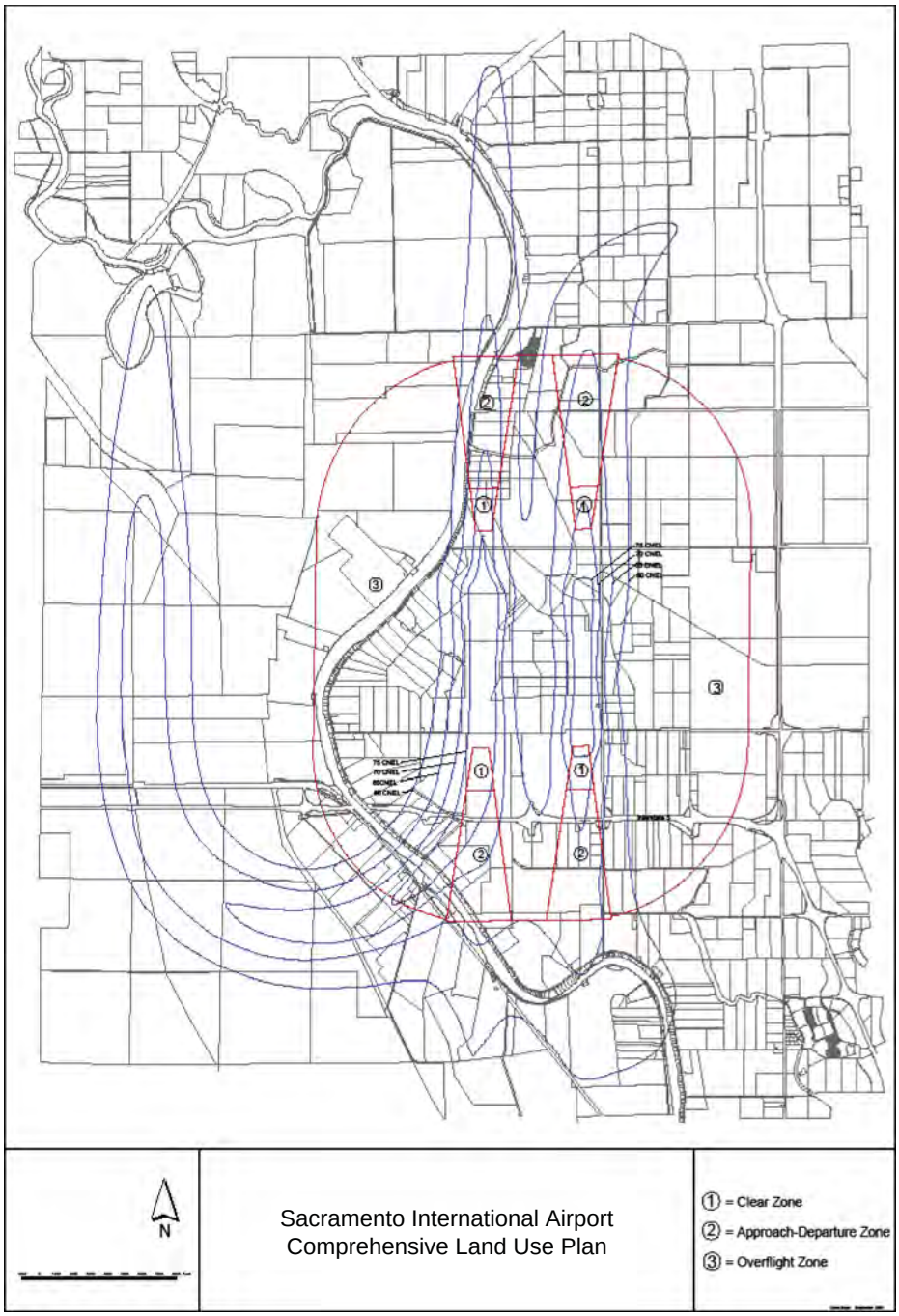


Figure 2.15-6. SMF current airport noise contours and comprehensive land use plan.

Transportation's California's Airport Land Use Handbook for guidance. Like many airports in California, SCAS finds it challenging to balance Federal (NEPA) and California (CEQA) environmental regulations with FAA regulations and guidance, especially when wildlife/habitat preservation and mitigation rules and polices conflict with the primary consideration of airport operational safety. Environmental regulations do impact land use considerations on and around SCAS facilities.

SCAS regularly receives proposed development plans from Sacramento County's Planning Department and advises the project proponents of concerns relating to airport compatibility.

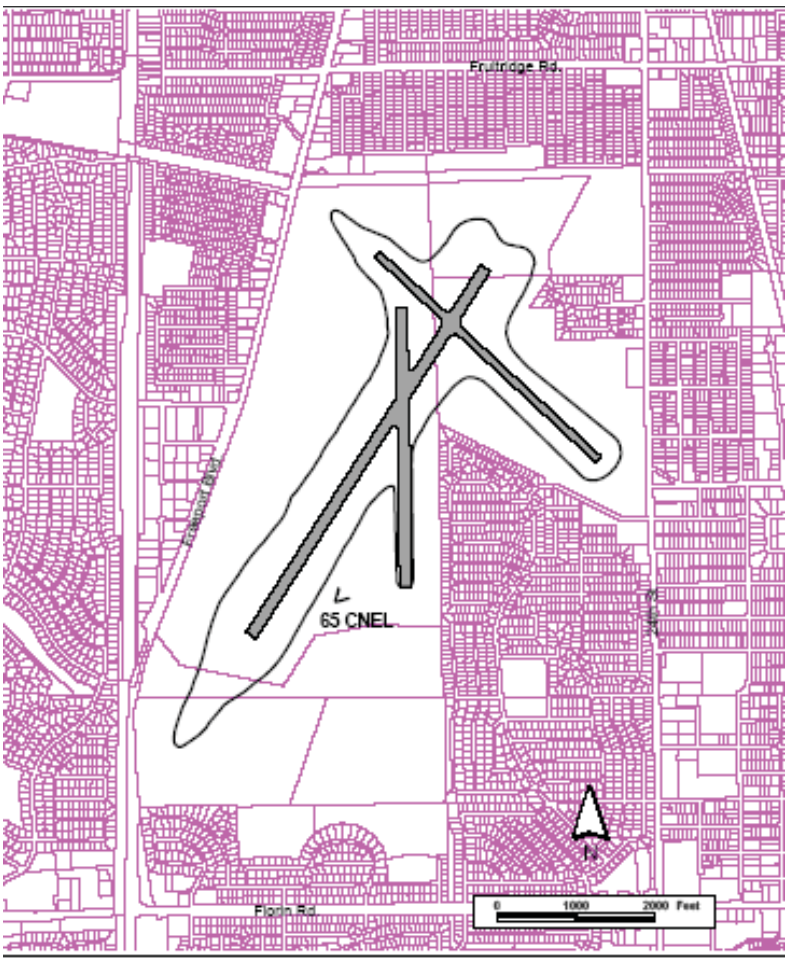


Figure 7
Sacramento Executive Airport
65 CNEL Noise Contour

Figure 2.15-7. SAC current airport noise contours.

While much of this activity is carried out directly with project sponsors, the County Planning Department also has a Subdivision Review Committee that meets every two weeks through which airport considerations are also shared with project proponents and County Planning staff. Additionally, SCAS reports a good working relationship with the city of Rancho Cordova in implementing conditions of the Mather Airport Planning Policy Area on applicable projects within Rancho Cordova city limits. The city has also been receptive to SCAS comments on other projects near Mather, an indication that the city recognizes Mather as a local asset and economic engine. SCAS has experienced a somewhat more challenging time establishing such collaboration with other surrounding jurisdictions with mixed results. Often, resistance appears to be tied to a perception that airport land use compatibility considerations are inconsistent with revenue generating development in the form of property taxes, and, until very recently, demand for residential development was a primary source of such new revenue generation. Since land use is a local issue, SCAS must rely on cooperation more so than regulation to limit or prevent new incompatible land uses.

In 1987, McClellan's Airport Land Use Compatibility Plan was updated while it still operated as an Air Force Base. Today, McClellan no longer operates as an Air Force Base; therefore, the fleet utilizing the airport has changed, resulting in a smaller area exposed to high aircraft noise

levels and has reduced the aircraft safety area required. The Sacramento Area Council of Governments, acting as the regional Airport Land Use Commission, is currently revising the McClellan Airport Land Use Compatibility Plan. The McClellan Reuse Plan includes a theoretic capacity noise exposure contour that includes airfield capacity, and full utilization of landside facilities. Additionally, this exposure plans for a full capacity scenario and well beyond the 20-year operational forecast. The noise exposure contours were utilized for the Reuse Plan's Environmental Impact Report and are dramatically smaller in area than the noise contours associated with the facility's contours developed while it was still an operational Air Force Base (Figure 2.15-8).

The city of Sacramento has recently proposed a new mixed residential and commercial use development between the 60 to 65 CNEL for McClellan. The draft SCAS and McClellan comprehensive land use would define new residential development within the 60 CNEL as incompatible. The city has requested SCAS designate this land as compatible for residential uses, citing the state and federal referenced 65 CNEL as the desired standard for limits on residential land use development.

Ultimately, SCAS has very limited legal recourse to require consistency with County land-use policies beyond the County's jurisdictional boundaries. Enforcement of CLUP provisions falls under the authority of the ALUC, in this case SACOG, not Sacramento County. There is concern that after new incompatible land-uses are created, the jurisdictions that created them, along with the residents allowed to reside in a previously incompatible area, may call on SCAS to mitigate for aircraft overflight impacts.

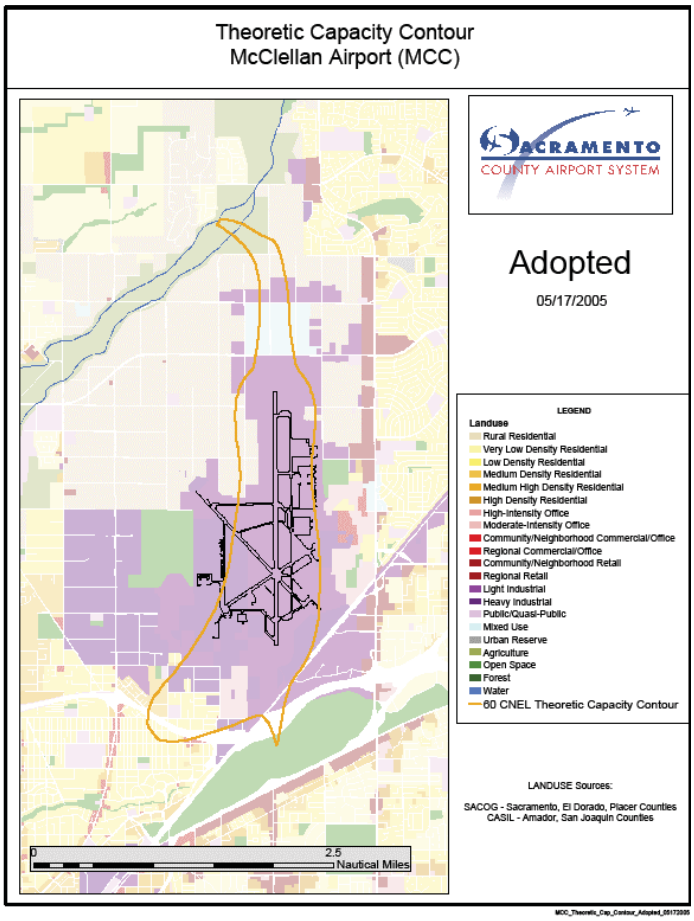


Figure 2.15-8. MCC airport reuse plan, full capacity scenario noise contours and comprehensive land use plan.

SCAS Noise Abatement Plans

SCAS periodically conducts noise studies to assess the noise impacts of aircraft operations. The need to conduct a noise study is generally prompted by a significant change in aircraft operations—either the number of operations conducted at the airfield, the number and type of aircraft using the airfield or if the flight paths used for airfield departure/arrival changes.

SCAS has an extensive Noise Abatement Plan (NAP) presented below, which has been developed over several decades through cooperative efforts with citizens and users. (The FAA Part 150 Noise Compatibility Program, NCP, represents the portion of the NAP that has received FAA approval and, therefore, can be considered for federal grants.) While operational measures receive the most public attention, the program is well rounded and includes complementary compatible land use measures and "continuing program" measures that focus on program implementation, communication, monitoring, and updating. The cooperative airport, citizen, and user effort has been, and will continue to be, the key to the success of the noise abatement program. Citizens provide critical input related to the identification of needs and program effectiveness.

Table 2.15-4. SCAS noise abatement land use elements.

Land Use Elements	
Sound Insulation (Residences and Public Buildings)	None inside the 60 CNEL Contour.
Purchase Assurance for Homeowners Located Within the Airport Noise Contours	None inside the 60 CNEL Contour.
Aviation Easements	Aviation easements required for all new residential development within Sacramento International Airport policy planning area.
Zoning Laws	No new residential development inside the 60 CNEL Contour.
Real Estate/Property Disclosure Laws	Defer to State of California Code of Regulations, Real Estate Disclosure Laws, CA Assembly Bill 2776.
Acquire Land for Noise Compatibility to date	SMF acquired less than 10 parcels.
Population within each noise contour level relative to aircraft operations	-None inside the 60 CNEL Contour.
Airport Noise Contour Overlay Maps	• Sacramento International Airport Comprehensive Land Use Plan contour • Sacramento Executive Airport Comprehensive Land Use Plan with noise contour • Mather Airport Comprehensive Land Use Plan contour
Total Cost of Noise Mitigation Programs to Date	$1,000,000 for all Sacramento County Airport System Noise Projects, estimated.
Source of Noise Mitigation Program Funding for Aircraft Noise	Airport Enterprise Fund.

All of SCAS land use elements are displayed in Table 2.15-4 since they apply equally to all airports. Due to the unique nature of each airport, their NAPs are displayed in individual Tables 2.15-5 to 2.15-7. No residences or housing units exist within the 60 CNEL for any of the airports with the exception of McClellan.

Mather Airport

SCAS states that Mather is near extremely noise sensitive populated areas along Mather's approach and departure corridors (Figure 2.15-9). MHR's specific noise abatement procedures are displayed in Table 2.15-7. In 2002, SCAS chartered a collaborative regional forum, the Mather Airport Aircraft Overflight Noise Group. The group was tasked with identifying actions that could reduce noise impacts from aircraft on the community. Table 2.15-8 lists the 33 recommendations of which 30 are approved for implementation and an additional 12 are planned for implementation in the future.

Table 2.15-5. Sacramento International Airport noise abatement elements.

Noise Abatement Elements	
Aircraft Noise Abatement Procedures	• During the time period between 2145 and 0645 local time daily, turbojet IFR/VFR training operations shall be conducted in an east traffic pattern for runway 16L, and assigned a heading of 010 and an altitude of 3,000 feet.
Preferential Runway Use System	• Airport's nighttime preferential runway system calls for use of runways 34L/R between 2145 and 0645 local time daily as conditions permit.
Control of Ground Based Noise Sources	• Engine Maintenance Runup Restrictions.
Cooperative Airline/Airport Program	• Encourage Stage 2 phase-out; completed. • Stage 2 airplanes >75,000 lbs are prohibited from operating at airports within the 48 contiguous states.
Continued Monitoring	• Noise Hotline. • Airport Noise and Operations Monitoring System. • Flight Tracking System .

Table 2.15-6. Sacramento Executive Airport noise abatement elements.

Noise Abatement Elements	
Aircraft Noise Abatement Procedures	• Traffic pattern altitude is 1,024 feet; 1,524 feet for turbine-powered and large aircraft. • All departing aircraft shall climb on runway heading to an altitude of 600 feet before turning unless otherwise instructed by the tower or for flight safety. • No touch-and-go operations between the hours of 2100 and 0600 local time. • No practice instrument approaches between the hours of 2100 and 0600 local time. Full-stop instrument approaches acceptable at all times. • Mid-field or Intersection takeoffs are prohibited. • Formation landings and takeoffs are prohibited. • Use of the airport is restricted to aircraft with FAA certified takeoff noise levels of 84 EPNdB or less as listed in FAA Advisory Circulars 36-1G and 36-2G. • Turbojet aircraft will use Runway 02/20 unless otherwise directed by ATC or for flight safety.
Runway Restrictions	• Runway 16 closed to takeoff by turbo jet aircraft. • Runway 02/20 maximum GWT 50,000 lbs.
Preferential Runway Use System	• Calm wind runway and turbojet aircraft, runway 02/20.
Continued Monitoring	• Noise Hotline. • Airport Noise and Operations Monitoring System. • Flight Tracking System. • **FIGURE 7** SAC Current Airport Noise Contour map.
Noise Level Restrictions	• Use of the airport is restricted to aircraft with FAA certified takeoff noise levels of 84 EPNdB or less as listed in FAA Advisory Circulars 36-1G and 36-2G. • U.S. Stage 2 Phase out complete as of 12/31/1999 (CFR Part 91.801). Stage 2 airplanes >75,000 lbs are prohibited from operating at airports within the 48 contiguous states.

Community Involvement

SCAS has long emphasized public outreach as an important part of its mission. A good example of SCAS' communication and public outreach is outlined Table 2.15-8. In 2002, SCAS chartered a collaborative regional forum, the Mather Airport Aircraft Overflight Noise Group. The Group is tasked with identifying actions that could reduce noise impacts from aircraft on the community and serves as a liaison between the Airport and the surrounding communities to ensure continuing and timely discussion of mutual Airport and community interests. Mather Airport also has a quarterly Technical Noise Committee meeting which allows SCAS time to meet with cities such as Rancho Cordova and Folsom on arising issues. Additionally, SACOG provides continuity and communication between SCAS and the surrounding member jurisdictions. As previously mentioned, though Placer County is not a member of SACOG and since McClellan operations impact this county, outreach with both Placer County and the city of Roseville has been included in the CLUP update. Finally, each airport manager has an informal network of communication between each other and their surrounding jurisdictions.

When an Airport Land-Use Compatibility Plan Update is initiated, an Advisory Committee is typically established by SACOG, the Airport Land Use Commission responsible for such updates. Advisory Committees typically include SCAS staff, airport users, fixed based operators, pilots, elected officials, and local, state, and federal officials, to provide input and make recommendations to the staff and consultants. Committee members help disseminate information on these studies to the rest of the community and to the aviation industry and to solicit input from these groups.

SCAS outreach on noise and land use issues has included:

- Public forums;
- Website;
- SACOG meetings;
- Mather's Technical Noise Committee;

Table 2.15-7. Mather Airport's noise abatement elements.

Noise Abatement Elements	
Aircraft Noise Abatement Departure Procedures	• Departure aircraft are encouraged to climb to ATC clearance limits as soon as practical. ATC noise abatement procedures in effect from 2200 to 0700. • VFR Turbojet aircraft departing north or northwest from the centerline of the runway will begin turns at or above 1,100 feet MSL. • VFR piston aircraft departing the traffic pattern shall not make turns prior to reaching 700 feet MSL.
Aircraft Noise Abatement Arrival Procedures	• Pilots are requested to use best operating practices to minimize aircraft noise at all times. Whenever possible, fly arrivals at or above 3-degree glidepath. • Standard Traffic Pattern altitudes are 1,096 feet MSL piston aircraft, 1,896 feet MSL turbine aircraft. • Normal traffic pattern flow is Runway 22L - left traffic Runway 22R - right traffic Runway 4R - right traffic Runway 4L - left traffic • If traffic allows, turbojet aircraft will use left traffic for runway 22R and right traffic for runway 4L. • Arrivals form the North and East: Vectors to intercept the approach east of CAMRR (20nm from the runway end) at or above 6,500 feet MSL. • Arrivals from the South through the Southeast: Vectors to intercept the approach east of LDOOR (15nm from runway end) at or above 5,000 feet MSL. • Aircraft entering a downwind from the Southwest of Mather must turn final prior to 10 miles. If unable, aircraft will be vectored to intercept final approach east of LDOOR at or above 5,000 feet MSL.
Preferential Runway Use System	• Runways 22L/R Departures: All jet departures turn left and maintain heading 090 through 4,000 feet MSL before proceeding on course. Northbound departures maintain 090 heading until passing through 6,000 feet MSL prior to proceeding on course. • Runways 4L/R: All jet departures turn right heading 100 until reaching 4,000 feet MSL, northbound departures maintain 100 heading until passing 6,000 feet MSL. • During Nighttime calm wind conditions use Runways 22L/R.
Air Traffic Control Noise Abatement Procedures	ATC noise abatement procedures in effect from 2200 to 0700.
Control of Ground Based Noise Sources	• Minimum use of reverse thrust.
Cooperative Airline/Airport Program	Encourage Stage 2 phase-out; now complete.
Continued Monitoring	• Pilot and Citizen Noise Hotlines • Airport Noise and Operations Monitoring System • Flight Tracking system

- Mather Airport Aircraft Overflight Noise Group;
- Real estate disclosure brochure;
- Jeppesen chart inserts and flight manuals;
- Sanderson flight manuals;
- Information provided to NBAA, AOPA, ALP, ATL, and ATC;
- Informal meetings with planning departments;
- Pilot and ATC briefings; and
- Direct communication with specific airlines.

Accident/Safety Issues

While SCAS facilities have an extraordinary safety record, a tragic 1972 fatal air show accident at SAC involving an F-86 that crashed into a local ice cream parlor resulted in the deaths of 22 people on the ground, including 12 children. This accident continues to remain a catalyst for both citizens and SCAS to remain vigilant about compatible airport planning surrounding all SCAS airports. In February 2000, Emery Worldwide Airlines Flight 17, a Douglas DC-8, on a scheduled evening cargo flight from Mather Airport to Dayton, Ohio, with three crew members

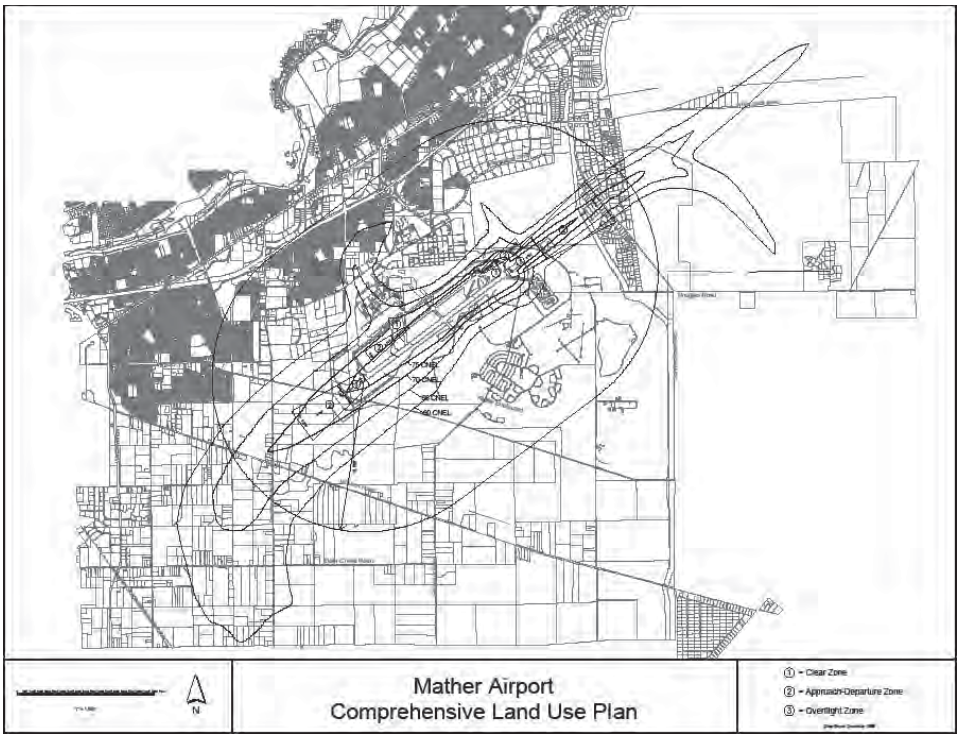


Figure 2.15-9. MHR current airport noise contours and comprehensive land use plan.

aboard, crashed into an auto salvage yard shortly after take-off. While the three crewmembers were fatally injured, there were no other injuries or deaths associated with this accident. McClellan had one accident in 1944 involving a take-off of a Curtis C-46.

SCAS has a more difficult time with preventing obstructions. Franklin Field has obstructions at all four runway ends. Runway 18 has a 5-foot fence obstruction, 400 feet from the runway end; Runway 36 has a 30-foot tree obstruction, 1,275 feet from runway end; Runway 9 has a 60-foot telephone line obstruction, 1,500 feet from runway end; Runway 27 has a 45-foot telephone line obstruction, 1,300 feet from runway end. Executive Airport has tree obstructions varying from 33- to 62-feet high at each runway end and a residential development with trees that inhibit and occasionally block the Control Tower's line of sight at the approach end of Runway 30. McClellan has a 90-foot tower obstruction.

SCAS reports that they have informal conversations with the surrounding jurisdictions regarding potential obstruction developments. Formal notification of proposed developments is through typical public disclosure requirements. The surrounding jurisdictions are cognizant of airspace restrictions for obstructions if they are proposed within a 5 nm radius of the airport. Seldom do jurisdictions understand that proposed development that is even further from the airport can also exhibit a similar obstruction hazard, depending on location and type of structure. In many cases, planning staff at other jurisdictions or even within Sacramento County may not be aware of federal, state, and local regulations concerning airspace protection. Therefore, SCAS is often not informed about the proposed hazard unless notified by FAA. SCAS staff spends considerable time and effort in educating project sponsors and planners on such regulations. In cases where such educational outreach was not effective, SCAS would need to rely on assistance form the FAA, the state of California Department of Transportation and SACOG for assistance in contesting development of potentially hazardous and incompatible land uses.

The FAA is responsive and willing to assist in researching project impacts on planned future improvements, such as proposed new category III ILS' at Mather or SMF.

Table 2.15-8. Mather Airport Aircraft Overflight Noise Group recommendations.

Proposed Measure	SCAS Action	Status/ Date Completed
Aircraft fly and approach at higher altitude, promote 3-degree ILS approach.	Pilot Information Line informs of 3 degree or greater glide slope on approach. ATC briefed.	Implemented/ July 2003
Delay extension of flaps and landing gear, permitted by conditions.	Pilot Information Line informs of pilot controlled delays.	Implemented/ September 2003
Encourage use of VOR/DME approach.	Measure shifts noise to residents living under VOR/DME approach.	Tested between July 15 and November 13, 2003/ FAA denied
Standard Terminal Arrival Procedures (STARs) for noise abatement procedures.	Formal request to FAA on October 1, 2003 for ILS arrival or any other procedures identified in Comprehensive Noise Abatement Plan	Awaiting FAA response
Conditional Extension of Runway 22R.	Preferential runway use policy developed in Master Plan EIR/EIS	Accepted/ December 2003 Master Plan completed
CEQA(California Environmental Quality Act) & NEPA process for Mather Master Plan to include Folsom, El Dorado Hills, Elk Grove, Silver Springs and Rancho Murrieta.	• CNEL and single event analysis included in EIR/EIS, flight paths, addressed in CLUP and Master Plan • Policy Planning Areas developed for CLUP finalized. • Mather Airport Policy Planning Area adopted by unincorporated Sacramento County.	• Accepted; December 2004 EIR ongoing • Ongoing/ April 2006 • Adopted/ April 2006
Jeppesen inserts include Noise Abatement Procedures with graphics.	• 2,000 copies of new inserts to Jeppesen plates distributed to pilots. • Developing unique flight manual pages for arrival, departure and nighttime noise abatement procedures for Airport Facility Directory, and Sanderson's North American Flight Manuals.	• Completed/ April-June 2005 • Ongoing/ Summer 2006
Monitor noise before and after new approach plate implementation.	• Noise measurements conducted October 2002. • Follow-up noise measurements included VOR/DME 120 day test.	• Implemented/ October, 2002 • Implemented/ March 2003 and August 2003.
Conduct/ participate in chief pilot meetings to review current noise abatement procedures and airline performance.	• First meeting held on Dec, 2002. Updates provided at quarterly tenant meetings. • 2nd presentation on September, 2003. Handout included noise abatement procedures best practices. • March 2004 Technical Noise Committee recommended Pilot Info Line to inform of NA procedures • October 2004 draft Jeppesen Chart reviewed. • February 2005 review of Continuous Descent Approach test results indicate revision needed and coordination with FAA and ATC. • May 2005, final CDA testing reported could result in 3-5 dB reduction compared to standard ILS approach procedures. • UPS reaffirmed commitment to using CDA. • ATC confirms letter of agreement to use CDA and place in directives manual by Fall 2005. • ABX Air adapting CDA for B757 for B767 usage, testing begins 1st quarter 2006. • 2,000 Jeppesen inserts distributed.	Implemented
Update Airport Facility Directory with noise abatement procedures.	• NA Procedure information added to Pilot Information Line. • Special Airport Remarks page includes noise sensitive areas.	• Implemented/ July 2003 • Ongoing/ Dec 2006

Table 2.15-8. (Continued).

Proposed Measure	SCAS Action	Status/ Date Completed
Update Boeing National Business Aviation Association, Air Line Pilots Association and Air Transport Association on NA procedures.	• July 2003, request to add Pilot Info Line phone number to publications and websites. • March 2005, updated arrival and departure information. • June 2005 AOPA and NBAA information provided. • June, 2006 develop flight manual pages and information on NA procedures to FAA's Southwest US Airport Facility Directory and Jeppesen's and Sanderson's North American Flight Manuals. • Spring 2005 Boeing website updated • Dec 2005 updated publications but, NBAA, ALP and ATA did not publish information.	Ongoing
Regularly disseminate NA procedures to aircraft operators with positive follow-up.	• March 2003: distributed NA procedures. • September 2003, Dec 2003 & April 2004: presentations delivered at Tenant's meetings. • Comprehensive Noise Abatement Brochure distributed to tenants and chief pilots and on website. • Oct 2004: Jeppesen chart insert reviewed. • June 2005: 2,000 copies of Jeppesen charts distributed to pilots.	Implemented
Establish web-accessible flight track display system.	July 1, 2003: website is available to public.	Implemented/ July 2003
Develop pilot information line language.	Completed and updated as needed.	Implemented
Airport Noise Operational Monitoring System (ANOMS) monitor NA procedural performance.	ANOMS utilized for VOR/DME testing, CDA procedures.	Implemented/ May, 2004; February, 2005; April, 2005; February, 2006
FAA Flight certifies glide slope out to CAMRR.	• Request FAA extend ILS glide slope to 20 NM. • FAA extends ILS service area to 45NM. • CNEL and single event analysis conducted for Master Plan EIR/EIS.	Completed/ October 2003
Implement Voluntary Agreements with Carriers to control noise.	• Analyze comprehensive noise abatement plan (similar to Fly Quiet Programs). • Complete EA/EIR/EIS to incorporate mitigation measure • Seek voluntary agreements with carriers. • SCAS staff researches other Fly Quiet Programs to determine appropriate inclusions.	• Accepted • Awaiting completion of Master Plan • Awaiting • Ongoing/ 18 months after EIS completed
Study Departure Tracks to reduce noise to South.	• Detailed analysis conducted. • Developed theoretical instrument departure procedures and preferred NA flight tracks. • FAA reviewed procedures. • FAA to publish new Instrument Departure Procedures for review. • Formal submission to FAA Procedures for review.	• Completed/ December, 2003 • Completed • Completed • Awaiting FAA Procedures/ 18 months

(continued on next page)

Table 2.15-8. (Continued).

Proposed Measure	SCAS Action	Status/ Date Completed
Utilize "stabilized" Continuous Descent Approach.	• Formally requests UPS to expedite CDA implementation. • SCAS, UPS and FAA Center of Excellence coordinate CDA development, testing and implementation. • FAA Oakland ARTCC and Northern CA TRACON streamline aircraft clearances to enable CDA execution by aircraft crews.	Completed/ October 2003 to May 2005
Conduct noise monitoring under departure flight tracks.	Completed.	March 2003
Analyze departure flight tracks to identify changes.	Increase in day-time morning southbound aircraft activity	Ongoing/ March 2003
Identify flights performing NA procedures well and encourage behavior.	• Analysis needed to determine best means of reporting. • SCAS staff investigate other Fly Quiet Programs. • Master Plan EIR/EIS identify mitigation measures to be used in Comprehensive Noise Abatement Plan.	Ongoing/ December, 2004
Protect south departure corridor with zoning, easements and other land use planning techniques.	• CLUP will address after Master Plan EIR/EIS is completed. • Secured Easements with Public Outreach to land developers on new residential developments. • New Policy Planning Area developed as interim to CLUP.	• Accepted/ December, 2007 • Ongoing/ 2-3 years • Completed/ April, 2006
Require Runway 22L/R departures turn to a heading of 090 and reach 4,000 MSL before turning south (24 hours).	FAA unable to implement procedure on 24-hour basis due to increased air traffic operations during daylight hours; ATC can determine to use procedure if workload and conditions permit.	Limited Acceptance/ June, 2004
Develop Instrument Departure Procedure with preferred NA flight tracks.	• Analysis conducted; IDP developed. • FAA reviewed. • SCAS formally requests FAA develop and publish new IDP. • FAA Procedures review will take 18 months.	• Completed/ March 2004 • Completed/ Oct 2004 • Implementing/ Feb 2005
Utilize NA Departure Procedures for minimizing noise impacts.	• Detailed analysis determine if each airline and aircraft procedure (Close-in or Distant) is most beneficial. • HMMH reports on Optimum Departure Procedure Analysis concluded procedures are currently being utilized by UPS, ABX and DHL. • Analysis to be used in Comprehensive Noise Abatement Plan.	• Accepted/ December, 2004 • Completed/ May 2005 • Awaiting/ 18 months after EIS
Develop a "Fly Quiet Program" to monitor NA procedure performance and reward high levels of compliance.	• Create Comprehensive Noise Abatement Plan. • Investigate other Fly Quiet Programs. • Master Plan mitigation measures included in Plan.	18 months after ELS completed
Depict Airport Approach and Take-off paths on official Zoning Maps.	Flight Track depiction addressed in CLUP update after Master Plan completed; SCAS to work with SACOG to develop reasonable radius from airport to incorporate flight tracks.	Ongoing/ January, 2004
Solicit UPS assistance in implementing CDA.	Brochures and flight manual inserts prepared and distributed. Reply cards review effectiveness by flight crews.	Implemented/ February 2006

Table 2.15-8. (Continued).

Proposed Measure	**SCAS Action**	**Status/ Date Completed**
Update CLUP.	Investigate potential easement inclusions; Public outreach begun with land developers. Policy Planning Area developed and adopted by unincorporated Sacramento County.	18 months after Master Plan completed
County Initiated Noise Abatement Items		
Review Plans for Compatibility	Noise Manager submit parcel development plan review on airport compatibility to County Subdivision Review Committee. Develop referral area on County planning maps for regular review of development projects. Policy Planning Areas for SMF, MHR and MCC airports submitted to County.	Ongoing March 2006
Annual Report to County Board on Aircraft Noise Issues	Report on NA procedures, measures, and success; depict historical and current noise contours for SMF and MHR.	Ongoing
Hold regular meetings with FAA ATC staff.	SCAS staff review NA procedures and areas for improvement.	Ongoing
Streamline Aircraft Noise Compliant Process.	Utilize website, respond to complaints in timely fashion.	Ongoing
Upgrade ANOMS.	Upgrade ANOMS technology.	Completed
Create working group with interested jurisdictions.	Technical Noise Committee was created to provide the opportunity to interested jurisdictions to participate in technical meetings related to Mather aircraft noise.	Completed

Willmar Municipal Airport, Willmar, Minnesota

Introduction/Airport Overview

Willmar Municipal Airport is located in Willmar, Minnesota, about an hour drive from the growing city of St. Cloud and 2 hours from Minneapolis (Figures 2.16-1 and 2.16-2). The general aviation Willmar Municipal Airport (K-BDH) officially reopened on September 5, 2006, in a new location. Previously, the airport was located next to a business park and was closer to the town of Willmar. The new airport, 2-miles west of the city, includes improved instrument approaches, a large hangar area, and a modern terminal. There is one 5,500-foot runway with plans and room to extend the runway to 6,500 feet in the future. Currently, there are 64 based aircraft that vary in size and speed at K-BDH.

Figure 2.16-1. Aerial view of Willmar Municipal Airport.

The airport handles private, business, and commercial aviation. In recent years, general aviation operations have declined while corporate jet operations have increased. Much of the traffic tends to fly early or late in the day, but the airport is open 24 hours per day. There are no scheduled commercial flights. In total, the airport handles about 20,000 to 25,000 operations per year.

Figure 2.16-2. General location of Willmar Municipal Airport.

Figure 2.16-3. View of Willmar airfield, c.1945.

History and Development

Willmar, Minnesota, has an aviation history dating back to the late 1920s when a group of hobby fliers started an airfield west of the city known as "Ramblewood." The hobby fliers raised interest in the city for an airfield that could be open to the public. Work on the airfield started in 1934 as part of President Roosevelt's New Deal Program. The airfield served as an emergency landing field for a scheduled airline route between the Minneapolis/St. Paul area and the Black Hills. As aviation grew, the city recognized a need for a professional airport manager. In 1945, John and Mary Jane Rice came to the Willmar Area to manage and develop the airport. Figure 2.16-3 shows the airport during this era.

The Willmar area has been growing as development pressure ripples out from St. Cloud. The city has the busiest rail yard in the state and a solid industrial and commercial base. A new highway is being constructed between Willmar and St. Cloud that will reduce driving times and is expected to bring more growth and development. In 2006, K-BDH had two runways: one 5,700 ft-by-100 ft asphalt runway and one 3,500 ft-by-300-ft turf runway. The airport was located adjacent to an industrial park that served a number of companies in the community, including:

- Pioneer Hybrids;
- Hormel Foods (Jennie-O Foods);
- West Central Tribune;
- West Central Communication;
- Cash Wise Food Corporation;
- Burlington Northern Santa Fe Railway;
- Willmar Electric Service;
- Duininck Brothers Construction;
- Dayton Hudson;
- Wal-Mart stores;
- State of Minnesota; and
- U.S. Army.

The decision to relocate K-BDH and construct a new airport started after the old airport initiated a master plan update process in 1989 and 1997 that explored expansion of the existing facility and runways to accommodate future increased demand. The airport and local community began to realize, too late, that K-BDH could not get FAA or state funding because of already-established incompatible land uses. These included a lighted ball stadium (built by the city on land originally purchased for the airport), a 130-foot high grain storage elevator, single-family homes, and a nursing home. Without the FAA and state funds, expansion of K-BDH was not possible.

The city commissioned studies to explore whether to buy out and remove the incompatible land uses in order to enable expansion on the existing site or whether to relocate the airport. The studies found that expected cost option of relocating the airport was not much greater than the buy-out option. In 1997, the cost of the preferred relocation option was projected at about $12.7 million in 1997 dollars, or $16.2 million in future dollars. A study prepared by HNTB for the 1997 Airport Master Plan update projects that the FAA would provide 64% of the funds, the state of Minnesota would provide about 17%, and the city would need to cover about 19% of the costs. In 1995, a joint airport-planning group recommended relocating the airport to a site two miles to the west.

The option of relocating the airport also had the benefit of making old airport land available to expand the adjacent industrial park, converting it to tax-generating commercial and industrial uses. By selling its land holdings at the old airport site, the city could generate revenue to cover its share of the cost of the new airport. The FAA required that the city spend the value of the unimproved old airport land toward development of the new airport before FAA funds could be used. The city's share of the total project cost amounted to about $2.7 million in escalated dollars. A report prepared by HNTB for the 1997 Airport Master Plan update indicates that the unimproved value of the land was quite low – less than the city's share of costs. In response, the city decided to improve and provide services to the old airport vacant land prior to the sale, dramatically increasing its value, but would be required to spend only the unimproved value of the land toward the development of the new facility. HNTB projected that the market would support sales of 300 acres of the land by 2015 which, once improved, was expected to generate between $6 and 7.5 million. The amount—nearly double the city's share of the project costs—could add substantially to city coffers over time.

Governance

The City of Willmar owns and operates K-BDH. The new modern terminal is pictured in Figure 2.16-4. The airport manager is a city employee and reports to the director of public works. The new airport location is within Kandiyohi County, and much of the land in the airport vicinity is under the county jurisdiction.

Minnesota Statutes give a municipality that owns an airport the authority to adopt extraterritorial zoning to protect land uses around the airport. Although an airport owner is not required to adopt airport zoning, the state strongly encourages local government to do so. Per Minnesota Statutes §§360.305, state funds for airport improvements are available only to airports where airport zoning that meets the state's minimum standards is in place and is being enforced. Local governments are encouraged to make maximum use of zoning and easements to eliminate potential hazards instead of acquiring land or interests in land. The state regulations do not allow the municipality to require removal of a use, structure, or tree made nonconforming by airport safety zoning. The implication of this requirement is that the city of Willmar had to acquire all property occupied by any existing use that was not conforming with the state's minimum airport zoning requirements, in order to retire the use.

Airport land use and safety regulations are outlined in Minnesota Statutes §§360.061-074. Specific minimum zoning regulations for land use airspace protection, safety, and noise sensitive uses are fleshed out in Minnesota Rules, Section § 8800.2400, et seq. Local airport operators may adopt zoning that either conforms to the minimum standards or is more restrictive. Minnesota establishes six airspace zones with height restrictions, authorizes but does not require noise sensitivity zones, and establishes three safety zones (A, B, and C) with specified minimum land use restrictions. For all three zones, tall structures and uses that cause glare or other possible hazards are prohibited. Zone B restricts uses that cause people to assemble; any use at a density exceeding 15 persons per acre, and certain noise sensitive uses such as schools. All permanent structures are prohibited from Zone A except existing, low density residential uses, and parcel size may be no smaller than three acres.

State statutes give authority for the airport owner (city of Willmar, in this case) to enforce the zoning on land within two miles of an airport even if the land is within the jurisdiction of another local government (in this case, Kandiyohi County).

Figure 2.16-4. Willmar Municipal Airport's modern terminal.

The airport operator must offer to either create a joint zoning board having authority to adopt and enforce zoning, or have the other jurisdiction adopt and individually enforce the same airport zoning as the airport operator. Lacking positive response to either option, the airport owner may simply enforce its zoning in the two-mile radius area around the airport. Thus, the state provides three possible mechanisms (joint zoning board, separate but equivalent zoning, or unilateral enforcement of zoning), each of which ultimately requires that all affected jurisdictions comply with airport zoning as specified by the airport owner. Kandiyohi County agreed to form a joint airport zoning board, which is the option that gives the county the most influence in outcome through participation in crafting the airport zoning.

There are two public commissions that play a role in airport management: the city's Municipal Airport Commission (MAC) and the new joint city-county Airport Zoning Board (AZB). The MAC existed for many years, but had become more or less defunct in the 1980s. The MAC's stated mission and purposes are to oversee airport operations, and its authorizing documents make no specific reference to airport compatible land use. The MAC was never active in reviewing development proposals in the city around the old airport. In the wake of the airport relocation, the AZB was formed. Per state law, the city council and county commissioners each appoint two members, who together select a fifth member to serve as the chair of the board. The AZB has adopted zoning regulations related to airport land use compatibility, and sits as a land use planning and development review board for proposals within the airport influence area and vicinity. The city planning director and the airport manager serve as staff and regularly attend meetings of the AZB.

The state land use compatibility guidance manual was recently amended in September 2006. In addition to the basic standards, the manual provides detailed land-use guidance and best practices and a recommended structure for implementing height and land use regulations that are intended to minimize airport safety hazards and protect airport operations. The state guidance document provides model ordinance language that exceeds the minimum standards as an optional guide for local jurisdictions to use. The Willmar airport manager and planning director praised the state guidance document, and the staff at the Minnesota Department of Transportation, Aeronautics Division, as having been very helpful in the airport relocation, construction, and planning processes.

Discussion of Compatibility Issues

Various land use decisions made by the city in the 1980s allowed the development of incompatible land uses in the current airport's safety Zone B. As previously noted, these included parks, a lighted ball stadium (built by the city on land originally purchased for the airport), a 130-foot high grain storage elevator, residential uses, and a nursing home. Each of the first three listed uses is considered incompatible in the safety zones because they attract wildlife, affect visibility, and penetrate the Part 77 surfaces. The residential and nursing home uses, while not recommended based on noise impacts, could potentially have been mitigated regarding noise. Thus at Willmar, noise incompatibility was not a major component of the land use incompatibility. The city realized too late the impact that decisions it made to approve uses in the safety zones would have on future airport operations and the potential for financial assistance for expansion.

With the development of the new airport (Figure 2.16-5), the city has been working to prevent new incompatible land uses and to ensure coordination between the city and county on land use development decisions. Actions that the city has taken include:

- Willmar purchased all Zone A lands around the new airport. Acquisition has been a principal tool to ensure compatibility, but has been very expensive and has required the use of condemnation. The city and airport would like to be able to purchase Zone B lands, but state grant money cannot be used for that purpose.

- The new joint city-county AZB was convened. Cooperation among the jurisdictions has been very good thus far.
- The AZB adopted an airport zoning ordinance that conforms to the state model ordinance.

There are currently no incompatible land uses in the airport vicinity of the new K-BDH. No aircraft accidents have occurred since the new airport opened.

Since the airport opened, the AZB has reviewed and rejected several proposals for uses in the airport vicinity that appeared to be incompatible land uses. In one instance, a company proposed to build a factory with a 300-foot smokestack near the new airport. In another, the municipal utility proposed to install large wind turbines in the airport vicinity. The idea of the turbines was initially vetted with planning staff at a smaller scale, and staff was tentatively supportive. However, when the development proposal was submitted some time later, the turbines were proposed at a height exceeding 400 feet, which would have penetrated the Part 77 surfaces. There was also concern that turbines of this size, having metal blades, might create signal interference in the precision approaches. Both of these proposals were denied by the AZB. The municipal utility subsequently found another more appropriate location for the turbines.

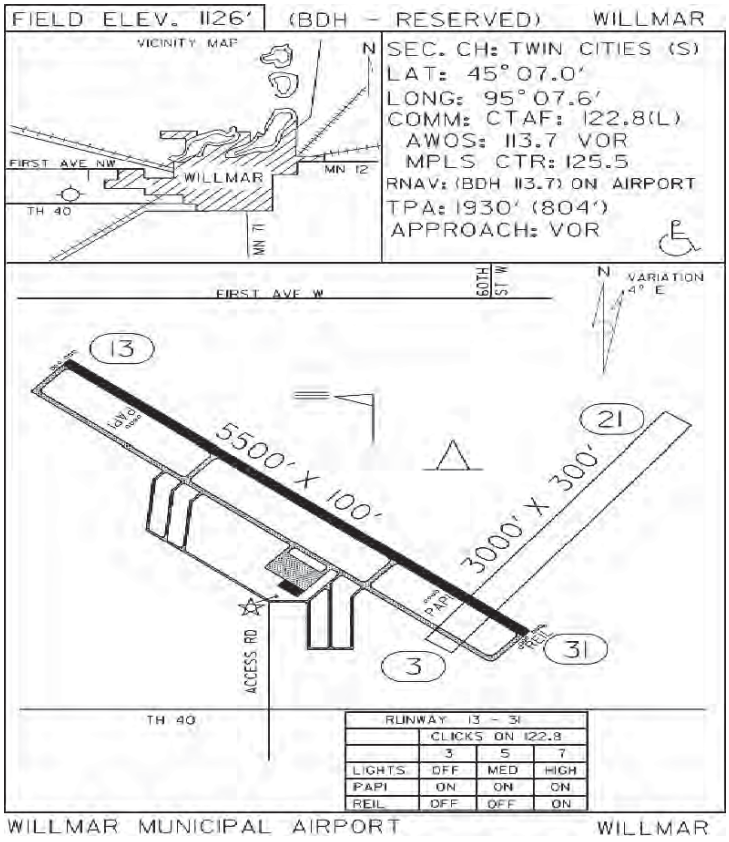


Figure 2.16-5. Willmar Municipal Airport diagram.

Existing Planning Documents and Regulations

Zoning

The Airport Zoning Board adopted a new airport zoning ordinance, which includes an overlay district around the airport. In a 2005 interview, the former airport manager indicated that the city supported making the ordinance stricter than the state model by banning all residential uses from safety Zone B. Ultimately, the AZB adopted an ordinance that follows the state model ordinance with no substantive changes. This includes adoption of the six height restriction zones, and A, B, and C safety zones that codify and apply the state guidance for land use restrictions. No specific noise zones were adopted.

Land Use Plans

The 2001 Kandiyohi County Comprehensive Plan includes a transportation objective and several guidelines relating to airports, as follows:

Objective E: Encourage the improvement of air transportation services and facilities.
- Guideline 1: Support improvements to airports within the region when the need has been demonstrated.
- Guideline 2: Airport decisions should consider growth and development factors.
- Guideline 3: The County should encourage airport zoning to help ensure that compatible land use decisions are made, including the height of structures.

The city of Willmar last updated its comprehensive plan in 1989. The city's comprehensive plan encourages airport expansion to meet growing demands, but does not address airport land use issues.

Community Involvement

The decision process to relocate the airport occurred in the context of the 1997 Airport Master Plan process. During that plan update, the city included a number of public outreach efforts and received feedback from the public about the potential alternatives. At this time, communication with the county began as the city looked for a new site outside of city limits.

Cooperation between the city of Willmar and Kandiyohi County has been relatively smooth by all accounts for two primary reasons. The Willmar Planning Director indicated that an established, amiable personal and professional friendship with the county planning director had extended to good communication and cooperation on the airport issue. The greater context, however, may be the fact that the state gives authority for an airport owner to impose zoning on affected land in adjacent jurisdictions. This fact leaves the county with several options on how to cooperate, but no ability to refuse. Kandiyohi County accepted the option that gave it the best opportunity to influence the zoning, by participating in a joint Airport Zoning Board and the drafting of the zoning ordinance.

The planning director reported that the only notable advocates or adversaries in the decision and implementation process for the airport relocation have been those property owners whose land was condemned for the new airport. In general, the community is very supportive of the airport. For example, diverse members of the community came together in a fundraising effort to bring an F-14 TOMCAT to Willmar (Figure 2.16-6). The city was contacted by the National Museum of Naval Aviation about interest in housing and displaying the aircraft, which was previously located at the Minneapolis/St. Paul International Airport Naval Base. Local aviation supporters, enthusiasts, and businesses contributed the needed funds to hire a company to remove the engines and miscellaneous parts and disassemble the derelict aircraft, and to transport and reassemble it in Willmar. The airport plans to landscape the area and place a walkway around the aircraft to allow locals and visitors a chance to see it up close.

Figure 2.16-6. F-14 at Willmar Municipal Airport.

Economic Impacts

At K-BDH, incompatible land use clearly had an enormous economic impact on the airport and the municipality. The cost of relocating the airport was initially estimated at $16.7 million. In 2008, city and airport employees were unable to provide information about the actual total cost, but suggested a figure of approximately $21 million. City and airport employees were also unable to provide information about what percent of the cost came from federal and state grants, versus expenditures by the city. Relocating the airport freed up almost 400 acres for additional industrial and commercial development at the old airport site, which should have a positive economic impact on the city once it is redeveloped. It appears that the sale of improved lands for industrial use should more than recoup the city's portion of the project cost, adding to the local coffers. The city received more than $97,000 of federal funds to assist with infrastructure improvements in the redevelopment area, increasing the value of the land for sale. State and federal taxpayers and aviation-system users shouldered the remaining cost of the local decisions to allow incompatible uses in the vicinity of the original K-BHD.

Conclusion/Analysis

At K-BDH, the failure of the city to protect its asset from incompatible land use resulted in costly relocation of the airport. In particular, the city allowed a number of incompatible uses in the safety zones, such as a grain elevator and lighted sport field. In this case study, the critical issue was not that the incompatible land uses had negatively affected airport operations, but that their presence cut off available funding from federal and state agencies for expansion. Willmar's airport had not required state funds for many years until expansion was contemplated, and had not enforced land use controls to prevent incompatibilities. But once the community needed to expand airport operations, it found it necessary to comply with the state requirements for land use compatibility.

Unlike most states, the state of Minnesota, through its Department of Transportation, provides extensive guidance on airport land use compatibility, including a model ordinance with minimum requirements information, suggested language, and best practices information. Minnesota is somewhat atypical in that it requires surrounding jurisdictions to comply with airport land use compatibility zoning within a minimum two-mile radius of the airport. In order to comply with funding requirements, Willmar has adopted a range of strategies to protect the new airport from incompatible land uses. These include acquisition of land in the safety zones, the formation of a new city-county joint airport zoning and land use review board, and adoption of zoning regulations by the city and county in the airport vicinity.

Although the airport relocation had substantial up-front costs, in the long run, the city of Willmar may actually realize a net gain from the airport relocation—in effect being rewarded for failing to protect the substantial public investment in the old airport. The city was able to relocate the airport just two miles away, preserving it as an economic development engine, while expanding the amount of land available for industrial and commercial expansion. The 1997 study projected that sales at the old airport site would generate more than twice the city's expected share of costs. Willmar was able to secure state and federal funds to cover the vast majority (approximately 4/5ths) of the airport relocation costs, and substantial grants to assist with improvement of the old airport lands for sale as improved industrial lands. Finally, conversion of the land from municipal ownership to tax-generating industrial uses will increase the city's tax base over the near-term.

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Abbreviations and acronyms used without definitions in TRB publications:

AAAE	American Association of Airport Executives
AASHO	American Association of State Highway Officials
AASHTO	American Association of State Highway and Transportation Officials
ACI–NA	Airports Council International–North America
ACRP	Airport Cooperative Research Program
ADA	Americans with Disabilities Act
APTA	American Public Transportation Association
ASCE	American Society of Civil Engineers
ASME	American Society of Mechanical Engineers
ASTM	American Society for Testing and Materials
ATA	Air Transport Association
ATA	American Trucking Associations
CTAA	Community Transportation Association of America
CTBSSP	Commercial Truck and Bus Safety Synthesis Program
DHS	Department of Homeland Security
DOE	Department of Energy
EPA	Environmental Protection Agency
FAA	Federal Aviation Administration
FHWA	Federal Highway Administration
FMCSA	Federal Motor Carrier Safety Administration
FRA	Federal Railroad Administration
FTA	Federal Transit Administration
HMCRP	Hazardous Materials Cooperative Research Program
IEEE	Institute of Electrical and Electronics Engineers
ISTEA	Intermodal Surface Transportation Efficiency Act of 1991
ITE	Institute of Transportation Engineers
NASA	National Aeronautics and Space Administration
NASAO	National Association of State Aviation Officials
NCFRP	National Cooperative Freight Research Program
NCHRP	National Cooperative Highway Research Program
NHTSA	National Highway Traffic Safety Administration
NTSB	National Transportation Safety Board
PHMSA	Pipeline and Hazardous Materials Safety Administration
RITA	Research and Innovative Technology Administration
SAE	Society of Automotive Engineers
SAFETEA-LU	Safe, Accountable, Flexible, Efficient Transportation Equity Act: A Legacy for Users (2005)
TCRP	Transit Cooperative Research Program
TEA-21	Transportation Equity Act for the 21st Century (1998)
TRB	Transportation Research Board
TSA	Transportation Security Administration
U.S.DOT	United States Department of Transportation