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ACRP REPORT 15

Aircraft Noise: A Toolkit for Managing Community Expectations

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Subject Areas
Aviation

TRANSPORTATION RESEARCH BOARD

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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.

THE NATIONAL ACADEMIES
Advisers to the Nation on Science, Engineering, and Medicine

The **National Academy of Sciences** is a private, nonprofit, self-perpetuating society of distinguished scholars engaged in scientific and engineering research, dedicated to the furtherance of science and technology and to their use for the general welfare. On the authority of the charter granted to it by the Congress in 1863, the Academy has a mandate that requires it to advise the federal government on scientific and technical matters. Dr. Ralph J. Cicerone is president of the National Academy of Sciences.

The **National Academy of Engineering** was established in 1964, under the charter of the National Academy of Sciences, as a parallel organization of outstanding engineers. It is autonomous in its administration and in the selection of its members, sharing with the National Academy of Sciences the responsibility for advising the federal government. The National Academy of Engineering also sponsors engineering programs aimed at meeting national needs, encourages education and research, and recognizes the superior achievements of engineers. Dr. Charles M. Vest is president of the National Academy of Engineering.

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www.national-academies.org

By Michael R. Salamone
Staff Officer
Transportation Research Board

This guidebook should be of interest to airport managers and other staff from airports of all sizes who are responsible for responding to neighboring communities regarding aircraft noise issues. It provides guidance on how best to improve communications with the public about issues related to aircraft noise exposure. Specifically, the guidebook presents best practices that characterize an effective communications program and provides basic information about noise and its abatement to assist in responding to public inquiries. It also suggests tools useful to initiate a new or upgrade an existing program of communication with public and private stakeholders about noise issues. An accompanying CD-ROM contains a toolkit with examples of material that has been successfully used to communicate information about noise, as well as numerous guidance documents about noise and communications that have seldom been brought together in the same resource.

Generally, current understanding of the factors that influence community responses toward aircraft noise is inadequate. Moreover, an airport's grasp of these factors is important to its ability to manage local aircraft noise issues within the community. When aircraft noise causes community opposition to airport operations or planned development, airports have often attempted to overcome the project-specific opposition rather than manage community expectations for the long term. Without effective, long-term management of community expectations for aircraft noise, airports face a significant constraint to meeting future airport-capacity needs.

It is increasingly important for airport decision makers to understand the aircraft noise issue and to take advantage of successful practices at other airports in managing community aircraft noise expectations. Airports also need new techniques or assessment methods to communicate more effectively and thereby manage community expectations.

Even where the airport eventually succeeds in reducing community opposition to airport development or expanded operation, the process can delay completion of needed facilities because of political action or lawsuits. Apart from the direct costs of legal action, these delays can add significantly to the costs or benefits of specific projects. In extreme cases, despite implementing many known noise mitigation procedures, airports have been forced to abandon development of much needed new facilities because of unmanaged expectations from aircraft noise.

As demand for more air travel forces more metropolitan regions to expand existing airports or seek sites for new secondary airports or even to relocate existing airports from constrained sites, community attitudes toward new and expanded airports will become an even more important element of airport system planning. Although various factors influence community attitudes about airport operations, aircraft noise is the dominant issue at many airports. Research is needed to provide airports with tools to manage these noise issues.

Under ACRP Project 2-05, Landrum and Brown was asked to (1) develop an informative guidebook about local aircraft noise to inform readers with a direct interest, involvement, or investment in airports; (2) develop a toolkit that airport decision makers can use to manage expectations related to aircraft noise within the community; (3) investigate alternative metrics to communicate noise issues to the community; and (4) suggest other improvements that go beyond current practice to ease aircraft-noise issues. For this research, the term "noise issues" involves the socioeconomic, political, operational, safety, environmental, and legal impacts of aircraft noise on an airport; the complaints about aircraft noise from neighbors; the effects that noise has on neighbors; and the communication between the airport and its neighbors.

To accomplish the project objectives, the research team (1) conducted a thorough review of relevant domestic and international literature, research, existing regulatory requirements, published technical guidance, known mitigation techniques, and other appropriate material associated with the various aspects of the noise issue; (2) surveyed a representative sample of airports (privately and publicly owned), including general aviation, reliever, large-, medium-, small-, and non-hub, air carrier airports and conducted follow-up interviews with persons of interest identified during the initial survey to identify the elements included in individual airport-noise programs, determine how the program elements are implemented, and assess their relative success or failure; (3) evaluated relevant practices, existing guidance, research findings, and other information on the range of noise issues identified; (4) identified techniques that can be used by airports to educate, establish, and reasonably manage expectations in the community and categorized techniques by type of noise issue; and (5) prepared the guidebook and CD-based toolkit.

CONTENTS

Introduction and Guidebook Summary

During the more than 50 years since the introduction of passenger jet traffic into the American transportation system, the primary issue of controversy between airports and their neighbors has remained aircraft noise. Although other environmental concerns have arisen from time to time, the level of noise and frequency of operations over surrounding communities has remained a driving force in how airport operations are constrained and how the public perceives the impact of those operations on its quality of life.

Eighteen years have passed since the publication of the FAA's *Community Involvement Manual* (*1*) in 1990, and available technologies for communication with an airport's stakeholders have increased exponentially. At that time the public had limited access to the internet, the world-wide web was little more than a theory with a development plan, and digital graphics software was not generally available to the masses. Consequently, many communications techniques that required extensive editorial and printing capabilities 20 years ago may now be accomplished on a desktop computer with simple graphics software. Events that required weeks to arrange and provide notice about may now be announced via the media, email, and web postings and held within a few days. The advancements in speed and technology of the last two decades have provided airport managers greater flexibility in how to communicate with the airports stakeholders and allow them to respond far more rapidly to public requests for information.

While manufacturers were rapidly building new aircraft and devising engine retrofit methodologies to allow older aircraft to continue in service, local noise abatement efforts were focused largely on rerouting flights, adjusting runway use programs, and restricting hours of operation or types of aircraft allowed to operate, with secondary interests in the management of land to prevent the development of new incompatible uses. Subsequent to the publication of the Community Involvement Manual, Congress has required the phase out of older and louder aircraft from the air carrier fleet, the great majority of general aviation business jets now meet quieter noise criteria, and no new restrictions on access to domestic airports have been approved by the FAA. Hence, the FAA, in support of and supported by numerous aviation industry groups, have advocated a balanced approach to noise abatement and mitigations. In the United States, this balanced approach rests on three legs – noise reduction at the source, operational mitigation, and land use management to control incompatibilities. The European Union has adopted a balanced approach that adds a fourth leg to consider, as a last approach, the restriction of activity at the airport. The Airports Council International (ACI) has urged that the balanced approach be expanded to include "people issues", meaning the inclusion of a public involvement program.

This Guidebook is intended to assist airport managers incorporate these "people issues" into the planning process by providing guidance to the best practices of communication on aviation

noise issues that have been identified at domestic and international airports. This chapter introduces the airport manager to the Guidebook and how public engagement, as opposed to one-way communication techniques, can benefit all sizes of airports; posits that a culture shift toward building relationships is necessary; provides a list of six best practices that characterize an effective communications program; and provides basic information about noise and its abatement to assist in responding to public inquiries. This document is intended for all airport managers who seek to better their relationships with surrounding communities. This Guidebook suggests tools useful to initiate a new or upgrade an existing program of communication with public and private stakeholders about noise issues.

Purpose of the Guidebook

This document is intended to be a guidebook designed for airport managers and sponsors to help them improve their communications with the public about issues related to aircraft noise exposure.

Communications involves an "exchange" of messages, ideas or information. An exchange implies two-way activity and can be achieved through various means: speech, writing, graphics, electronic media, and even by tone of voice and body language. Airports may fail to effectively communicate with the stakeholders about aircraft noise if they use only "one-way" techniques. For improved communications, airports must proactively *engage* the public in a two-way flow of information.

Engagement creates opportunities to deliver improved understanding. It establishes a more consistent framework for both airport staff and policy makers to make more informed decisions about important issues. It fosters enthusiasm and excitement about best planning practices, and involves the public in important policy considerations. Engagement improves communication by advancing the airport staff's credibility and contributing to an atmosphere of trust. The public comes to feel as if they are part of the solution rather than being manipulated through a series of required procedural steps. As planners and managers engage a community, their capacities for brainstorming and knowledge are extended, and they grow as providers of public service.

How to Use the Guidebook

The intended audience of this Guidebook is managers of all sizes of airports.

- For small airports staffed perhaps only by the airport manager, it provides ideas to consider and basic direction for a communications approach that can be successful immediately and also evolve as the airport grows.
- For medium-sized airports, there is not only basic direction, but also suggestions on staffing and basic communication techniques.
- For large airports, there are ideas for refinement of the basic approach, as well as ideas for improving techniques or strategies that may already be in place.

For every airport, the first three chapters provide the fundamentals of:

- What techniques are identified as the best practices in airport communication,
- Why building a relationship with the public can be beneficial to the airport as well as the public, and
- What outcomes an airport should expect if it does build a good relationship with the surrounding community.

Airports of different sizes can then explore, in Chapter 4, the strategies and techniques that are most appropriate to their size of airport. Chapter 5 reviews applicable literature and provides case studies of several airports and an university, each of which has encountered difficulties in communications with surrounding neighborhoods and has sought to change their approach to that interaction. Chapter 6 provides background material to the airport manager not thoroughly versed in the complexities of noise issues to better enable him to respond to public questioning. Chapters 7 through 9 describe approaches to the abatement mitigation and description of noise in terms useful to lay communications. The printed document concludes with a list of the reference material cited throughout the chapters. The accompanying Toolkit includes many examples of material that has been successfully used to communicate information about noise, as well as numerous guidance documents about noise and communications that have seldom been bought together in the same resource. Appendix A, included in the Toolkit, is an annotated bibliography of the many documents, websites, and regulatory guidance used in the development of this report.

The Relationship Between Environmental Planning for Airports and General Community Response Factors

Airports generate environmental impacts in a variety of different categories required to be reviewed by every environmental assess conducted under the guidelines set forth by the National Environmental Policy Act of 1969 (*2*). Among these are water run-off issues raised by aircraft de-icing, air quality occasioned by greenhouse gas generation, energy concerns associated with the amount of fuel burn, and recycling/sustainability issues arising from large quantities of waste off-loaded from aircraft after each flight and from goods consumed in the terminal area. However, the environmental effect most commonly associated with airports during the last 60 years has been the noise emissions generated by the aircraft using the facility.

For more than 40 years, the public has complained about how aircraft noise has impacted their lives. Through protest, complaint, litigation and political action, they have demanded that actions be taken to reduce the noise levels over their homes and places of work. The U.S. Congress instituted a program of systematic noise level reduction by mandating that new aircraft designs be able to meet maximum noise level limits to be certified for flight.

This process was formally implemented by the FAA through the 14 CFR Part 36 (*3*) noise level requirements for three different types of aircraft, dependent on their size and date of design certification. Subsequently, 14 CFR Part 91 (*4*) operating requirements for aircraft were modified to require that all large jets designed before 1976 were to be phased out of the operating fleet during the mid-1980s if they exceed the least restrictive set of noise level standards. Subsequently, as a result of congressional approval of the Airport Noise and Capacity Act of 1990 (*5*), large aircraft were required to conform to the most restrictive standard levels imposed by Part 36, resulting in the fleet now flown at domestic airports. European and some Asian airports are evaluating the imposition of even stricter noise level limits to further reduce noise at the source.

It is important to understand that the public does not complain only about the total amount of noise to which it is exposed. It also is concerned about the number of flights that pass over, their individual noise levels, the time of day that they pass over, and their height or proximity to the viewer on the ground. The DNL metric was adopted by the FAA in 1979 as a result of the Aviation Safety and Noise Abatement Act (*6*) for environmental documentation. It was developed

for the 1974 Levels Document by the EPA (*7*) and was based on transportation noise from all sources in urban settings. In 1992, the Federal Interagency Committee on Noise (FICON) determined that the DNL metric remained the best available predictor of community annoyance (*8*). The FAA's selection of 65 DNL as the threshold of significance was based on consideration of the cost and feasibility of mitigating noise beyond that level. At that time, many older, louder aircraft remained in the operating fleet and contributed to large noise exposure patterns surrounding the airport.

While the elimination of older, louder large jet aircraft has led to the reduction of noise levels from individual sources by 20 or more decibels on average, since 1996 the number of passenger and cargo flights at domestic airports has increased by 40 percent through the end of 2007 (*9*). Consequently, the contours of equal noise exposure in Day Night Sound Level (DNL) surrounding airports have shrunk greatly from their size during the 1970s, but if the level of traffic continues to grow to meet increasing demand forecasts, the contour sizes may begin to enlarge from current levels. Unless a new technology is introduced that will result in another significant reduction of noise at the source and the product of that technology is then propagated throughout the operating fleet, noise exposure patterns around airports are likely to remain static or grow slightly.

Since the establishment of the metric and the selection of 65 DNL as the threshold of significance occurred in the 1970s, the number of commercial flights by large aircraft in the United States has increased by more than 100 percent based on statistics published annually by the Bureau of Transportation Statistics (*9*). At the same time, the cities of the United States have extensively grown through suburbanization and ex-urbanization. Many members of the public have questioned the continuing validity of the accepted metric as being representative of all the noise effects the neighbors of airports experience. Airports are concerned that areas recently relieved of significant noise levels will not open to incompatible development in the short-term while remaining at risk for the expansion of contours with the continuing growth of the airport. Airports seek a balance between airport noise abatement and the control of developing noise sensitive land uses.

Under the policy guidance of the National Environmental Policy Act (NEPA) of 1969 and FAA Order 1050.1E, Change 1 (*10*), environmental planning for airports is required to follow given procedures, processes, and use established criteria and thresholds of significance in determining the effects of various impact categories. Under current rules, the DNL is the established metric of choice, although planning over the past decade has opened to new metrics that respond to the public demand that action be taken to evaluate and abate the number of events it experiences, to mitigate the loudest of the single aircraft events, and to reduce the activity during the most sensitive periods of time. Such evaluations are currently deemed supplemental to the noise analyses, but are becoming more broadly accepted among airports and more widely known by the public within the airport environs. While thresholds of significance for any supplemental metric have not yet been determined, future research may be better able to determine more useful ways to define the environmental impacts of these additional factors.

Culture Shift Required

A basic change required of many airport managers, before public involvement can fully succeed, is one of culture. The culture must shift from an attitude of focus on information delivery (one-way communication) to focus on an engagement relationship (two-way communication). **Until this problem is solved, further techniques and strategies are likely to fail.**

Formal research on airport public involvement, research on other transportation modes, and research on other institutions that deal with the public all confirm that the "we vs. they" or "decide, announce, defend" (*11,* p. 3) approach has failed and must transition to strengthened two-way communications to have a better chance for long-term success. Interviews conducted for the preparation of this Guidebook with airport operators, users, and interest groups also support this position, but with less conviction on the part of airport operators. The literature review and case studies presented in Chapter 5 provide detail.

Surveys show airports and community groups have different communications goals.

- Most airports said that their goal was to educate.
- Most non-airport groups said that their goals related to cooperation, communication, open discussion, and partnership.

"An Assessment of Airport Community Involvement Efforts," (*12,* p. 3) included in Literature Review (Chapter 5) states,

> Airports tend to conduct public outreach as though the only purpose were to educate the public about reality from the airport's perspective, in an effort to persuade people to let the airport get on with its business.

This attitude was confirmed by follow-up interviews to the initial on-line survey for this Community Response to Aircraft Noise Study. Most airport noise officers stated during their interviews that their goal was to educate the public. In contrast, most non-airport interest groups stated some version of cooperation, communication or partnership as their goal. The 2005 Assessment paper also found that,

> Addressing problems between airports and communities will require changes in the attitudes and practices by both airports and the communities that host them (*12,* p. 12).

The second literature review reported in Chapter 5 was a TRB paper "State of the Practice: White Paper on Public Involvement," (*13*) published in 2000. Relating to public involvement in transportation, the report stated that a challenge to practitioners was to remove institutional barriers by making a serious commitment "to include the public when making decisions and change their organizations and practices to reflect that commitment." It also said that,

> For many organizations this will involve a dramatic culture change as agency employees from the top down adopt a new policy development and implementation paradigm (*13*).

Universities, like other major institutions that must work with surrounding communities, also are learning the lessons of two-way communication. The third literature review detailed in Chapter 5 is "Crisis in the College/University Relationship with the Community: A Case Study." Its abstract states,

> Crises can arise in relationships between colleges and universities and their surrounding communities especially when campuses need to grow. If these institutions have focused strictly on sending their messages out rather than establishing two-way communication with important publics, they may suddenly find themselves embroiled in conflict and confronted with a crisis (*14*).

Moving toward a culture of two-way communication is the foundation of all best practices, strategies, and techniques for the airport manager who wants to succeed in their relationship with the community about aircraft noise issues. The success in "engagement" communications on noise issues may pave the way to better relationships and dialogue leading to mutually beneficial resolutions to other disagreements as they arise.

Best Practices in Achieving Effective Communications: 6 Keys

Airport surveys, follow-up interviews, case studies, literature reviews, and professional experience were reviewed to identify the fundamental ideas that would help managers of airports of all sizes implement an effective noise communications approach. Managers may use these best practices to assess their own approach to communicating with the public about aircraft noise and determine where, or if, they could make changes that would improve public engagement.

Build Trust Through "Good" Two-Way Communications

Trust and respect are the keys to a long-term relationship between the airport and community groups. They require proactive involvement with the public and other interest groups using interactive techniques. Although the relationship may at times shift from collaborative to adversarial, efforts toward building trust and respect through engaged communications will ultimately result in an understanding of each parties position. A singular focus on educating the public will not build relationships, nor will it build trust.

Put Senior Leadership Out Front

When groups have something important at stake they look to an organization's leader for clues on its approach and as the ultimate authority on decisions and conflict resolution. Airport staff, user representatives, and the public will look to the words and attitudes expressed by the senior airport management to guide their own attitudes and responses. The presence of airport upper level management brings other decision makers to the table, and can help in the resolution of issues.

Use Graphics to Illustrate the Message

Advancements in computer software continue to allow visualization of real life and virtual "What If" scenarios. A picture is worth a thousand words – and animated pictures may be worth a million in effectively explaining the concepts of aircraft noise to a non-technical public. Audiences seem to better understand concepts conveyed through visual presentations, and factual data that illustrates issues through charts, graphs and video clips. With graphics, audiences tend to become more positively engaged with the presenter and the issues.

Have a Transparent Process

Public mistrust of the airport and its motives is at the foundation of most airport conflicts. Consistent openness and truthfulness, demonstrated by telling people what is known, as soon as it can be told, in a transparent planning process, builds lasting trust.

Select Staff for Service-Oriented Attitude (People-Skills)

An emerging realization, strongly supported by airports that have successful public communications programs, is that a "public service attitude" and "people skills" are equally important to technical skills among noise staff members. Community interest groups strongly agree. Airports with no noise staff must work to see that all employees who might respond to noise concerns are sensitive to the public relations aspects of the issue.

Be *Ahead* with Communication

The history of most airports is decades long – many over a half century. The last 50 years have been a time of major suburban growth. Airports that were built far from development now often find neighborhoods surrounding them and the public residing much closer than they once were. Airports are upgrading and adding facilities, adding or changing their service or basic mission, incorporating on-airport development, and expanding boundaries to meet aviation demand. All these efforts generate public interest and potentially have negative public reactions. Airports, no matter how small and seemingly stable, should develop a communication strategy to engage the public that looks far into the future to assure that the airport will remain a part of that future.

Best Metrics to Communicate the Characteristics of Noise

Based on the interviews conducted with members of the public, airport noise officers and managers, and the experience of the authors, the public has great difficulty relating the aircraft noise that they can hear and identify to the way noise exposure is assessed and mapped at airports. Although the DNL metric integrates the noise generated by every single event, at its variable loudness, that affects a location, and adjusts the level of effect by the time of the day to provide, the metric is so complex that the public loses sight of its components. Based the findings of this study, the best practices for communicating noise event information to the public are:

- The Day Night Sound Level (DNL) must be included among the metrics used by airports to communicate its noise exposure patterns to the public. Although it may not be well-understood, its regulatory basis makes it essential for publication and distribution of noise exposure patterns. In California, the Community Noise Equivalent Level (CNEL) is an acceptable substitute.
- The Sound Exposure Level (SEL) is an important tool to help convey the potential effect of aircraft noise on sleep disturbance and the disruption of learning. It also is used as the proper measure for determining exterior to interior attenuation levels for sound insulation programs. Although the SEL may be developed over any period of time, an evaluation of the SEL of single aircraft operations forms the basis of all compatibility computations of DNL.
- The Number of Events Above (NA) a selected sound level threshold (in SEL or decibels) has been identified by many public correspondents as the most meaningful metric to understand the components of existing noise, and the comparison of differences between existing noise and alternative conditions. It responds directly to the events an individual hears and how loud those events are expected to be.
- The Time Above (TA) a select sound level threshold of decibels appears to be best applied to assessment of ground noise, particularly when the majority of that noise occurs within a narrow band of loudness. It also is a preferred metric for the investigation of the amount of time schools are exposed to noise levels in excess of the speech disturbance level which may interrupt the both the lecture and cognitive processes.

Cumulative versus Single Event Noise

Federal regulation requires that noise be reported in a cumulative daily average because the best correlates to annoyance. The public demands that noise be described as it is heard. Effectively using single event metrics to complement the required cumulative noise metric is critical to good communication about aircraft noise issues.

Be open to the public. Give them what they want in terms of data, information. People do not want information controlled. Give it to them with no hesitation. If you do not give people the data they want then they get upset because it looks like you are hiding something. (SFO)

Be honest, be truthful, give the public the facts and explain why. (VNY)

It is taken for granted that staff must have or be able to acquire at least minimal technical skills to work at an airport on noise issues. A hard-learned lesson however, is that people-skills are at a similar level of importance. (SDF)

Staff should be very personable; able to go to the middle ground in dealing with the public; honest; diplomatic; a good listener from the public's perspective (shouldn't say that the public's complaint or idea is ridiculous); able to deal with and provide information; very courteous, knowledgeable, factual and accurate. (FLL)

Think of the implications of change long before change happens and be ready to address it (SDF)

Best Practices for Managing Noise Compatibility Issues

In responding to public demand, airports consider a variety of techniques to seek higher levels of compatibility between the aircraft operations and the surrounding use of land. The measures that appear to be most effective in achieving the greatest level of compatibility are those that move large numbers of aircraft from areas of higher population density to areas of lower population density. Such measures may be achieved only with the cooperation of the users and the FAA's Air Traffic Organization through the piloting and control of where aircraft fly. Other actions may be implemented directly by the airport without the participation of the FAA, but will require the cooperation of the users to succeed. The four best practices identified as abatement actions that accomplish this effect are:

- Modify flight track locations to overfly corridors of compatibly used land, particularly at low altitude. In many cases this practice moves aircraft to greater distances from the noise source (the aircraft) to the receiver. Judicious design of the relocated flight track may contribute substantially to the reduction of significant and moderate noise effects.
- Establish voluntary runway use programs that maximize, weather and activity allowing, the use of compatible lands as the principal arrival and departure corridors to the airport. In many cases, aircraft are able to accept small tailwind or crosswind components during landing or takeoff that will allow use of more compatible flight corridors than would strict adherence to flight into the wind.
- To abate aircraft noise on long standing communities located near the airport, the airports evaluated for this study frequently restricted run-up operations, particularly during the night-time hours. This action, although usually having little effect on DNL noise contours, responds to community complaints about ground noise impacts on sleep or other quality of life issues.
- Numerous airports interviewed for this evaluation indicated that open and frequent communication with their users was a critical component necessary to achieve the greatest benefits from their noise abatement programs. Several endorsed formal or informal pilot awareness programs and the belief that if pilots understand the issues of compatibility faced by the airport and the things the pilot could do to manage the aircraft noise through flight techniques, then they would willingly participate. To implement such a "good neighbor" policy requires that the users understand the issues faced by the airport and the concerns expressed by the communities. These can be achieved through a variety of good communication techniques elaborated upon in the following chapters of this document and the associated Toolkit.

A combination of techniques to manage aircraft noise and the use of land exposed to high levels of that noise is most effective, achieving a fair and balanced approach to noise compatibility.

Of equal importance to the maintenance of a comprehensive program for compatible land use and the management of public expectations regarding aircraft noise are the actions that the airport and the surrounding jurisdictions themselves may take to assure the improvement or continuation of compatible uses in the airport environs. Among the best practices identified as mitigation actions are:

- Acquire property within significant noise level areas to 1) reduce the number of incompatible uses now present, or 2) to eliminate the risk of development in incompatible uses.
- The sound insulation of noise sensitive property will mitigate the interior of the structure, but will not mitigate exterior activities. Such programs are typically limited to residences, churches, and schools within the highest noise levels at airports that cannot practicably acquire the areas of incompatible use.
- Comprehensive community planning can be a significant contributor to the maintenance of compatible uses in the airport environs, so long as the planning process uses aircraft noise as

A combination of techniques to manage aircraft noise and the use of land exposed to high levels of that noise is most effective, achieving a fair and balanced approach to noise compatibility.

a determinant of the acceptability of land for various uses. When the planning process is completed without regard for aircraft noise patterns and issues, noise sensitive uses often develop in conflict with aircraft noise.

- Noise overlay zoning is a tool that may be applied in the airport environs to assure the development of uses compatible with airport operations. It may restrict use to or allow development of commercial, industrial, and open space properties in high-noise areas and reserve areas of lower noise levels outside the patterns of significant loudness to uses that would be incompatible with aircraft operations.

- The subdivision design and approval process is frequently the most useful tool available for the establishment of avigation (noise and/or overflight) easements, disclosure requirements and non-suit covenants that may be attached to the deed of property for each lot. These measures are not panaceas in that they often do not change attitudes toward the airport, although they may reduce liability.

- Collaboration between airport management and local land use planners in the review of proposed development may lead to the early detection of potential incompatibilities and their potential avoidance or mitigation by suggesting alternative designs or structural requirements to mitigate the noise exposure expected at the site. Reviews may be of individual requests for zoning change, requests for subdivision approval, or broader land use planning studies.

Need for Building Relationships

This chapter helps the airport manager review why to embrace building relationships and a public/customer service approach in airport communications. It introduces how other institutions, including universities with the need to expand, have learned their lesson about the importance of listening to the public.

Too often airports are faced with a lawsuit or an angry crowd that unexpectedly appears at a routine public meeting. Airport staff representatives then often wish they had a trusting, long-term relationship with the public. The time to develop that relationship is much, much earlier than in the middle of a crisis.

Legal/Administrative Requirements for Public Contact

In aviation, federal requirements for communication with the public are minimal. They are generally limited to informal public workshops, scoping meetings, or a formal hearing as part of some environmental processes, such as the Part 150 Noise Compatibility Study or an Environmental Impact Statement. Airports typically do what state or federal law or local policy require of them — advertise in the local paper, post a notice in a public place, hold a formal hearing, or notify property owners when necessary. While these efforts provide an opportunity for discussion, they may represent little more than one step in a process required to gain project approval, rather than a chance to enhance constructive engagement.

Airports often operate with a high level of autonomy in making decisions about what happens on the airport, so long as those decisions do not create adverse impacts on the areas beyond its boundary. When they choose to develop airport property for non-aviation uses, airports may not be subject to the same standards of notification, coordination with community groups, planning commission review, and council hearings as private developers are impelled to undertake when developing adjacent properties.

What involvement does the public expect? Because an airport *acts* like other governmental institutions and may have direct relationships with local government, the public tends to perceive it as a public asset that should have the same type of openness in its planning and development as is required of other public entities and other transportation organizations.

At the same time, airports operate under various administrative structures. Some are city departments, some are agencies whose boards are appointed by the mayor or other elected officials, and some operate as independent authorities. In most cases, airport funding comes from user fees and federal sources and is only supplemented by local taxes, if local funding is received at all.

Shifting to a Public Service-Oriented Approach

During recent decades, there has been a shift toward greater public involvement and an increasing expectation on the part of the public that they have a right to be heard and treated as partners in the decision-making process. Because the public is so well-informed and involved in many areas, organizations and institutions that the public perceives as being public assets are finding that developing a customer service/public service attitude is critical to the success of their mission.

A university example, detailed in the University of Missouri at Kansas City Case Study (*14*) presented in Chapter 5 of this Guidebook, describes how a university's development plans were threatened because of their assumption of total autonomy. They believed they had no need to do more than inform the public. After facing a very angry and well-organized public, the university decided that involvement and good two-way communication was the key to increased community approval and support. The project incurred months of delays as the university fought to overcome its own mistakes made early in the public review process by establishing better community relations. Other institutions such as state departments of transportation and the EPA are moving in a similar direction.

What does having a public service attitude mean? A customer or public service attitude means that every individual in the organization must relate to the public as if every member of the public were contributing to their paycheck, because directly or indirectly they do. Many airports interviewed confirmed the need for a customer service attitude.

Engagement creates opportunities to deliver improved recommendations. It establishes a more consistent framework for both airport staff and policy makers to make more informed decisions about important issues. It fosters enthusiasm and excitement about best planning practices, and involves the public in important policy considerations. Engagement advances the airport staff's credibility and contributes to an atmosphere of trust. The public feels more like they are part of the solution, rather than pawns being manipulated through a jaded set of procedures. As airport planners and managers engage a community, their capacities for brainstorming and knowledge are extended, and they grow as public servants.

CHAPTER 3

Desired Outcomes of a Community Engagement Program

This chapter helps managers of airports of all sizes to consider their goals in communication and look at how their stated goal relates to community goals. It provides guidance on measuring the success of airport communications programs, discusses the consequence of not improving communications, and discusses the decisions airports must make on communications based on their unique situations. The chapter closes with the "What Does the Public Really Want", a listing of the three essentials that communities seek from noise programs. This chapter is important because airport managers need to decide the goals and objectives of their program and the level of resources and involvement they wish to commit to it.

Airport and Non-Airport Communication Goals

When interviewed, most airport representatives said that their communications goal was to educate. That implies a belief that:

- Noise is primarily a technical issue that requires understanding, and
- Public education about noise is the most important component in public acceptance of the airport's approach to dealing with the issue.

When interviewed, most non-airport groups interviewed said that their goals related to:

- Cooperation
- Communication
- Open discussion
- Partnership

This implies that noise issues are a problem that needs a solution, and that the solution requires a longer-term interactive process involving both the airport and the community.

Each airport must determine its ultimate goal and define its objectives before progress can be measured. Potential airport objectives involve education, but also cooperation, communication, and partnership.

Potential Communication Objectives

- Build long-term relationships with stakeholders based on trust that allows various sides to work through difficult issues together
- Encourage the community to meaningfully engage with airport leadership first before going to the press or litigation
- Avoid unrealistic expectations by educating the community about what is feasible and what constraints to action are imposed by regulation

- Develop a noise management program that "all stakeholders agree with and carry it out with open and respectful communication" (SDF)
- Achieve "a change in public perceptions, less intense complaint calls and a less angry tone of communications from the public." (LGB)

Defining and Measuring Success

There can be various levels of success in a communications program. It is easy for airports to know when they have not been sued, but is not easy to objectively measure whether trust and a "good" relationship exists. The academic profession is still trying to devise effective measurement mechanisms for public involvement techniques as applied to transportation in general. Without a definitive answer as yet, it is up to each airport to clearly define its goals for public involvement and to use mechanisms that are as objective as possible to measure its success. The value of this exercise is understanding where to allocate limited airport resources—media and public relations, public engagement, staffing, or other.

Some possible approaches for defining and measuring success are:

- Statistically valid community attitude surveys
- Feedback from focus groups of the community and airport neighbors
- Use a series of evaluation questions such as those shown below as proposed in "Stakeholder Involvement & Public Participation by the U.S. EPA." (*15*)

Consequences of Doing Nothing

Doing nothing about community engagement means that at some point when schedule is critical the airport is likely to be caught by surprise by an intense community reaction to an airport proposal. At that point it will become much harder to build a relationship of trust with the community. Building the kind of community relationship that will help prevent or resolve storms of controversy takes time. By doing nothing regarding community engagement, the most precious time — the time before the controversy erupts — is wasted.

Example Evaluation Questions

- What were stakeholder/public perceptions regarding their ability to participate in the process?
- To what degree were those expectations met?
- What was the level of effort required by stakeholders/the public to participate? Were the goals and steps of the process clearly explained?
- To what extent did the effort meet those goals?
- Was the process fair?
- Was the process competent? (e.g., was the process well-structured? was there proper leadership in place to guide the process?)
- What major factors contributed to the success or shortcomings of the stakeholder involvement/public participation effort?
- How could the stakeholder involvement/public participation effort have been designed differently to work more effectively?
- What resources (staff, time, dollars) were spent to engage in a stakeholder involvement or public participation effort?
- What were the FTE (full-time employee) or dollar amounts required to perform the public participation or stakeholder involvement effort?
- To what extent can the level of resources be associated with positive results of the stakeholder involvement/public participation effort?

- How many stakeholders/citizens participated in the effort?
- Were all significant stakeholder groups represented?
- Did the effort result in a product or agreement that furthered progress towards achieving positive outcomes?

"Stakeholder Involvement & Public Participation by the U.S. EPA" (15)

How Much is Enough?—One Size Does Not Fit All

Airports, unlike other types of transportation agencies, are not required by regulation to do extensive and regular community engagement other than during environmental project planning. Consequently some airports have virtually no experience in community engagement. They may assume that there are technical solutions to all issues and that the public has no role in determining technical solutions. According to O'Connor et al. (*13*), the highway industry also is subject to complex technical requirements, but has found that public engagement leads to more public support and smoother implementation.

The Highway Experience with Public Engagement

- Public ownership of policies/sustainable and supportable decisions;
- Decisions that reflect community values;
- Efficient implementation of transportation decisions; and
- Enhanced agency credibility.

It is the responsibility of airport leadership to make the decision about how extensive a level of public engagement to require in airport activities, particularly in noise management offices. Airport managers can learn from the experience other industries faced with similar decisions.

It is tempting to assume that the correct answer can be found and described in this Guidebook that will allow all problems with communications to be resolved. In fact, many of the experienced "experts" interviewed for this research study emphasized that "one size does not fit all" and that "cookbooks don't work".

Each airport must work to design and refine a process that may go on to engage the public for decades. As was written in an article entitled "Effective Public Involvement in Transportation A Primer for Practitioners" (*16*):

- An effective public involvement effort will take time, money, and patience; and
- Because you got it right once, don't think you've got it down.

What Does the Public Really Want?

Based on dozens of interviews for this project, what the public wants from airports about noise conditions can be summarized in three basic concepts:

- Promote communication: this includes working in an interactive way with one or more organized groups, involving them as partners in pursuit of mutual goals.
- Present the facts clearly and honestly: this includes designing websites that can actually be used by the community to both learn and to do their own analysis.
- Reduce the noise impacts: this may refer to an overall reduction of noise levels or the abatement of particularly offensive single events.

Community Engagement Strategies and Techniques

Introduction

The preceding chapters address why engagement with the public is important to communicating information about aircraft noise, the basic approach and principles of doing so, what both airports and the public are trying to achieve by it, and why and how to measure its achievements.

This chapter discusses some of the more successful ways to approach community engagement. Efforts to coordinate and implement a community engagement program are more likely to succeed when specific objectives are identified and strategies are implemented. Case studies, discussed in Chapter 5, have been used to generate information about best practices for community engagement strategies among five airports with different missions and a university complex. Also included in that chapter is a review of literature directly related to public engagement in the transportation and environmental industries that have direct applications to airport-community relationships.

This chapter will help airport managers

- Understand the basic components of public engagement;
- Design, develop and implement a public engagement program that will suit the unique circumstances of their community;
- Evaluate the results of their public engagement efforts; and
- Better understand the relationship between public interest in aircraft noise issues and what the airport can do about it.

To gain the greatest benefit from this chapter, the following steps are useful:

Step 1: Read the nine strategies for community engagement that have been identified as best practices and "lessons learned" at other institutions that have been engaged in controversial issues with nearby neighbors. These strategies will provide context to the next step in evaluating your current community relations condition.

Step 2: Then go to the "When & How is it Best to Start" section and complete the self-assessment process. This will provide a baseline or current assessment of the airport's community engagement program.

Step 3: Using the results of Step 2, refer to the sections of the Guidebook and Toolkit that address the areas(s) with the lowest results. Planning practices also are available to help improve a program's proactive and engaging service-oriented focus.

Step 4: Then refer to the other sections of the Guidebook and Toolkit, as appropriate to the airport's circumstances.

Step 5: At least annually, update the self-assessment to identify the areas in which the program has improved, as well as those areas in which the program should place additional emphasis.

Subsequent chapters of the Guidebook and Toolkit references will give information about characteristics of the relationship between aircraft noise and surrounding land uses, an overview of the various noise metrics available to the noise analyst to enhance the public's understanding of the conditions of noise in the airport environs, and discussion and tools to assist the airport manager to better communicate about concepts of noise abatement and land use management opportunities that always will arise during discussions of aircraft noise with public audiences. The chapters will provide tools and examples that the airport manager may tailor to the airport's particular needs.

Throughout the remainder of this Guidebook, icons, as indicated below, will be included that relate to the documents, graphics, or other examples provided on the accompanying Toolkit Compact Disc. Each icon will consist of a box surrounding a computer mouse icon with a two part number. The first number is the chapter where it is referenced, and the second number is the sequential tool number within that chapter. ⌐ X-1 ⌐ The tool may be accessed by going to the table of contents for the Toolkit CD and double clicking on the tool number.

When to Use This Chapter

Airport Managers should refer to this chapter when:

- Responding to controversial issues of noise and sensitive use conflicts that have arisen around the airport, particularly if unexpected
- Developing a long-term community engagement strategy;
- Developing a noise abatement and land use management program
- Planning a new project;
- Constructing improvements; and
- Any other time controversy arises between the airport and its surrounding community over issues of environmental concern.

Community Engagement Strategies

Airport surveys (airport noise officer survey results are located in the Toolkit) ⌐ 4-1 ⌐, follow-up interviews, case studies, literature reviews and professional experience were sifted for the fundamental ideas and strategies that would help managers of airports of all sizes to implement an effective noise communications approach. Although local community engagement efforts could succeed without addressing all of these strategies, the chances of success improve greatly when most or all of these strategies have been addressed.

Strategies for Successful Community Engagement

- Have a community/service-oriented commitment;
- Develop progressive communication strategies;
- Establish continuous proactive engagement;
- Acquire good listening skills;
- Develop quality, rather than quantity information;
- Build lasting relationships and establish trust;
- Manage community expectations through transparency;
- Address emotional feelings and do hard things; and
- Decide when help is needed.

How to Use the Engagement Strategies

Several of the airport managers interviewed, as well as much of the literature reviewed for this study, have indicated that using multiple concurrent, coordinated strategies is more effective than using only one. Actual techniques for community engagement will differ from location to location depending upon the local environment, culture and other factors, but applying these strategies will lead to a more proactive community engagement program.

Strategies for Successful Community Engagement

Strategy 1: Have a Community/Service-Oriented Commitment

During recent decades, there has been a shift toward greater public involvement and an increasing expectation on the part of the public that they have a right to be heard and treated as partners in the decision-making process. Organizations and institutions that the public perceives as being public assets are finding that developing a service-oriented attitude is critical to the success of their mission.

Public perception necessitates agency change. Because the public has become so well-informed and involved in many areas, organizations and institutions that the public perceives as being public assets are finding that developing a service-oriented attitude is critical to the success of their mission.

A service-oriented attitude means that every individual in the organization must relate to the public as if every member of the public were contributing to their paycheck, because the public perception is that they do. The literature review and case studies confirmed that a comprehensive, interactive approach to public involvement requires a cultural change from the top down, especially as the aviation industry has no strong mandates to require interactive engagement. Surveyed airports with dedicated noise management personnel acknowledged the need for technical skills or the ability to acquire them. However, an emerging realization, strongly supported by airports that have successful public communications programs, is that a "public service attitude" and "people skills" are equally important. Community interest groups that were interviewed strongly agree. Airports with very small staffs must work even harder to assure all staff has a service-oriented attitude since they cannot afford to hire separate staff to work with the public.

Community/Service-Oriented Strategies for Success

- Solicit the support of the airport's senior management to initiate steps to create a service-oriented mindset.
- Instill the attitude of willingness to try new things. Be open to good ideas from anywhere.
  – Establish ongoing relationships and build partnerships beyond the noise department.
  – Expect change to be a long-term process.
- Make a "service-oriented attitude" and "people skills" or the aptitude to learn these skills a principal consideration in new hires.
- Provide training opportunities for existing staff to learn more about engagement techniques and approaches to convey a "service-oriented attitude". Public relations/customer service training is very important.
- Assign sensitive and public service oriented spokespersons to public meetings.
- Provide a basic educational program regarding noise issues and communication with the public to EVERY airport staff person that interacts with the public.
- All noise staff, including support staff, should be able to answer questions and/or make presentations.
- Supplement a small noise staff with other airport staff who work with the public, for example, a public relations staff.

- Select a noise staff with these most important characteristics:
  – Experience in community relations and people skills: ability to listen and have a thorough understanding of what people are trying to say; ability to deal with people calmly without getting excited or upset; ability to make people feel comfortable that the noise staff have researched the answer; ability to educate and respond to people; friendliness.
  – Technical skills, ability to document the information properly.
  – Quick learners with good work ethic.

Strategy 2: Develop Progressive Communication Strategies

The history of most airports is decades long; many have been in place for more than 50 years. The last half century has been a time of major suburban growth. Airports constructed far away from development now find development surrounding them and the public residing much closer than it once was. Airports upgrade and add facilities, add or change their service or basic mission, incorporate on-airport development, and expand their boundaries. All these efforts generate public interest and potentially negative public reactions. Airports, no matter how small and seemingly stable, must develop a strategy to communicate with the public that looks far into the future to assure that the airport remains a viable part of that future.

Airports, interest groups, and other industries have learned a great deal about setting up communication programs that deal with controversial issues, often from their initial mistakes. Advice provided by those interviewed for the preparation of this Guidebook can help other program managers avoid the same or similar mistakes.

Chapter 1 "6 Keys" and Chapter 5 "case studies" of this Guidebook provide synopses of airport approaches to developing and using progressive strategies for communication. The techniques provided in a later section of this chapter refer to Toolkit examples of such strategies, as implemented by airports and other public bodies.

New Technology for Public Communications

Today there exists an astounding array of new communications tools. Internet-based social media tools like blogs, podcasts, social networks, and other new and emerging communications tools and technologies have and will continue to expand the ways people communicate with each other. Although mainstream media continues to play a role in the dissemination of information, this traditional channel is being influenced by digital media.

The Pew Internet & American Life Project conducted a survey in 2006 designed to classify Americans into different groups of technology users (*17*). The authors developed a typology along three dimensions of people's relationship to information and communications technology: assets, actions, and attitudes. A summary of findings are:

- 8% of Americans are deep users of the participatory Web and mobile applications;
- Another 23% are heavy, pragmatic tech adopters – they use gadgets to keep up with social networks or be productive at work;
- 10% rely on mobile devices for voice, texting, or entertainment;
- 10% use information gadgets, but find it a hassle; and
- 49% of Americans only occasionally use modern gadgetry and many others bristle at electronic connectivity.

Progressive Communication Strategies for Success

- Improve Relationships Before a Crisis Happens
  – Make communication mean constructive involvement and building trust, not just a one-way flow of information.
  – Approach people well in advance of change—not when it is a "done deal".

- – Increase options for participation. Use small group and one-on-one meetings in the community to improve relations. Meet people on their own turf and target homeowner associations; follow up on meetings with responses to questions.
  - – The human face and voice are important: offer the option of a personal response on certain types of complaints.
- Developing a Program
  - – Design a program that fits the airport's situation. There is no simple public involvement process that meets the needs of every airport. Draw examples and techniques from the best practices of others. One size does not fit all.
  - – Develop a coherent strategy of public education and engagement as well as airport user monitoring, negotiating, and enforcement.
  - – Expect community interest and involvement to rise and fall with the visibility of issues at the airport.
  - – Assure that the tone of communications is not condescending, patronizing, or confrontational. Get help with communications even if the airport is small, if there are plans for any change in the configuration of the airport or if there are any significant changes in land use within five or fewer miles of the airport under major corridors of flight.
  - – Have a Public Involvement and Noise Program plan even if environmentally significant noise contours are entirely on airport property. The mere availability of a plan for each of these topics will provide consistency in response to public questions raised, even if no significant effects are present.
  - – Monitor, communicate, and make decisions *with* key public. Focus communications on the present and the future, rather than on historic situations.
  - – Aim the communications program to people in the middle—not those strongly for or against the airport.
  - – Consider well the impact of the type of governance on the noise communications strategy. How can local officials become involved in a positive way?
  - – Develop ways to gauge when both the airport and the community group are really willing to listen, to state their positions openly, and to seek progress toward understanding.
  - – Expect meaningful opposition on airport noise issues. Encourage the community to perceive for itself unreasonableness in its membership and to form its own conclusions. Don't react defensively.
- Embrace and use new technology for public communications
  - – Determine what level of technology use is possible now at the airport and start preparing for use of new and evolving technology appropriate to the specific groups the airport wishes to reach.
  - – Identify airport staff members who are interested in and experienced in the use of Internet technology and get their assistance in developing public communications Internet based strategies.
  - – Improve the graphics, clarity and simplicity of writing, and ease of navigation of existing website. Add interactive elements.
  - – Learn the vocabulary and uses of evolving Internet communication technology. Start with a limited approach to test the time, cost, and controls required.

The study determined that Americans sort into 10 distinct groups of users of information and communication technology (ICT). The 10 groups that emerge in the typology fit broadly into an elite or high end, middle of the road or medium users, and those with few technology assets or low-level adopters framework. However, the groups within each broad category have their own particular characteristics, attitudes and usage patterns. See Table 4-1.

- The high end **elite users** of ICTs consist of four groups that have the most information technology, are heavy and frequent users of the Internet and cell phones and, to varying degrees,

Table 4-1.   Ten distinct groups of users.

An overview of the groups of information and communication technology users				
	% of general population	Median age	Number of IT devices (of 8)	% with broadband at home	What you need to know about them
Omnivores	8%	28	6.0	89%	They have the most information gadgets and services, which they use voraciously to participate in cyberspace and express themselves online and do a range of Web 2.0 activities such as blogging or managing their own Web pages.
Connectors	7%	38	5.0	86	Between featured-packed cell phones and frequent online use, they connect to people and manage digital content using ICTs – all with high levels of satisfaction about how ICTs let them work with community groups and pursue hobbies.
Lackluster Veterans	8%	40	4.1	77	They are frequent users of the internet and less avid about cell phones. They are not thrilled with ICT-enabled connectivity.
Productivity Enhancers	8%	40	4.3	71	They have strongly positive views about how technology lets them keep up with others, do their jobs, and learn new things.
Mobile Centrics	10%	32	3.9	37	They fully embrace the functionality of their cell phones. They use the internet, but not often, and like how ICTs connect them to others.
Connected But Hassled	10%	46	3.4	80	They have invested in a lot of technology, but they find the connectivity intrusive and information something of a burden.
Inexperienced Experimenters	8%	50	2.9	15	They occasionally take advantage of interactivity, but if they had more experience, they might do more with ICTs.
Light But Satisfied	15%	53	2.5	15	They have some technology, but it does not play a central role in their daily lives. They are satisfied with what ICTs do for them.
Indifferents	11%	47	2.0	12	Despite having either cell phones or online access, these users use ICTs only intermittently and find connectivity annoying.
Off the Network	15%	64	0.5	0	Those with neither cell phones nor internet connectivity tend to be older adults who are content with old media.
Source: Pew Internet & American Life Project April 2006 Survey. N=3,355 for internet and cell phone users. Margin of error is ±2%.					

A Typology of Information and Communication Technology Users. Horrigan, John B., Associate Director for Research, PEW/INTERNET, May 7, 2007. (*17*)

are engaged with user-generated content. Members of these groups have generally high levels of satisfaction about the role of ICTs in their lives, but the groups differ on whether the extra availability is a good thing or not.

- The medium users **middle-of-the-road users** consist of two groups whose outlook toward information technology is task-oriented. They use ICTs for communication more than they use it for self-expression. One group finds this pattern of information technology use satisfying and beneficial, while the other finds it burdensome.
- For those with **few technology assets,** the low-level adopters (four groups), modern gadgetry is at or near the periphery of their daily lives. Some find it useful, others don't, and others simply stick to the plain old telephone and television.

Internet usage and access is continuing to accelerate so more are becoming medium and high end users with time.

Example Tools

Communication

- Blogs: Blogger, Livejournal, TypePad, Wordpress, Vox
- Microblogs: Twitter, Pownce, Jaiku

- Social networking: Avatars United, Bebo, Facebook, LinkedIn, MySpace, Orkut, Skyrock, Micromagnate.com, Flickr
- Social network aggregation: FriendFeed, Youmeo
- Events: Upcoming.org, Eventful

  Collaboration

- Wikis: Wikipedia, PBwiki
- Social bookmarking: Delicious, StumbleUpon
- Social News Sites: Digg, Mixx, Reddit
- Opinion sites: epinions, Yelp

  Multimedia

- Photo sharing: Flickr, Zooomr, Photobucket, SmugMug
- Video sharing: YouTube, Vimeo, Viddler, Revver, Openfilm
- Livecasting: Ustream, Justin.tv, Stickam
- Audio and Music Sharing: imeem, The Hype Machine, Last.fm, ccMixter

Strategy 3: Establish Continuous Proactive Engagement

Trust Identified As Critical Element

To earn trust with the public and interest groups requires proactive involvement, not merely a reactive response to public challenge.

Non-airport groups that were interviewed for this project indicated that methods for airports to build a relationship of trust with the community included listening, being open, giving people the facts with explanations and actually doing something to reduce noise impacts. Most non-airport groups have long term relationships with airports, some of which were originally addressed reactively by the airport, but have become proactive over time. A strong example of the value of proactive involvement was from an airport that had rated a number of communications techniques as a complete failure due to a lawsuit. The airport staff interviewed said in retrospect that proactively initiating discussions with the neighborhood before there was controversy and starting noise abatement procedures would have been a better approach than waiting for the complaints to be made.

Proactive Engagement Strategies for Success

- Implement permanent, ongoing outreach relationships, enhanced by increased activity during a growth project or noise study.
- Create an ongoing, cooperative relationship and dialog with the community well before a project begins or crisis occurs.
  - If appropriate, develop, participate in, and support with staff and financial resources an airport/community roundtable whose meetings serve as a public forum on noise issues and mitigation.
  - Give ownership and responsibility to all group members and establish ground rules for how they will make decisions to help them succeed.
- If affordable, implement flight tracking and identification system on line.

Strategy 4: Acquire Good Listening Skills

Having airport staff becoming good listeners was seen by those interviewed for case studies as being an essential part of two-way communications. The willingness of <u>both</u> the airport and the community to engage in effective, sincere communications was a key to success.

From the community point of view, an airport's change from one way communication that was perceived as arrogant and confrontational to a style willing to work with the community and listen to public opinion was critical.

Good Listening Strategies for Success

- Listen carefully.
  - Listen carefully to understand the public's perceptions, suspicions, and emotional responses, and seek to address them. Try to trouble-shoot problems. The concerns are often significant because aircraft noise is perceived to affect people's quality of life and their property values.
  - Try to understand different perspectives and points of view.
- Community meetings.
  - Make sure that the public has a forum to speak and respond that is perceived to be reasonable in terms of timing, access and locations.
  - Assure that the perceived leadership, one who has authority, of an organization takes a lead in meeting with the public on major issues.
  - Ask major airport user representatives to become an active part of the public involvement process. Pilots, airline representatives and air traffic controllers are often perceived as having more credibility than airport staff or consultants.
  - Non-interactive meetings that include only presentations, without question and answer sessions, are normally not conducive to good community relations.
  - A combination of an open house style approach with boards and stations on specific topics and a large group presentation with questions and answers is an effective technique.
  - Hire professional facilitators for public meetings where there are presentations with question and answer sessions. Don't use airport staff as facilitators at controversial meetings – they are often perceived as biased.

Principal Characteristics of Most Frequently Used Public Venues

The communication of information about airport activities that may affect noise conditions, as well as the receipt of information about noise impacts from the public is an ongoing process. There are many different methods to inform or engage with the audiences identified in the public involvement program. The following section highlights the principal characteristics of the seven most frequently used structures for public involvement.

Open House

- The one-to-one conversations that occur during an open house can help build trust and establish a rapport between citizens and project staff.
- An informal, neutral setting will keep officials and the public relaxed and make communications smoother.
- Citizens and staff can find out more about all viewpoints if public interest groups, civic organizations, agency officials, and facility staff are present at the session.

Workshops

- Workshops provide more information to the public than is possible through fact sheets or other written materials.
- Workshops have proven successful in familiarizing citizens with key technical terms and concepts before a formal public meeting.
- Workshops also allow two-way communication, making them particularly good for reaching opinion leaders, interest group leaders, and the affected public.
- If only a limited number are held, workshops can reach only a small segment of the affected population.
- When planning a workshop, one should make sure that it is announced in local newspapers, to help ensure that it will be well-attended. In addition, it may be helpful to specifically invite all residents who have expressed an interest in the airport's noise conditions.

Public Meeting

- The primary benefit of informal meetings is that they allow two-way interaction between citizens and local officials, and actively promote public participation.
- Informal meetings also may diffuse any tension between stakeholders.
- Some groups may perceive any effort to restrict the number of attendees as a "divide and conquer" tactic to prevent large groups from exerting influence on potential actions and to exclude certain individuals or groups. One way to prevent this perception is to hold informal meetings with those organizations or individuals who express concern about being left out of the process.
- Keep a written record of the informal discussions and make it available upon request or include it in the information repository.
- Provide an opportunity to submit written questions and comments for individuals who are unable to attend the meeting.

Focus Groups

- Focus groups allow the sponsor to obtain in-depth reactions to issues.
- When conducted early, they can help to outline the public participation plan and give an indication of how the general public will react to certain noise issues or alternatives.
- The reactions of a focus group cannot, in all cases, be counted on to represent the greater community.
- Some people may perceive focus groups as an effort to manipulate the public.

Community Advisory Group (CAG)

- CAGs can increase active community participation and provide a voice for affected community members and groups.
- They promote direct, two-way communication among the community and the facility and can highlight the airport's commitment to inclusive stakeholder input.
- The CAG may be structured so that members represent not only the public, but also airport users and agency officials, with the intent of providing broader understanding of issues and constraints associated with noise compatibility management.
- CAGs can be time and resource intensive. CAGs that do not accurately reflect or account for public concerns may lose support in the community.
- The mission and responsibilities of the CAG must be made clear from the start. Forming a CAG does not necessarily mean that there will be universal agreement. Nor does having a CAG mean there will be no controversy.
- Provide meaningful incentives to work together, such as being jointly accountable to an official body, and having a commitment for use of the group product.
- Use CAGs only when there is an ability to implement their results. Don't waste people's time. Give ownership and responsibility to all the group members.
- Begin taking actions under local control as soon as practical.
- Develop an approach to training new or replacement members.

Roundtables and Working Groups

- A roundtable or working group gives public and community representatives a place to express their issues and work out problems.
- Carefully select airport spokespersons and key negotiators for their ability to deal calmly with sensitive issues and personal sensitivities within the community; involve top management.
- Understand the role of elected officials in acting and speaking for their constituents. Elected officials are valuable for big picture thinking, creativity, and are capable of seeking consensus and making community decisions. Their disadvantage is their continuity is subject to their electability.

- Involve airport user groups as valuable participants; they need to define their role and parameters and be willing to invest time, key personnel and resources.
- Seek rational community leadership who can participate in a dialogue. People with narrow interests, with no ability to give and take do not contribute to effective engagement or solutions.
- Involve the FAA: Keep them involved by not allowing the focus to be on complaints. Identify how the airport can help them with studies and get local FAA staff to take ownership of study outcomes. Clarify FAA roles before any study starts.
- Include representatives of any organized opposition; this may not be easy, but will be perceived as inclusive and fair.
- Select a strong leader. The most effective group leader is someone everyone can respect; who can keep order in an effective diplomatic way; who can keep the meeting moving on a pre-set agenda; and is familiar with the material.
- Set up ground rules:
  - Decide how meetings will be run and how frequently they will be scheduled.
  - Define member responsibilities.
  - Determine how group decisions will be made.
  - Agree on how to handle disagreements and disruptions.

Public Hearing

- Public Hearings are normally infrequent and targeted to a specific purpose required under local, state, or federal law. "On the record" comments are received from any individual or agency that desires to take an official position on a project action. They are often professionally facilitated and nearly always have an official transcript of proceedings completed.
- The primary benefit of formal public hearings is that they allow comments to be made "on the record" that must be considered during final evaluation of the proposed project actions.
- Formal hearings also may increase tension between stakeholders.
- Some groups may perceive any effort to restrict the time allowed to attendees as a tactic to prevent large groups from exerting influence on potential actions and to exclude certain individuals or groups.
- A formal written record of comments and responses to them is prepared and made available upon request or included in the information repository.
- Provide an opportunity to submit written questions and comments for individuals who are unable to attend the hearing.

Strategy 5: Develop Quality, Rather Than Quantity Information

All airports interviewed for this study, as well as reviews of related literature, have emphasized the need to provide the community with accurate, clear, timely, and relevant data related to noise issues. Interactive techniques (where the public contributes or participates in a process) build trust and support.

Action Not Tools Seen As Important
"The techniques, like the roving van and the audio visuals, are just tools. What the airport does with the results (like flight tracking), how they present the information, and then what they do about it is what is important."

The non-airport groups that showed the most pride and loyalty to their noise advisory group and to their airport's approach were those that could point out specific accomplishments, based on jointly derived information. These ranged from helping to handle difficult complaints and revise complaint forms, to working on the master plan to testifying before Congress. One respondent specifically said that people feel better when they do things themselves because it opens up a dialogue.

Good techniques/tools are important but not as important as good staff. As one non-airport source put it, the techniques, like the roving van and the audio visuals, are just tools. What the airport does with the results (like flight tracking), how they present the information, and then what they do about it is what is important. Another non-airport source suggested that good staff would act as "ombudsmen" and really have the ability to do something.

Quality Information Strategies for Success

- Use data to build trust and manage expectations: be open, direct, and stick to credible information. Do not hesitate to give out as much information as laws allow. Make sure people understand what can and cannot be provided and then follow through on promises.
- Address perceptions as well as reality.
- Provide basic education about aircraft noise, including what an airport can and cannot control.
- Select spokespersons and negotiators for their ability to be sensitive to community concerns.
- Use the web and make it user friendly; develop tools to help people understand noise; include web-based flight tracking if warranted.

Strategy 6: Build Lasting Relationships and Establish Trust

Too often airports are surprised with a lawsuit or an angry crowd that appears at a public meeting. Airport staff persons then often wish they had already established a good, long-term relationship with the public. The time to develop that relationship is much, much earlier.

Trust is the key to a successful long-term non-adversarial relationship with community groups that continues to function well even when there is fundamental disagreement. Trust was frequently mentioned as a goal by both airport and non-airport sources. Non-airport sources, involved in such a relationship of a decade or more duration, rated them very highly. Airports, with some exceptions, tended to be more skeptical about the community, perhaps implying lack of trust in the community.

Differing Perspectives to Overcome

Trust was frequently mentioned as a goal by both airport and non-airport sources. Non-airport sources, involved in such a relationship of a decade or more duration, rated them very highly. Airports, with some exceptions, tended to be more skeptical about the community, perhaps implying lack of trust in the community.

To build trust, two-way communication (engagement) is essential. Engagement fosters enthusiasm and excitement about best planning practices, and involves the public in important policy considerations. Engagement advances the airport staff's credibility and contributes to an atmosphere of trust. The public feels more as if they are part of the solution, rather than as if they were being manipulated through a series of required steps to accomplish a program requirement.

Strategies for Successful Relationship Building

- Build a long-term relationship based on trust that allows both sides to work through difficult issues.
- Promote communication by working **interactively** with one or more organized groups, involving them as **partners** in pursuit of mutual goals.
- Present the facts clearly and honestly, including designing websites that can actually be used by the community to both learn and develop their own analysis.
- Demonstrate ways the public can consider the noise issues and investigate applications to reduce the noise impacts.

Strategy 7: Manage Community Expectations Through Transparency

Public mistrust of the airport and its motives is at the foundation of most airport conflicts. Trust is the key to a long-term, non-adversarial relationship with community groups and trust requires proactive involvement with the public and interest group by using interactive techniques. A singular focus on educating the public will not build trust-based relationships.

Transparency is Critical to Building Trust

Consistent openness and truthfulness, demonstrated by telling people what can be told, as soon as it is known, in a transparent planning process, builds lasting trust.

When groups have something important at stake they look to an organization's leader for clues on its approach and as the ultimate authority on decisions and conflict resolution. The presence of airport upper management brings decision makers from other organizations to the table and can help in the resolution of issues. Their interaction sets the tone for other staff involved in airport noise issues.

Strategies for Managing Community Expectations for Success

- Encourage a transparent process through dissemination and sharing of information related to short-term and long-term airport activities and goals. Information should be lay-friendly to prevent perceptions that there is something to hide.
- Preclude unrealistic public expectations by educating the community about what is feasible and what the airport can and cannot control.
- Use "good" two-way interactive communications techniques by:
  – Putting senior leadership out front by proactively seeking opportunities to attend neighborhood or business meetings. Also, have leadership be in attendance and have a lead role at airport public meetings or public hearings.
  – Using strong graphics to deliver the message in visual presentations, web sites, and newsletters, as well as factual data that illustrate issues through charts, graphs, images and video clips.
- Develop a strategy/protocol for handling complaints.
  – Include a person the public can talk to, and a web based comment or complaint system as part of communications.
  – Make it a priority to talk to people and get back to them in a timely manner on questions or complaints.
  – Analyze complaints in terms of *who* is complaining and how frequently. Seek out the real reasons for the complaint. Determine if the complaint is legitimate, is a reactionary response to another airport project, or other. Get to know high profile complainers one-on-one.
- Embrace the media.
  – Do not ignore or try to hide from the media.
  – Do not let the public first find out about the airport's major plans in a media exposè or by sending a letter telling the neighbors what has already been decided.

Strategy 8: Address Emotional Feelings and Do Hard Things

It is difficult, but not impossible, to earn trust when an emotional issue is involved. Most airport respondents and some non-airport respondents have dealt with angry people. They understand that often the causes are legitimate but not necessarily able to be fixed. Their approach generally is to calmly diffuse anger, educate, and to do something about the problem if possible. A number of respondents judge themselves to be successful at handling angry people, if not entirely successful at deterring them from calling again with the same complaint.

Strategies for Doing Hard Things

- On issues that may become controversial, identify the widest possible group who might be affected and consider how they might be involved or addressed early in the communications planning process.
- Involve groups at the very beginning of a planning process to get buy-in before positions have hardened. At that point, really listening, determining what is feasible to do, and engaging with the public to help put a plan together can build long term relationships.

- For small airports, it may be more beneficial to employ staff skilled in community and public relations to deal with the noise program than to hire experts with technical skills. Technical skills in aviation can be learned, but it is hard to teach an aviation expert community relations.

Strategy 9: Decide When Help Is Needed

It often is useful to retain professional assistance in noise planning, public relations, and communications to work through a planning process or development program that has a foreseeable conclusion. Professional assistance offers broader experience through work at many airports having many different issues and may bring greater focused skills to a process than staff experts. When the noise management program is continuing, it is normally more reasonable to hire staff to maintain a communications and noise program than to seek outside assistance.

What Your Help Should Know

- Assure that any consultant team understands community concerns and how to address them.
- Assure that any consultant selected is willing to have a very open interactive approach to working with the public and involve them early in the process.
- Consider using the consultant as an expert and advisor to a combined city/user/community work group.

When and How Is it Best to Start?

The selection of specific tools and approaches for any public communications program is dependent upon factors that include cost, demands on staff time, level of skills needed, past experience, and staff resources.

As a program is developed, decisions will need to be made based upon the complexity of the subject matter and its special needs, within the constraints of available resources.

- What level of funding is available for this effort?
- What mix of tools should be used to be effective, and are they affordable?
- Is there sufficient time to plan and execute the level of program desired?
- Is assistance available?
- If a high-end program cannot be provided, then what activities are adequate for the needs of the project?

This section includes two resources:

- A self-assessment tool provides a baseline assessment of an airport's community engagement program.
- An implementation steps matrix provides an implementation framework for planning, informing and engaging the public regarding aircraft noise issues.

Self-Assessment Tool

The self-assessment tool should be used as a guide to help airport management complete a quick analysis of the current efforts to reach out to the community and to strategize planning to inform and engage the public regarding aircraft noise issues. It includes questions to help airport management determine how well their airport incorporates best practices in communications. Each question should be considered thoroughly and honestly to achieve the most meaningful results. Negative responses will identify areas where improvement may be appropriate. A

completed self-assessment will provide a baseline or current assessment of the airport's community engagement program.

When to Use the Self-Assessment Tool

- The self-assessment tool should be used as an initial guide to assess the current level of commitment and resources dedicated to communications programming regarding aircraft noise issues.
- At least annually, update the self-assessment to identify the areas in which the program has improved, as well as those areas on which the program should place additional emphasis.

How to Use the Self-Assessment Tool

To gain the greatest benefit from the self-assessment, the following steps are indicated.

Step 1: Review the full questionnaire (Table 4-2).
- The questionnaire leads you through a series of questions divided into three categories:
  - General communications
  - Communications with airport user groups; and
  - Communications with government officials and land use authorities.

Step 2: Answer each question based on current airport practice.
- The questions have been structured to assist airport mangers in assessing the current levels of communications commitment, preparedness, and effectiveness.
- Questions focus on one-way and two-way communications, attitudes toward communications, communications with users, and tools used.
- Each question should be considered thoroughly and honestly to achieve the most meaningful results.
- Negative responses will identify areas where additional focus may be indicated.

Step 3: Score your responses.
- Apply the rating scale
  - The rating scale is a weight per column. Each rating scale choice (column header) is assigned a value from left to right, with "2" being the highest, most positive value. The numbers in the parentheses are the weighted values assigned to the answer.
  - For example:
    - The first rating scale choice is valued at 2 (Frequently).
    - The second at 1 (Occasionally).
    - The third at 0 (Never).
- Calculate score for each question.
  - The numbers in the parentheses are the weighted values assigned to the column.
  - All 56 questions should be answered.
  - Each answer must be multiplied by the weighted value to reach the rating score.
    All rating scores must be added to reach the Questionnaire Total Ratings Score at the bottom of the questionnaire.

Step 4: Apply the results.
- There are 112 points possible.
  - A response rating of 80% - 100% (89 points or above) indicates a proactive communications program.
  - A score of 50% to 79% (56 – 88 points) indicates a moderate program.
  - A score of 49% or below (55 points or below) suggests that a hard look of the existing program policy and procedural priorities should be taken; consider why a score is low and refer to those sections of the Guidebook.

Table 4-2.   Self-assessment questionnaire.

General Communications			
How frequently does the airport use the following techniques to listen to and understand public concerns and to engage the public (two-way communication) about noise-related issues?	**Frequently**	**Occasionally**	**Never**
a. Monitor and respond to complaints			
b. Talk to people one on one			
c. Attend meetings held by the community			
d. Sponsor public meetings and ask the public questions			
e. Organize and participate in meetings of all sizes involving the community, airport user and airport management, and FAA in a working relationship to solve noise problems.			
f. Other (list)			
Characterize the airport upper management's position on community engagement:	**Strongly Supportive**	**No Strong Position**	**Do minimum to comply with laws**
Characterize the airport upper management's position on community engagement:			
Characterize the airport upper management's actions in relation to community engagement:	**Frequently**	**Occasionally**	**Never**
a. Communicates with staff about community engagement			
b. Talks to citizens one-on-one			
c. Attends meetings held by the community			
d. Attends meetings held by the airport			
e. Participates in meetings involving the community, airport user and airport management, and FAA in a working relationship to solve noise problems.			
How frequently are graphics used in the following communications?	**Frequently**	**Occasionally**	**Never**
a. Written publications			
b. Web site			
c. At public meetings			

Table 4-2.   (Continued).

How often is graphics assistance available?	Frequently	Occasionally	Never
a. On staff			
b. On contract			

Are the following approaches used that characterize a transparent planning and noise management process?	Yes	Sometimes	No
a. We have a written process available for public review on how we will handle requests for data that includes the response time goal, what categories of data will and will not be released and why, the form of the response and any associated costs, who the contact people are.			
b. We monitor responses to requests for data to make sure they are timely, in understandable language whether written or spoken, and contain the maximum information we can provide to the public legally.			
c. We seek opportunities to proactively share information that the public might want to know.			

Indicate the frequency with which the airport uses the following tools to educate the general public (one-way communication) about noise-related issues.	Frequently	Occasionally	Never
a. Attend/present at meetings held by community			
b. Sponsor public meetings with presentations and feedback mechanisms.			
c. Distribute written publications that are highly graphic and in non-technical language that is understandable to the general public.			
d. Provide general noise and project specific information on the web that is highly graphic and in non-technical language understandable to the general public.			
e. Conduct training workshops for committee members and/or public on noise issues			
f. Other (list)			

Table 4-2.   (Continued).

Do the following characterize the airport personnel who handle noise matters?	Yes	Sometimes	No
a. They are technically skilled			
b. They are good listeners and good communicators with the public one-on-one			
c. They are good listeners and good communicators with the public in meetings held by the community			
d. They are good listeners and good communicators with the public in meetings sponsored by the airport			
e. They are good listeners and good communicators in meetings involving the community, airport user and airport management, and FAA in a working relationship to solve noise problems.			

Does a community involvement plan exist for the noise program that is regularly updated?	Yes, written procedures are used consistently	Yes, but unorganized, unwritten, & often inconsistent	No
Does a community involvement plan exist for the noise program that is regularly updated?			

Are individual community involvement plans prepared for each project that complies with the overall community involvement plan?	Yes, Written	Sometimes	No
Are individual community involvement plans prepared for each project that complies with the overall community involvement plan?			

Communications with Airport User Groups			
How frequently does the airport use the following techniques to listen to and understand aircraft operators concerns and to engage aircraft operators (two-way communication) about noise-related issues?	Frequently	Occasionally	Never
a. Talk to people one on one			
b. Web-interactive dialogue or blog			
c. Regular user forums			
d. Special user meetings			
e. Tenant meetings			
f. Staff user liaisons for noise			
g. Pilot awareness programs			
h. Other (list)			

Table 4-2.   (Continued).

Indicate the frequency with which the airport uses the following tools to distribute information to aircraft operators (one-way communication) about noise-related issues.	Frequently	Occasionally	Never
a. Publications, newsletters, mailers, reports, etc.			
b. Web – Information based			
c. Visual media			
d. Posters and notices in pilot lounges			
e. Other (list)			

Communications with Government Officials and Land Use Authorities			
How frequently does the airport use the following techniques to listen to and understand government officials and land use authorities concerns and to engage them (two-way communication) about noise-related issues?	Frequently	Occasionally	Never
a. Talk to people one on one			
b. Web- interactive dialogue			
c. Noise Round Tables or Advisory Groups			
d. Working Groups			
e. Other (list)			

Indicate the frequency with which the airport uses the following tools to distribute information to government officials and land use authorities (one-way communication) about noise-related issues.	Frequently	Occasionally	Never
a. Publications, newsletters, mailers, reports, etc.			
b. Web – Information based			
c. Visual media			
d. E-mails and letters			
e. Other (list)			

- When analyzed and ranked, the levels provide information to airport managers for establishing training, policy, procedural priorities, or program changes.
- Using the results, refer to the Implementation Steps Matrix and later sections of this chapter that provide examples of well-designed efforts of other institutions to address the airport areas(s) with the lowest results.
- Planning practices also are available in the Guidebook to help improve a program's proactive and engaging service-oriented focus.

Completion of this self-assessment will provide a baseline or current assessment of the airport's community engagement program.

Implementation Steps Matrix

Once the status of the current program is understood, what is the next step toward developing a communications program that addresses aircraft noise? The best practices research in Chapter 1

identified a number of well-defined planning processes and tools for community engagement. The remainder of this chapter provides implementation steps and a discussion of how to carry them out for planning, informing, and engaging the public regarding aircraft noise issues. Although best practice sources recommend different numbers of steps, the essence of these steps varies little.

This section will help airport managers understand, design, develop, and implement a public engagement program that will suit the unique circumstances of their airport and its relationship with its surrounding community.

What is in the Implementation Steps Matrix?

The Implementation Steps Matrix (Table 4-3) provides a recommended step-by-step implementation framework, from identifying the stakeholders and issues to carrying out public involvement and issue resolution. Public involvement and communications is a cyclical process that can be divided into four general steps. This section describes these steps in sequence; however, public involvement may not follow such a straightforward approach. For a public involvement program to be effective, it is necessary to keep the process flexible. The level of detail of the plan will depend on the magnitude and potential impact of the project or plan.

Overall public involvement objectives are listed in the first column, followed by specific tasks to achieve. References to the tool kit are identified in the last column. The recommended implementation steps are:

- Step One: Establish Preliminary Plan
- Step Two: Plan & Conduct Outreach Methods and Message
- Step Three: Plan Level and Method of Public Engagement
- Step Four: Evaluate Public Involvement Activities

How to Use the Implementation Steps Matrix

To gain the greatest benefit from the matrix, the following steps may be used:

Step 1: Complete the self-assessment questionnaire.
- This will provide a baseline or current assessment of the airport's community engagement program.
- Using the results, refer to later sections of the Guidebook in Chapter 4 that address the areas(s) identified with the lowest results.

Step 2: Review the full matrix and assess where the airport stands in the process.
- The Matrix provides four steps, determine what stage of planning is needed to begin:
  - Step One: Establish Preliminary Plan.
  - Step Two: Plan & Conduct Outreach Methods and Message.
  - Step Three: Plan Level and Method of Public Engagement.
  - Step Four: Evaluate Public Involvement Activities.

Step 3: Review Objectives and Tasks.
- Review each public involvement objective, listed in the first column, followed by specific tasks to achieve shown in the middle column.

Step 4: Complete each Task.
- Complete each task and document results.

Step 5: Reference the Toolkit as needed.
- Reference the later portions of this chapter, identified in the last column, and the Toolkit examples, as needed.

Table 4-3.   Implementation steps matrix.

Steps	Tasks	Resources
Step One: **Establish Preliminary Plan**		
Identify Program Parameters There is no one way to conduct public involvement. Therefore generally no two public involvement plans will be the same. Scoping is a continuous process; expect the plan to evolve over time.	• Define communication program parameters. • What is the extent and purpose of the public involvement and communication program? • What is the airports experience with noise information communications? • What is the past level of public interest? • What is the current relationship with the public?	See Toolkit example communications manuals. See Chapter 2 Need for Building Relationships.
Ensure Department Commitment Success requires a clear commitment from senior management supported by clear goals and timelines.	• Solicit and secure support from senior airport management. • Clarify airport goals and objectives for the public involvement effort. • Memorialize management direction and decisions.	See Chapter 1 Introduction – Culture Shift Required.
Verify Regulatory Requirements Gain an understanding of any applicable regulatory requirements.	• Verify regulatory requirements by jurisdiction or funding source. • If required, clarify expectations and how they will impact the public involvement plan.	See Toolkit example communications manuals.
Determine Level Of Public Involvement Definition of the level of public involvement and the role of the community in decision-making is critical during preliminary planning. Interactive public involvement is not always appropriate for all program elements. To be successful, intentions must be made clear at the beginning.	• Determine the factors that are key to defining the level of public involvement necessary to communicate on noise issues. Example factors may include: o Degree of anticipated noise change. o Sensitivity of the public to noise issues. o Locations of interested public. o When decisions or plans must be completed. • Determine if the involvement process will be open to all of the public or only a representative segment of the community. • Determine the level of public involvement and the role of the community: o What needs to be decided? o Define limits of authority over the outcome. o Define what the public can and cannot decide. o Are roundtables, focus groups, or advisory committees desirable? o How will their input be used?	See Toolkit example communications manuals.
Identify the Audience Before the first public contact, collect background data to identify preliminary public issues. This research will inform the balance of your plan and is an effective way to anticipating controversial issues.	• Identify community interest in noise issues and gauge their attitudes toward the airport. • Look at the community as a whole system. Identify the target audience such as: o Direct and indirect stakeholders. o Interested groups or agencies. o Identify the opposition. o Identify groups traditionally under-represented, such as minority communities. o Network with local leaders. o Consult with the local business community and aircraft operators. o Consult with Metropolitan Planning agencies • Memorialize what is learned.	See Toolkit example communications manuals and checklist for communications.
Establish Timeline, Resources, Budget A successful public involvement and communication program allows for adequate lead time, resources, and budget to implement its components. Determine the best method, resources, and costs for communicating with the public.	• Determine level of interaction or communication needed to address issues. • Select techniques to be used. • Determine the location, timing, and function of public involvement activities. • Allow flexibility in the budget and consider: o Meeting expenses (e.g., advertisement, refreshments, rooms, equipment); o Costs for community data, studies or profiles; o Costs for information dissemination; o Costs for document public input; and o Costs for technical assistants or consultant support.	See Toolkit example communications manuals and checklist for communications.

Table 4-3.   (Continued).

Step Two: Plan & Conduct Outreach Methods & Message		
Establish Communication Mechanisms Develop communication methods that the local community prefers, and "the accepted methods" that will be effective for delivering information.	• Develop a strategic communications plan with clearly defined goals and objectives. 　o Identify preferred communication methods such as radio, TV, newsletter, newspapers, web, e-mail, direct mail. 　o Advertise through media sources such as radio, TV, and internet. • Develop and use attention-grabbing materials and visuals for newsletters, fact sheets, posters, etc. • Determine in advance the timing of public notices, published ads, and direct mail. Typically two weeks. • Document outreach activities, events, and dates.	See communications planning checklist example communications manuals.
Define Key Messages To Be Conveyed Develop messages for the community that are clear, understandable and make the noise issue relevant to their daily lives.	• Define the key messages based upon airport and noise program goals and objectives such as: 　o Airport role in the community. 　o What the noise compatibility issues are. 　o Program process, approach and timeline. 　o Who is involved and why. 　o Who makes the decisions. 　o Who is responsible for what aspects of noise compatibility management. 　o Status and opportunities of the communications program. 　o How the program will involve the public and elected officials. 　o How their input will be factored into the consideration of noise compatibility issues.	See Toolkit example communications manuals and checklist for communications.
Define Level Of Information Needed By The Community	• Prepare summaries of long, complicated, and highly technical documents. • Develop appropriate supplemental tools to help the public understand the issues and effects. • Provide access to full-length documents.	See the example tools provided in Chapters 6 through 9
Refine Target Audience	• Refine target audience relevant to project goals and objectives. • Collect ownership data no sooner than 90 days from date of distribution.	
Refine the Schedule	• Reaffirm the location, timing, and function of public involvement activities at all levels.	
Determine What Technical Or Consultant Support Is Needed	• Based upon the preliminary plan outlined in Steps 1 and 2, determine what technical or consultant support is needed for: 　o Development of communications message, graphic tools, media, and dissemination of the message. 　o Preparation of technical or graphic documents, brochures, or fact sheets.	
Provide Information to the Public Provide the public with access to accurate, understandable, relevant, and timely information.	• Identify and prepare materials that will be distributed. • Package the message in formats appropriate to audiences identified	See Toolkit example communications manuals, checklists for communications, and checklists for meeting preparations and meeting announcements.
Track Progress And Revise Plan	• Track project and communications progress. • Memorialize plans and decisions. • Revise the plan as needed to address the unforeseen.	

Table 4-3.   (Continued).

Step Three: **Plan Level and Method of Public Engagement**		
Determine Level Of Public Involvement Start planning the specific public involvement and communication activities identified in Step 1 and determine if new data requires a change in strategy to include or to no longer provide engagement activities as part of the process. Strategize what will work best locally before designing a public engagement process to use some form of public meeting.	• Re-confirm if the involvement process will be open to the general public or only to a representative group of the community. • What meeting forums will be most effective in raising and resolving public issues or concerns? • What level of public involvement will be needed to manage expectations? • How will the program promote constructive involvement?	See Toolkit example communications manuals, checklists for communications, and checklists for meeting preparations and meeting announcements.
Determine Method of Engagement Choose the formats of communication and public involvement that best suit those stakeholders desired to be a part of the process.	• Evaluate the tools available and select the appropriate techniques for each target audience by considering the level of effort needed and the outcomes desired. • Use different tools and techniques as appropriate to deliver consistent messages at different stages of the program.	See Toolkit example formats of communication and public involvement tools.
Step Four: **Evaluate Public Involvement Activities**		

Define Evaluation Parameters
Evaluations of public involvement and communication programs help to define, measure, and improve the overall effectiveness of the program. Evaluation should lead to action as you go along.
	• Consider the process and elements to be evaluated:
	  o Decide what to measure.
	  o Set clear, measurable outcomes and evaluation processes.
	  o Note lessons learned.	

Implement the Evaluation	• Develop survey instruments or other tools to measure the effectiveness of the program. • Solicit comment from participants and airport staff. • Compile and analyze the responses. • Modify activities or process to improve program.	

Community Engagement Techniques and Tools

Public involvement practitioners recognize that there is no single solution or set of rules for involving the public in airport decisions. Different situations and different stakeholder groups often call for different approaches. For these reasons, an inventory (Toolkit) of best public involvement approaches and sample tools has the potential to enhance airport manager's communications efforts and outreach skills with the public. Such a toolkit can provide airport managers with examples of new ways of doing old things and with available resources to guide public outreach related to noise compatibility issues. The techniques also may be modified for application in other airport actions such as project development planning.

This section provides an inventory and compilation of example tools and techniques for public involvement from a variety of sources. Such examples can be thought of as the "toolbox" for public involvement; all tools and techniques cannot be used in the same setting, although some can be used for more than one situation. The icons in each section reference the reader to examples provided on the accompanying CD.

This comprehensive set of techniques and tools is intended to assist airport managers with the implementation of the previous sections of the chapter for communications programs and public involvement regarding noise compatibility issues. Such tools are derived not only from the aviation industry, but also from innovative public involvement techniques in use in other industries.

This toolkit is designed for airport managers of all sizes of airports

- For small airports staffed perhaps only by the airport manager or for newcomers to public involvement efforts, it provides guidance tools for how to relate noise information to the public, what steps need to be taken, what issues are commonly encountered, and tips for how to address them.
- For other small- and medium-sized airports, there are basic resource tools and strategies for growing or improving the existing public involvement programs.
- For large airports or experienced airport managers there are resources to consider as enhancements for existing communications programs.

The example tools and techniques presented in this chapter are illustrative of "best practices" in communications, drawn from current airport and other similar industry practices. Chapters 6 through 9 provide tools and techniques used to better explain concepts of noise abatement and land use management, and noise metric usage.

There currently is not a comprehensive synthesis of national best practices for public involvement in the fields of aviation, transportation, environmental planning, land use planning, or the university system. This section reviews practices and tools of several states or agencies recognized for effective communications practices. It identifies guidelines and approaches, toolkits and resources, and planning technology tools recommended for use by airport managers.

The discussion of each type of technique or tool includes background information, lessons learned for airport managers and a summary listing of example tools is presented. Specific examples may be found on the CD accompanying this Guidebook These tools were chosen because each demonstrates value to either small, medium, or large airports to achieve a more effective and productive communications program.

The tools demonstrate there are many approaches to communication. There is not one generally applicable approach to communication for all sizes of airports. As the range and complexity of these tools demonstrate, successful communication at the local level can be found at many different levels of coordination and complexity.

Community Involvement Manuals

Description. Communications programs attempt to improve interactions with the public. They often include objectives, steps, or measures to facilitate citizen involvement at all levels of the decision-making process. They encourage meaningful and effective methods of addressing the needs of the public and sharing information.

Lessons for Airport Managers. Begin any project with an understanding of the overall process and effective public involvement design.

Example Best Practices. The following community involvement manuals were chosen as best practice examples:

- **Pennsylvania DOT's Public Involvement Handbook** (*18*) 4-2

    Pennsylvania Department of Transportation's *Public Involvement Handbook* describes the principles, procedures and techniques for enhancing citizen participation in the development of improvement projects. The approach and techniques described in this handbook are intended to foster meaningful public involvement, while minimizing controversies that stop projects and erode public trust.

    It should be noted that an update to this document is expected to be released in late 2008. The update will reflect a variety of communications methods (e-mail, PowerPoint presentations, web, etc.) that have become available since its last publication in 1995.

The handbook is divided into five sections.
– The first section is an introduction, which describes the benefits of community participation in project development and includes a discussion of an approach to involving the public in projects on issues ranging from reaching out to avoiding trouble.
– The second and third sections provide practical guidance for enhancing the public's trust and for managing conflict that might arise during project development. Discussion ranges from dealing with perceptions, responding to emotions, troubleshooting, resolving disputes, and everyday conflicts.
– The fourth section details the process of developing and carrying out a public involvement program and describes the role of a Public Involvement Coordinator.
– The final section of this handbook is a toolbox of ideas and techniques. See the Communications Checklist section of this toolkit for Chapter 5 contents.
- **Virginia DOT's** *Public Involvement: Your Guide to Participating in the Transportation Planning and Programming Process* (*19*) 🖱 4-3

Includes public involvement and communications goals, as well as public involvement opportunities. It also illustrates how the phases of a project fit together, from planning to operations and maintenance, and discusses citizen involvement at each level. It presents the public with many opportunities to get involved in various projects, and offers numerous contacts for questions or for more information.
- **FAA.** *Community Involvement Manual* (*20*) 🖱 4-4

Although somewhat dated (1990), this manual retains many helpful guidelines for professionals and others dealing with public involvement efforts on airport development projects and the associated concerns of airport communities. Since planning and community involvement situations will vary with different airports, communities, issues, and points in the planning process, the manual outlines a process for identifying community involvement needs, evaluating techniques to meet these needs and designing a workable program. Following the introductory chapter, the manual is comprised of six guidance chapters.
– Chapter 2 outlines the legal requirements and describes the potential benefits of an effective program.
– Chapter 3 outlines principles and provides helpful hints.
– Chapter 4 reviews critical aspect of community involvement, specifically the audience.
– Chapter 5 describes the desired results.
– Chapter 6 outlines the key features of specific techniques.
– Chapter 7 outlines a process for developing a program.

Communications Checklists

Description.   A communications checklist is a means of organizing methods to convey a project's message, appropriate media relations, target audiences, communications tools, and evaluation methods. It allows appropriate persons to plan ahead for the types of media and tools that will be necessary to effectively promote the project's message, and start thinking about how to use the information gathered. Additionally, communications checklists help identify which communication methods best fit the project needs, and help decide with whom the information needs to be shared.

Example Best Practices.   The following meeting communications checklists were chosen as best practice examples:

- **The International Association for Public Participation (IAP2) Toolbox**
  IAP2 is an association of members who seek to promote and improve the practice of public participation in relation to individuals, governments, institutions, and other entities that affect the public interest in nations throughout the world and serve the learning needs of members
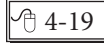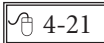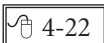
through events, publications, and communication technology. IAP2 provides training for beginner through advanced practitioners with a broad-based learning experience covering all of the foundations of public participation.

– IAP2 published a *Spectrum of Public Participation* (© 2007 IAP2) (*21*) outlining the steps to increasing the level of public impact in relation to public participation goals, promises made to the community, and example techniques. 🖱 4-5

– IAP2 published a *Public Participation Toolbox* (© 2007 IAP2) (*22*) with examples of different techniques that can be used to: 🖱 4-6

  ▪ Share information;
  ▪ Compile and provide feedback; and
  ▪ Bring people together.

– In addition to a description of each technique, IAP2 has provided:
  ▪ "Think it Through" pointers and tips when using each of the techniques;
  ▪ "What Can Go Right"; and
  ▪ "What Can Go Wrong" helpful hints.

- **Hear Every Voice: A Guide to Public Involvement at MnDOT Minnesota** (*23*)
  Minnesota DOT's (MnDOT) *Hear Every Voice: A Guide to Public Involvement at MnDOT* was prepared in 1999 to provide statewide guidance for planners and project managers on designing and implementing public involvement programs to achieve MnDOT's strategic vision of putting their customers first and balancing their interests to achieve the greatest public good.

  – The guide includes matrixes designed to assist one charged with developing a public involvement program to understand the public involvement process 🖱 4-7 , create the program 🖱 4-8 , public involvement guidelines, and a toolkit of resources required. 🖱 4-9

  – Unique to the plan, each tool and technique is ranked by its usefulness in long-range planning, corridor studies, project development, programming, or construction-related activities.

- **Pennsylvania DOT's Public Involvement Handbook** (*18*)
  Pennsylvania DOT's *Public Involvement Handbook* describes the principles, procedures, and techniques for enhancing citizen participation in the development of improvement projects. The handbook is divided into five sections. See the Manual section of this Toolkit for more information on this document.

  The final section of this handbook is a toolbox of ideas and techniques that can be applied to a variety of situations in which an agency interacts with the public throughout the development of improvement projects. The toolbox also includes a matrix that compares tools and techniques according to cost, time, and skills, in addition to a matrix that recommends tools and techniques based on the phase of the program or project.

  The handbook includes checklists for preparing:

  – Brochures 🖱 4-10

  – Conflict Resolution 🖱 4-11

  – Direct Mail 🖱 4-12

  – Field Offices 🖱 4-13

  – Flyers and Posters 🖱 4-14

  – Information Lines 🖱 4-15

  – Media Relations 🖱 4-16

  – Newsletters 🖱 4-17

  – Newspaper Advertisement 🖱 4-18

  – Public Service Announcements 🖱 4-19

  – Road Signs 🖱 4-20

  – Selecting Your Tools 🖱 4-21

  – Survey 🖱 4-22

- **The State Highway Administration (SHA) of Maryland's DOT (MDOT) created a Communication Plan Template for SHA Projects** (*24*)
  This checklist is intended for use by project managers for communications plan preparation. It is designed to assist the manager in considering the various components of a transportation project and how they may interrelate with one another. 🖱 4-23
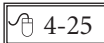
Checklists For Meeting Preparation and Meeting Announcements

Description.   A well-designed and well-distributed announcement of a public participation opportunity will contribute substantially to the program's effectiveness in drawing public input. Likewise, positive media relations are helpful to establish credibility, reliability, and make a connection with the community. Announcements come in numerous formats, including electronic mailing lists and e-mail, hotlines, newspaper inserts or advertisements, direct mail letters, television, or the internet. The type of meeting announcement used depends on the size of the audience intended to be reached, as well as the needs of the community.

Lessons for Airport Managers.
- Meeting Announcements/Notices
  – Public notices are an efficient, simple means of alerting the public to important events. However, public notices should never substitute for other activities that involve direct communication with the public if active and comprehensive public participation is the desired goal.
  – Public notices can be more effective, and provide more of a feedback loop, when they are combined with a means of gathering information from the public.
  – Every notice should contain a contact person so that the public can direct comments or questions to the agency, the facility, or other stakeholder groups.
  – Target the appropriate audience while reaching out to as many people as possible.
  – Utilize various methods of media to announce upcoming meetings, in order to include all citizens and encourage meeting attendance.

Example Best Practices.   The following announcements were chosen as best practice examples:

- **KCI Studies Postcard** (*25*) 🖱 4-24

  Announcements for the Kansas City International Airport Master Plan, Noise Compatibility Plan, and Area Plan Public Open Houses were sent in the form of a postcard. The postcard is colorful, attention getting, and concise, but provides all necessary meeting information.

- **Tysons Corner Development Announcement** (*26*) 🖱 4-25

  A general invitation to participate in the community dialogue on the future of Tysons Corner development is eye catching and vibrant. It describes the project and gives opportunities to provide input for those who are unable to attend the meeting.

- **Illinois DOT's (IDOT) Announcement** (*27*) 🖰 4-26

  Illinois DOT's (IDOT) announcement for the 2007 Illinois State Transportation Plan Review Meetings is clear and informative, and the graphics and layout help draw readers' attention.

- **Wakarusa Water Reclamation Facility Water Bills and Postcards** (*28*) 🖰 4-27

  Lawrence, Kansas, residents were involved in the planning for a new water reclamation facility over the course of three open houses. A series of graphics and posters designed for the open house were used to establish a "brand" identity for all announcement tools including water bill inserts, postcards, and posters. The use of utility billing inserts provides a simple method to reach a wide audience throughout the airport environs.

  The following meeting preparation tools and meeting approach checklists were chosen as best practice examples:

- **Pennsylvania DOT's Public Involvement Handbook** (*18*)
  Pennsylvania DOT's *Public Involvement Handbook* describes the principles, procedures, and techniques for enhancing citizen participation in the development of improvement projects. The handbook is divided into five sections. See the Manual section of this Toolkit for more information on this PennDOT document. The final section of the Handbook is a toolbox of ideas and techniques that can be applied to a variety of situations in which an agency interacts with the public throughout the development of improvement projects. The toolbox also includes a matrix that compares tools and techniques according to cost, time, and skills, and a second matrix that recommends tools and techniques based on the phase of the project.
  The DOT's checklists and guidance for preparing for meetings include:

  – Announcements 🖰 4-28

  – Public Meetings 🖰 4-29

  – Public Hearings 🖰 4-30

  – Public Open House 🖰 4-31

  – Neighborhood Meetings 🖰 4-32

  – Formal Meetings 🖰 4-33

  – Workshops 🖰 4-34

  – Public Officials Meetings 🖰 4-35

  – Citizen Advisory Groups 🖰 4-36

  – Focus Groups 🖰 4-37

Brochures

Description.   A brochure is a public information tool meant to communicate messages quickly and to a broad audience. They should be visually and graphically appealing, fun, interesting, and attention getting. Brochures often summarize the overall goals and objectives of a project or process, highlight an event or milestone, and may or may not include specific details.

Lessons for Airport Managers.
- The cost of writing, designing, and printing a typical color brochure may seem prohibitive, but should be thought of as a long-term investment.
- Attractive, well-illustrated, user-friendly materials make it easy for people to comprehend a process or proposal. Likewise, if they highlight ways for people to participate, community members may decide to get involved.
- The cost of public information materials varies widely, depending on complexity and volume. Brochures can be relatively inexpensive to produce, even on a large scale. Costs are less per unit in volume printings, and brochures may be designed on a personal computer and produced in-house.

Example Best Practices.   The following brochures were chosen as best practice examples:
- **Phoenix Sky Harbor International Airport brochure series** (*29*) ⌐ 4-38 ¬

  The Phoenix Sky Harbor International Airport, in conjunction with the Community Noise Reduction Program (CNRP), has produced several bilingual brochures with information related to the CNRP and its services for the public.

- **Seattle-Tacoma International Airport's Noise Monitoring brochure** (*30*) ⌐ 4-39 ¬

  Seattle-Tacoma International Airport's Noise Abatement Office issued an informational brochure describing its new and improved noise monitoring system.

- **Van Nuys Airport's Community Outreach Program brochure** (*31*) ⌐ 4-40 ¬

  Van Nuys Airport's Public and Community Relations published a Community Outreach Programs brochure, offering information on the Citizens Advisory Council (CAC), upcoming meetings, and other activities the public can attend.

- **Auckland International Airport Acoustic Treatment Package brochure** (*32*) ⌐ 4-41 ¬

  The Manukau District Plan provides information regarding the Aukland Airport's sound insulation program for homeowners and educational facilities in aircraft noise affected areas.

- **Cincinnati/Northern Kentucky International Airport brochure** (*33*) ⌐ 4-42 ¬

  The Cincinnati/Northern Kentucky International Airport (CVG) completed a new **Part 150 Noise Compatibility Study (Part 150)** and **Master Plan Update** for CVG. Two brochures about CVG's 4th runway and its noise compatibility program are provided to the public, including the role of public comments on runway operations.

- **Detroit Metro Airport Part 150 Noise Compatibility Study brochure** (*34*) ⌐ 4-43 ¬

  Detroit's Metro Willow Run Airport noise compatibility planning is focused on reducing existing noncompatible land uses around airports and preventing the introduction of additional noncompatible land uses through the cooperative efforts of all those involved. This brochure summarizes the effort.

- **Edmonton Airports Noise Brochure** (*35*) ⌐ 4-44 ¬

  The Edmonton Airport Noise Brochure includes an overview of airport operations, general noise information, noise concerns and equivalents, abatement procedures, and noise forecast.

- **Livermore Municipal Airport Brochure.** *An Overview* (*36*) ⌐ 4-45 ¬

  The Livermore Municipal Airport (LVK) is a General Aviation Airport which serves private, business, and corporate tenants and customers. The overview explains aircraft noise abatement, economic benefits, airport operations, standard traffic patterns, neighborhoods affected by airport operations, and community services.

- **Long Beach Airport. Community Guide to Airport Noise brochure** (*37*) ⌐ 4-46 ¬

  This brochure provides an overview of the noise program efforts including: a message from the staff, what is the airport noise compatibility ordinance; 10 key component of the ordinance,

direction for use of on-line flight tracking software; and background and locations of noise monitors, reporting of noise complaints, violation process, roles and responsibility, frequently asked questions, glossary of noise terms, and contact information.

- **Teterboro Airport Industry Working Group Brochure** (*38*) ⎙ 4-47

  This brochure explains the purpose and goals of the group. Comprising experienced aviation experts representing TEB's fixed-base operators, airport users and tenants, and national and local aviation industry associations, the Working Group is the first all-industry group to voluntarily step forward to work with its owner, the Port Authority of New York and New Jersey, to address community concerns about noise related issues.

- **Westchester County Airport Noise Abatement Program Overview** (*39*) ⎙ 4-48

  The Westchester County Airport Noise Abatement Program is managed by the airport's Environmental Department. The brochure provides an overview of program efforts including: program history, monitor compliance with the voluntary noise abatement programs, responds to citizen noise concerns and to research new noise abatement initiatives in an effort to help reduce the impact of aircraft noise on the surrounding residents.

- **Winnipeg International Airport. The Airport in our Neighborhood** (*40*) ⎙ 4-49

  The noise abatement procedures currently in place at Winnipeg James Armstrong Richardson International Airport have grown out of consultation with the community through the Advisory Committee on the Environment, the airlines, the municipalities, Transport Canada, and the airport. They are described in this brochure.

Fact Sheets

Description.   Fact sheets are effective in summarizing facts and issues; they also communicate a consistent message to the public and media. In addition, fact sheets can be tailored to meet specific information needs. Fact sheets can aid in creating a general understanding of a project, are relatively inexpensive to create on a desktop computer, and can be distributed easily and directly through a mailing list, on-line post, or at meetings.
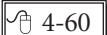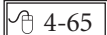
Lessons for Airport Managers.
- Fact sheets are a one-way communication tool, and therefore should always provide the name and telephone number of a contact person to encourage comments and questions.
- Fact sheets are effective in summarizing facts and issues. They communicate a consistent message to the public and the media.
- They are relatively inexpensive and can be distributed easily and directly via mail or website. In addition, they can be tailored to meet specific information needs and be frequently updated as new information becomes available.

Example Best Practices.   The following fact sheets were selected as best practice examples:

- **London-Gatwick Airport Fact Sheet Series** (*41-49*) ⎙ 4-50 - ⎙ 4-59

  London-Gatwick Airport is committed to reporting on a range of issues affecting aviation-related business. A series of fact sheets provide information on aircraft operations and how their impact is regulated and managed. The user can also learn about the airport's environmental performance.
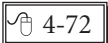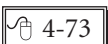
- **San Francisco International Airport Fact Sheet Series** (*50-55*) ⎙ 4-60 - ⎙ 4-65
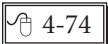
  The Aircraft Noise Abatement Office of the San Francisco International Airport sponsored the publication of a series of fact sheets describing the activities, roles and responsibilities, and composition of the Noise Abatement Office. Specifically, one fact sheet outlines how to file noise-related complaints.

- **Naples Municipal Airport fact sheet series** (*56-59*) ⏻ 4-66 - ⏻ 4-68

  This factsheet series is used to help General Aviation pilots operate their aircraft in the quietest manner possible consistent with safety, and is designed to help the airport be a good neighbor to its surrounding residential communities. The series includes: Recommended Fixed-Wing Arrival & Departure Procedures; Recommended Noise Abatement for Helicopters; and Recommended Abatement for Jets.

- **Miami-Dade Aviation Department. Plane Facts about Aircraft Noise Factsheet** (*60*) ⏻ 4-69

  The factsheet provides an overview summary of the community outreach program, noise control, noise abatement and procedures, and flight tracking program.

- **Van Nuys Airport Part 161 Noise Study – Fact Sheets** (*61-62*) ⏻ 4-70 - ⏻ 4-71

  Los Angeles World Airports (LAWA) has embarked on simultaneous studies of potential noise-based operating restrictions at both Van Nuys Airport (VNY) and Los Angeles International Airport (LAX). As part of this study, handouts were prepared to describe some of the ways Van Nuys describes noise and the effects of noise on people.

- **Vancouver International Airport. Aeronautical Noise Management** (*63-64*) ⏻ 4-72 - ⏻ 4-73

  The Airport Authority has a comprehensive Aeronautical Noise Management Program that includes: consultations with the Vancouver International Airport (YVR) Aeronautical Noise Management Committee; a five-year noise management plan; published noise abatement procedures; an airport noise monitoring and flight tracking system; and a complaint management and response system. The airport's fact sheets include information on: Airport Noise and the Community; What causes airport noise?; What does YVR do to manage noise?; Float Plane Operations at YVR; Why do I notice more noise in the summer?; Who regulates float planes?; What does YVR do to manage noise?; and How can I get more information?

- **PARTNER- Quantifying and Mitigating the Impact of Noise on People Factsheet** (*65*) ⏻ 4-74

  The PARTNER (Partnership for AiR Transportation Noise and Emissions Reduction Evaluation) Program factsheet provides a project overview of its programs to evaluate and develop metrics that can be used to evaluate the impact of airport and other noise sources on a community and to understand the relationship between noise annoyance, physiological responses, cognitive performance, and sleep quality.

Flyers or Posters

Description. Creative and eye-catching flyers and posters are an excellent way to inform a community about upcoming events or public involvement opportunities. Typically, flyers are a standard, letter-sized page. Posters, on the other hand, are usually larger in size and should be easily readable to attract public attention. Flyers and posters should be distributed throughout the study area in public places and businesses or shops frequented by a large number of citizens to reach the most people. Contact information should be included on the flyer or poster to encourage written responses.

Lessons for Airport Managers.
- Many public places have "Community Bulletin Boards" specifically designated for announcements. Ask permission before hanging posters. Also, if possible, leave stacks of flyers near entrances and on countertops.
- Don't rely solely on flyers; they are disposable.
- Posters are visible to large numbers of people for long periods of time and can be used in tandem with flyers to increase awareness.

- Posters in pilot lounges at Fixed Base Operator facilities are often a helpful approach to communicating noise abatement issues to itinerant pilots.

Example Best Practices.   The following flyers and posters were chosen as best practice examples:

- **Colorado DOT's I-70B West Project flyer** (*66*) 🖱 4-75
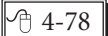
Flyers were distributed for an open house for Colorado DOT's (CDOT) I-70B West Project. In addition to meeting logistics, the flyer included a map of the study corridor for reference.

- **City of Lenexa, Kansas' Rain to Recreation posters** (*67*) 🖱 4-76

A series of posters was designed for the City of Lenexa, Kansas' Rain to Recreation project, which promoted quality growth and development in the region while preserving natural features.

- **Westchester County Airport. It's Not Just an Airport, It's a Neighborhood flyer** (*68*) 🖱 4-77

This flyer explains Westchester County's Voluntary Restraint from Flying Program (commonly referred to as the "voluntary curfew"), which asks that flights be avoided between midnight and 6:30 a.m. each day.

- **Naples Municipal Airport Recommended Noise Abatement Jet Aircraft Arrival & Departure Procedures** (*58-59*) 🖱 4-78

The Naples Municipal Airport has produced a series of flyers for the pilot that may be developed as handouts or posters. The examples provided would make useful posters for a bulletin board in the local FBO pilot lounges.

Newsletters

Description.   Newsletters are a means of direct communication to a wide audience that keeps interested people informed of previous or upcoming activities. These publications provide a level of project detail that is not usually available from other news media. They are useful if there is a need to present ongoing, detailed information or a forum for exchanging ideas, updates, announcements, and news. A newsletter uses a user-friendly, news-based format to provide regular updates, and can subsequently require significant amounts of time and resources to write and distribute. They may be prepared in either print or digital form.

Lessons for Airport Managers.
- Newsletters and program or project status reports are useful ways to disseminate important information to stakeholders. Making them widely available can enhance their credibility.
- Newsletters may require significant amounts of staff time and resources, dependent upon the frequency of their preparation.
- Direct distribution of periodic technical reports may create confusion if they are not accompanied by a summary.
- When creating a newsletter, there are six major steps to consider: deciding on content, design/layout for readability, selecting images, proofing, printing, and mailing.

Example Best Practices.   The following newsletters were chosen as best practice examples:

- **O'Hare Monitor newsletter** (*69*) 🖱 4-79

The quarterly *O'Hare Monitor* relays information to the public from the Chicago O'Hare Noise Compatibility Commission and documents upcoming public meetings.

- *Noise Matters* **newsletter** (*70*) 🖱 4-80

The San Diego *Noise Matters* newsletter is published periodically for the residents neighboring San Diego International Airport.

- **Phoenix Sky Harbor International Airport publishes periodic newsletters** (*71*) [🖰 4-81]

  As part of the Community Noise Reduction Program (CNRP) effort, the Phoenix Sky Harbor International Airport publishes periodic newsletters on behalf of the Voluntary Acquisition and Relocation Services (VARS) and Residential Sound Mitigation Services (RSMS) programs. These newsletters keep residents informed on various outreach campaigns and other community information.

- **Boise Airport newsletter** (*72*) [🖰 4-82]

  The Boise Airport quarterly newsletter includes information on: Avigation Easements, Residential Land Acquisition, Noise Levels, Economic Impact, Terminal Construction and Remodeling, Air Service, Drop Zone, and status of the Master Plan.

- **Metropolitan Advisory Commission Noise Newsletter** (*73*) [🖰 4-83]

  MSP Noise News is published quarterly to help keep residents and other interested parties informed about airport noise issues at the Minneapolis-St. Paul International Airport.

- **Salt Lake City Department of Airports' Elevations newsletter** (*74*) [🖰 4-84]

  This electronic one page newsletter provides a general overview of current airport issues.

- **Sea-Tac International Airport. Port of Seattle - Air Mail newsletter** (*75*) [🖰 4-85]

  This electronic newsletter is issued quarterly and provides an overview of airport current events and operations.

- **Detroit Metro Airport. Part 150 Noise Compatibility Study** (*76*) [🖰 4-86]

  A newsletter summarizing issues, deliverables, and how to become involved in the planning process related to the 1993 Part 150 Noise Compatibility Study.

- **General Mitchell International Airport. Part 150 Noise Compatibility Study newsletter** (*77*) [🖰 4-87]

  This newsletter is representative of those developed as part of the Milwaukee Airport's process of updating its Part 150 Noise Compatibility Study.

Frequently Asked Questions

Description.   A comprehensive list of Frequently Asked Questions (FAQ) can be an effective tool for sharing information with the public. Questions and answers should be clear and concise, and avoid technical explanations. FAQ can help limit the amount of phone calls or emails that an agency or person may receive if the public is properly directed to the site. It is still important to publicize the agency's contact information if a citizen has questions not already answered in the FAQ.

Lessons for Airport Managers.   The development and use of a set of FAQ related to specific conditions at the local airport will provide:

- Consistency in responses to difficult and complex questions; and
- Reduce the need to constantly refresh knowledge of area specifics when there are long intervals between the same question being asked or new staff is familiarized with the situations present.

Example Best Practices.   The following sets of frequently asked questions were chosen as best practice examples provided by airports:

- **San Diego International Airport's Frequently Asked Questions** (*78*) 🖱 4-88

  San Diego International Airport's Noise Mitigation Office hosts a list of FAQ on its website. The questions are separated into three major categories: General Questions, Operational Questions, and Legal and Legislative Questions.

- **Oakland International Airport Frequently Asked Questions** (*79*) 🖱 4-89

  Oakland International Airport has a list of FAQ on its website concerning aircraft noise information. This FAQ also includes a glossary of aviation-related terms, noise terminology, and aircraft noise fundamentals.
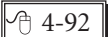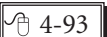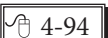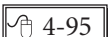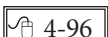
- **San Francisco International Airport's Frequently Asked Questions** (*53*) 🖱 4-90

  San Francisco International Airport's Noise Abatement Office website includes FAQ pertaining to sound insulation, runway configuration, and the airport's noise monitoring system.

- **Dane County Regional Airport (Madison, Wisconsin). Noise Abatement Frequently Asked Questions** (*80*) 🖱 4-91

  Dane County Regional Airport website includes FAQ pertaining to sound insulation, runway configuration, and the airport's noise monitoring system.

In addition to the FAQ posted on the websites of the preceding four airports, this Toolkit includes sets of FAQ and sample responses for airports with five different mission levels: large/medium air carrier hubs, small and non-hub airports, cargo airports, and large and small general aviation airports. The responses are more technical in nature than those usually posted on a website or provided in distributed information, but airport managers often are asked for more specific answers to specific questions. These FAQ provide a more detailed level of response. While there are many commonalities between each airport type, there are differences as well. The airport manager may evaluate the responses for each airport level to apply to the local conditions or use them to develop tailored responses for the airport.

- Sample FAQ – Large or Medium-Hub Airports 🖱 4-92

- Sample FAQ – Small or Non-Hub Airports 🖱 4-93

- Sample FAQ – Cargo Hub Airports 🖱 4-94

- Sample FAQ – Large General Aviation Airports 🖱 4-95

- Sample FAQ – Small General Aviation Airports 🖱 4-96

Annual Reports and Noise Program Overviews

Description.   Noise programs are created to deal with aircraft noise and subsequent mitigation strategies on a communitywide level, by involving the public and educating them on noise elements. Program materials can be geared toward a general audience, while other noise abatement programs are tailored for aviation-industry professionals.

Lessons for Airport Managers.
- Aircraft noise elements tend to be highly technical and, therefore, not easily understood by the general public.
- Airport managers can act as a go-between between the public and the aviation industry.

- Noise education materials help explain issues related to aircraft noise, answer the most common questions, and describe how noise levels are determined.

Example Best Practices.   The following were chosen as best practice examples of program reports and overviews:

Noise Education

- **The City of Atlanta's Department of Aviation and Hartsfield-Jackson Atlanta International Airport overview** (*81*) 🖰 4-97

  The City of Atlanta's Department of Aviation and Hartsfield-Jackson Atlanta International Airport created an educational publication on aircraft noise. The publication features the history of noise mitigation efforts, frequently asked questions related to noise, how noise levels are determined, and the roles and responsibilities of various entities to control aircraft noise.

- **London-Gatwick Airport's** *Bothered by Aircraft Noise?* (*82*) 🖰 4-98

  This booklet highlights key elements of aircraft noise in lay terms and illustrates noise contours surrounding the airport. Additionally, the booklet contains information about what the industry and airport have done to mitigate noise.

General Noise Program Overviews and Reports

- **O'Hare Noise Compatibility Commission,** *2006 Annual Report* (*83*) 🖰 4-99

  This report includes a Noise Compatibility Commission overview, initiatives, community outreach, and other program updates.

- **Seattle-Tacoma International Airport,** *Noise Mitigation Programs* (*84*) 🖰 4-100

  This brochure explains noise abatement programs that were developed through airport and community planning efforts to reduce aircraft noise.

- **Van Nuys Airport,** *Noise Management Program* (*85*) 🖰 4-101

  The noise management program outlined in this brochure illustrates community response efforts as well as continued diligence toward achieving effective noise reduction at the source.

- **Long Beach Airport, Community Guide to Airport Noise. Overview** (*86*) 🖰 4-102

  This booklet was developed by the airport's Noise Office to provide factual information on the City of Long Beach Airport Noise Compatibility Ordinance and the airport's efforts to minimize aircraft noise over nearby neighborhoods. The booklet also explains what the Airport has control over and what it does not have control. It also provides answers to frequently asked questions about noise.

Noise Programs – Technical

- **Broward County Aviation Department:** *Partnership for Quieter Skies Quarterly Report, 2007* (*87*) 🖰 4-103

  The Partnership for Quieter Skies program was initiated in response to requests for a more transparent reporting of objective information related to Fort Lauderdale-Hollywood International Airport's noise abatement efforts.

- **Denver International Airport Noise Office:** *2007 Cumulative Noise Report* (*88*) 🖰 4-104

  The *Report* gives an update on Denver's Airport Noise and Operations Monitoring System (ANOMS), ARTSMAP noise modeling program, Noise Exposure Performance Standards (NEPS), and other airport statistics.

- **Baltimore/Washington International Thurgood Marshall Airport**: *Real Estate and Land Use Compatibility Planning Quarterly Noise Report,* **First Quarter 2007** (*89*) 🖱 4-105

  This quarterly *Report* provides a review of the aviation noise abatement program and includes updates on various types of aircraft operations, noise levels at noise monitoring sites, and updated information on the Noise Assistance Programs.

- **Seattle Tacoma International Airport,** *2006 Annual Technical Report* (*90*) 🖱 4-106

  The Airport Noise Programs *Annual Technical Report* for 2006 details various noise abatement initiatives and major accomplishments, and also provides pertinent airport facts and statistics.

- **Phoenix Aviation Department, Aviation Noise Report – 2006 Year End Review** (*92*)

  🖱 4-107

  This report reviews the aircraft activity and noise measurement data for the year 2006 for Sky Harbor International Airport, Deer Valley Airport, and Goodyear Airport. It is formatted as a PowerPoint presentation, but available in printed form.

- **Portland International Airport, Noise Abatement Annual Report 2000** (*91*) 🖱 4-108

  The Port of Portland provided a comprehensive document that incorporated a report on noise conditions for the year, illustrations of noise abatement procedures and techniques, annual activity information, and a noise primer for the lay person into a single document for broad distribution.

- **Partnership for AiR Transportation and Noise Emissions Reduction.** *Report to the United States Congress - AVIATION AND THE ENVIRONMENT - A National Vision Statement, Framework for Goals and Recommended Actions* (*93*) 🖱 4-109

  This document reports the results of a study mandated by the U.S. Congress in December 2003 as part of the *Vision 100 Century of Aviation Reauthorization Act* (H.R. 2115, Public Law 108-176)(*140*). Section 321 of the legislation mandates that the Secretary of Transportation, in consultation with the Administrator of NASA, shall conduct a study of ways to reduce aircraft noise and emissions and to increase aircraft fuel efficiency. Fifty-nine stakeholders from 38 organizations spanning the aerospace industry including NASA, FAA, EPA, the Department of Commerce (DOC), the Department of Defense (DoD), academia, local governments, and community activists actively participated in the planning process.

- **Partnership for AiR Transportation and Noise Emissions Reduction.** *Research Projects* (*94*)

  🖱 4-110

  This report provides a summary of 14 projects being conducted under the PARTNER Program. They include: Low Frequency Noise Study; Measurement, Metrics, and Health Effects of Noise; Valuation and Trade-offs of Policy Options; Continuous Descent Arrival; En Route Traffic Optimization to Reduce Environmental Impact; Land Use Management and Airport Controls; Sonic Boom Mitigation; Measurement of Emissions; NoiseQuest; Health Impacts of Aviation-Related Air Pollutants; Emissions Atmospheric Impacts; Lateral Alignment in Complex Systems; Environmental Design Space; Energy Policy Act Study; Investigation of Aviation Emissions Air Quality Impacts; Alternative Fuels; and Reduced Vertical Separation Minimums.

Multimedia Presentations

Description. Multimedia presentations utilize a combination of text, images, sounds and other interactive content forms. These types of presentations are useful in their ability to make an impact and convey messages to a wide audience. Some multimedia presentations allow two-way communication that enables viewers to respond by voice or on-line; a further refinement of technology uses cameras and special connections at both ends so that participants can see and hear one another.

Lessons for Airport Managers.
- Multimedia presentations provide direct or immediate knowledge as compared with a written summary document. They can help people grasp a concept, understand complex programs, and absorb large amounts of information quickly.
- Making project staff available for community speeches and presentations will signal the airport's commitment to public involvement.
- Because the presentation is delivered in person, the audience has a chance to ask questions, and the presenter can gauge citizens' concerns and seek greater clarification of misunderstandings. Also, many people can be reached at one time, reducing individual inquiries.
- Presentations require substantial effort to be effective. A poorly planned presentation can distort residents' views of the situation and cost the airport credibility.

Example Best Practices.   The following multimedia presentations were chosen as best practice examples:
- **San Diego County Regional Airport Authority Six-Part Noise series** (*95-100*). [🖰 4-115] - [🖰 4-116]

  A six-part series of "Noise 101" presentations were prepared for the public by San Diego County Regional Airport Authority on behalf of the San Diego International Airport, to discuss the basics of aircraft noise and the airport's noise program, rules, regulations, and other components.
- **Broward County Aviation Fort Lauderdale-Hollywood International Airport. FAR Part 150 Noise Compatibility Study presentation.** (*101*) [🖰 4-117]

  This Power Point presentation provides an overview of Part 150 Study tasks for its Public Hearing on the consultant's recommended Part 150 actions.
- **Boston Logan Community Advisory Committee – Potential Flight Track Alternatives.** (*102*) [🖰 4-118]

  The FAA in conjunction with Massachusetts Port Authority and the Logan Airport Community Advisory Committee (CAC) has undertaken a study of how to reduce noise impacts from aircraft overflights to and from Boston Logan International Airport. This study is known as the Boston Overflight Noise Study. This presentation provides illustrative graphics for potential flight track alternatives.
- **Using Supplemental Metrics to Address the Effects of Noise on People. TRB Annual Meeting. January 22, 2007.** (*103*) [🖰 4-119]

  This presentation provides an overview of Supplemental Metrics and presents case studies of their application. It makes the case that with the increased transparency provided by these effect metrics, policy makers and concerned citizens can engage in a more informed discussion that could ultimately lead to better outcomes for all.
- **International Civil Aviation Organization—The Balanced Approach to Aircraft Noise Management presentation.** (*104*) [🖰 4-120]

  This presentation provides a brief summary on the International Civil Aviation Organization's approach to aircraft noise management including: why it was developed; what it aims to achieve; how it works; and revisions and implementation.
- **Dane County Regional Airport. Noise Abatement Subcommittee - Review of Noise Complaint Activity presentation. April 18, 2007** (*105*) [🖰 4-121]

  This presentation for the Noise Abatement Subcommittee provides an overview of: Aircraft Movements; Complaints By Aircraft Type and Area; and Proactive Measures.

- **Vancouver International Airport. Managing the Sounds of a Gateway - An introduction to Noise Management Practices at Vancouver International Airport.** (*106*) ⏏ 4-122

   This presentation provides an overview of the Vancouver International Airport Authority's Aeronautical Noise Management Program and best practices overview in the context of the Airport Authority's Environmental Management Program.

Websites

Description.   Websites can be a very effective way to share information with the public and even to receive feedback through online comment forms, surveys, blogs or other interactive tools. To be successful, a website should have a well-designed home page, be easy to navigate, and should let the user know where to find specific information. Websites also are useful to post documents and upcoming events of which the airport would like the public to be aware. Communicating through websites makes information accessible anywhere at any time, but not all users have easy access to the internet. Likewise, large files or graphics can take a long time to download. Websites can be translated into other languages if the study area is multilingual.

Lessons for Airport Managers.
- Make the site easy to find! Place a link to noise-related material on the airport's home page if the information is located elsewhere.
- Make the site interactive by including hotlinks or other features that draw interest.
- Use graphics, images, and color to articulate the message.
- Update the site frequently! Old or out-of-date information conveys the wrong message to the viewer.
- Provide contact information, including mailing address, phone number, and e-mail.
- Include links to other related websites. This is an easy and inexpensive way to provide more information.

Example Best Practices.   The following were selected as good examples of airport noise websites:

Small Airport - http://www.msnairport.com/about/environment.aspx (*107*)

Dane County Regional Airport, Madison, WI. Environmental Responsibility and Noise Abatement Website. The Dane County Regional Airport, Madison, WI. website provides an overview of the Noise Abatement Program and its measures to limit aircraft noise in the community. By clicking on website links users can find information about what the airport is doing about noise, the noise abatement program, noise abatement subcommittee, and frequently asked questions.

Documents are available for download. ⏏ 4-123

Medium-size Airport - http://www.flylouisville.com/about/noiseprogram.asp (*108*)
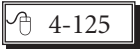
Louisville International Airport, Noise Compatibility Program. The Louisville International Airport website provides an overview of the Noise Compatibility Program and its measures to minimize noise exposure in the community. By clicking on website links users can find out information about what the airport is doing about noise, the noise compatibility program, community noise forum, and access archives for the Part 150 Update for Louisville International Airport.

Documents, leaflets, and reports are available for download. ⏏ 4-124

The Airport Authority launched a state-of-the-art flight tracking system in 2004. The tracking system allows users to view flight tracks and identify aircraft in near real-time or re-play mode. Information from two portable noise monitors also may be uploaded into the system to correlate aircraft noise with flight tracks and dates.

Large Airport - http://www.gatwickairport.com/portal/page/XYZGatwickNoise/ (*109*)

Gatwick Airport: Interactive Aircraft Noise Website. The purpose of the BAA's Gatwick Airport website is to provide the public useful and clear information about the aircraft noise they are hearing and why it occurs. This website's purpose is to explain some of the issues about airplane noise, answer the most common questions, and describe what the airport is doing about it. 🖱 4-125

By using the website links, users can find information about areas where they live or work and understand how departing and arriving aircraft can affect them. The interactive website is extensive, informative, and user-friendly with many pages dedicated to communicating the effects of aircraft noise, education, and the airport's role in the community. Additionally, documents, leaflets and reports are available for download.

The interactive aircraft noise website is accessed from the Gatwick Airport home page. The home page is well designed and highly graphic; it includes windows and pull-down menus for navigation to the noise website. The home page for the website also is well designed, inviting, and includes navigation windows to more detailed sections. These include "Noise Explained" which provides educational information for the layperson, and "Noise In Your Area" which provides the public interactive on-line flight tracking and identification system access.

The Noise Explained section includes a detailed page on the Causes of Aircraft Noise which includes a range of topics, from what causes aircraft noise, to living close to the airport, under the flight path, under the approach path, living under a holding stack or between the holding stack and airport, noise around the airport, and what the airport is doing about it.

- *Bothered by Aircraft Noise? We're Listening.* This on-line booklet sets out to explain some of the issues about airplane noise, answer the most common questions, and sets out what Gatwick is doing about it including: what is the problem, how big is the problem, what they have done about it, and further information.
- The **Causes of Aircraft Noise** page includes an interactive diagram of an airframe and demonstrates how noise is generated as air passes over the plane's body fuselage and its wings. It shows aircraft with their flaps down and up, with illustrative text to explain the effects in each configuration.
- **Under the flight path** provides interactive diagrams of wind direction and the consequences of living or working under a flight path and hearing planes taking off.
- **Living under a holding stack** provides an interactive diagram of a plane flying in a holding stack pattern and explains what you hear while they are waiting to make final approaches.
- **Noise around the airport** explains why and how noise around the airport is measured. A noise exposure contour map with information related to the distribution of noise in neighboring communities for the area around Gatwick is provided.
- **Better Technology** uses charts and interactive diagrams to show how much quieter each new generation of aircraft has been than the one that preceded it.
- **Improving operations** uses an interactive diagram to show a continuous descent approach procedure, non-continuous descent approach, and both profiles.

The **Noise In Your Area** section includes **Where Do You Live and Tracking Flights.** By using an on-line tracking tool, users can see where aircraft are flying in relation to where they live or work. Webtrak is available to plot postal code location and replay a selected period of Gatwick flights. A series of file attachments which provide greater detail about aircraft operations at Gatwick can be found in this section of the website.

Interactive Learning Tool

Description.   Public decision-making processes at every level of independent agency or government are being transformed by new methods and new technologies for citizen participation.

Finding the right tool for the task at hand is the key to success. For example, engagement tools can provide focused feedback from stakeholders through on-line deliberation, webcast meetings, stakeholder dialogues, community conversations, research or keypad polling.

Lessons for Airport Managers.

- Today's public is aware of and often expect the use of technical advances that make it possible to participate or provide comment on a project or study.
- The right tool can provide focused feedback from stakeholders, help an organization increase meeting effectiveness, and promote participation through application of state-of-the-art technology.

Example Best Practices.   The following interactive learning tools were chosen as best practice examples:

- **FHWA's Noise Compatible Land Use Planning Workshops** (*110*)
  http://www.fhwa.dot.gov/environment/noise/ncp/index.htm
  FHWA sponsored a series of workshops in 2005 at strategic locations around the country to describe the merits of noise compatible planning along roadways. Specifically, the workshops were designed to:
  – Educate and increase the use of noise compatible land use strategies by communities;
  – Build the resources (video, reports, course curriculum) to better educate communities; and
  – Lead to less frequent utilization of noise barriers.

  The half-day workshop began with a plenary session, which provided an overview of noise compatible land use planning, the status of local activities, and examples of implementation of noise compatible land use strategies from around the country. Participants then separated into breakout sessions to discuss application of the noise compatible principles for their community. The workshop showed land use planners and elected officials how they can influence neighborhoods affected by highway noise by utilizing local ordinances and zoning tools. Open-space techniques that greatly reduce interior noise penetration include buffer zones between the roadway and the development, possibly focusing garages and rear yards adjacent to the roadway, and providing landscaping and recreational features such as earthen berms or recreational trails. Similar techniques may be used in judicious subdivision designs based on aircraft ground noise patterns.

  From these workshops, a proceedings document (*111*) 🖰 4-126 was developed summarizing the workshops, and a curriculum (*112*) 🖰 4-127 was developed, which can be used to teach the basic concepts of compatibility planning by any party interested in educating management, developers, planners, decision-makers or students on noise issues. The program is supported by an extensive PowerPoint (*113*) presentation. 🖰 4-128

- **America Speaks 22nd Century Town Meetings** (*114*)
  http://www.americaspeaks.org
  This is a public forum that links technology with small-group, face-to-face dialogue to allow thousands of people to deliberate simultaneously about complex public policy issues and express a shared message to decision makers. The drop down boxes under "Services" on the home page lead to a variety of useful tools and capabilities for engaging the public.

- **Hartsfield-Jackson Atlanta International Airport. Hartsfield-Jackson Kids webpage.** (*115*)
  🖰 4-129

  http://www.atlanta-airport.com/sublevels/airport_info/kids/home.html
  The Hartsfield-Jackson Kids page provides information on noise and air quality issues written for young people. Kids of all ages are invited to become a part of the Hartsfield-Jackson Atlanta

International Airport's Kids Club by staying in touch and visiting their website. The website includes multiple sections including: History, Safety, Watch Us Grow, The Airport and the Environment, Careers in Aviation, Activities & Events, and the Kids Club. The Airport and the Environment page includes a section on Airplane Noise (for kids). Information includes: What is noise? What are noise operations monitoring systems? Just what is a flight track? What is an air traffic controller? What are noise monitors?

- **Colorado DOT (CDOT) "Virtual Open House".** (*116*) 4-130

  http://www.westvailpass.com/.
  For the West Vail Pass Environmental Assessment Process the Colorado DOT (CDOT) offered a "Virtual Open House". For citizens not able to attend the scheduled open houses, an on-line version of each meeting was held approximately one week later. The "Virtual Open House" is a live, on-line meeting that gives participants the opportunity to review the meeting materials displayed at the open houses and ask questions of the study team in real-time. Each "Virtual Open House" is recorded and available for playback on the website.

Advanced Technology Demonstrations

Description.   Visualization software offer promise for creating engaging images for presentations or websites.

Lessons for Airport Managers.
- When a new project is proposed, people begin to imagine how their community might be changed.
- People may react differently to a proposal when they can visualize it.
- Today's public is aware and often expect the use of technical advances that make it possible to visualize a new project or its effects before it is built.
- However, use of these tools also can send the wrong message to the public if used too early in the design process. The finished look of technology may imply that all decisions have been made without public input.

Example Best Practices.   The following advanced technology demonstrations were chosen as best practice examples:

- **FHWA Visualization in Planning website.** (*117*) 4-131

  FHWA's *Visualization in Planning* website includes noteworthy practices and innovative uses of visualization for transportation planning. Through visual imagery, the complex character of proposed transportation plans, policies, and programs can be portrayed at appropriate scales—state, region, local area, project architecture, etc., and from different points of view. "The effective presentation of projects' impacts to the public has become an increasingly essential part of the planning and design of transportation" (*110, website homepage*) systems.
  Examples of visualization techniques include sketches, drawings, artist renderings, physical models and maps, simulated photos, videos, computer modeled images, interactive GIS systems, GIS based scenario planning tools, photo manipulation, and computer simulation.

- **Wisconsin Department of Transportation, Best Practices for Public Involvement in Transportation Projects.** (*118*) 4-132

  This paper recommends the following as best practice examples of advanced technology demonstrations for the Wisconsin Department of Transportation, Best Practices for Public Involvement in Transportation Projects:
  - HighRoad, by Creative Engineering, Australia, allows designers with minimal technical expertise to create 3-D animation visualizations of designs. See http://www.createng.com.au./.

- North Carolina DOT. 2-D and 3-D photo simulations using Adobe PhotoShop. See http://www.ncdot.org/it/visualization/

- **CommentWorks℠** (*119*) ⏽ 4-133

  ICF International, a global consulting and technology solutions firm piloted **Comment-Works℠**, a web-based public participation system that allows the gathering and categorization of comments, preparation of summaries and responses, response tracking, and reporting. The public can submit comments and view comments or other materials on-line. It has been used by the U.S. Department of Energy, EPA, Federal Occupational Safety and Health Administration (OSHA), Department of Homeland Security, and others. Information may be found at http://www.icfi.com/services/enterprise-solutions/commentworks/overview.asp

- **Interactive Sound Information System** (*120*) ⏽ 4-134

  The Interactive Sound Information System (ISIS) is a private enterprise software tool designed to provide public information related to aircraft noise levels over surface locations. It allows the user to compare single event levels for current and alternative conditions by playing acoustic events through as set of speakers at noise levels calibrated for distances that might be expected during real world conditions. Information may be found at http://www.noisemanagement.org/index.html.

Outreach Vehicle Tools

Description.   Community Outreach Vehicles (COV) generally are outfitted with technology to demonstrate aircraft noise issues and may travel to schools, libraries and community events offering an interactive aircraft noise demonstration system and video presentations.

Example Best Practices.   The following noise outreach vehicles were chosen as best practice examples:

- **O'Hare Community Out Reach Vehicle** (*121*) ⏽ 4-135

  The purpose of the O'Hare COV is to address public concerns and to promote the initiatives of the Chicago Airport System and the O'Hare Noise Compatibility Commission at community events, festivals, schools, and libraries. Video presentations and computer demonstrations of the Airport Noise Monitoring System are provided. The COV is powered by compressed natural gas and is equipped with an ADA compliant automatic hydraulic wheelchair lift. The COV also is used as a learning tool. It travels to schools located within the City of Chicago and its surrounding suburbs to discuss noise retrieval procedures, data collection, and aviation career possibilities. A portable noise monitor also is used so that students can visualize noise levels of various events.

- **Miami-Dade Plane Facts About Aircraft Noise - Noise Abatement Van** (*60, p. 8*) ⏽ 4-136

  The Miami-Dade Noise Abatement Van is equipped with portable noise monitors. These monitors are used at various locations throughout the County to record aircraft-related noise levels. The van is also used to patrol Miami International for illegal aircraft maintenance run-ups.

- **Portland International Airport Noise Van** (*91*)
  The Portland International Airport Noise Van is equipped for monitoring noise in and around the Portland metro area. Noise technicians use it to support field measurements for airport in-house projects and/or requests from citizens.

Case Studies in Airport/Stakeholder Communication

After an introductory overview of contents, this chapter begins with a review of three studies of the current practice of public involvement in three peer industries – aviation, surface transportation, and non-transportation environmental concerns. The literature review is followed by a comprehensive look at current practices in communication through five selected airport case studies and one university case study that have similar issues in communicating with the public.

Airport managers may review their own approach to communications to the experiences of other airports reported in the case study synopses for airports of similar size or situations. Managers may also review how other airports and other industries have handled difficult public involvement situations and consider the applicability of the lessons those situations have taught.

Content and Case Overview

The literature reviews and case studies are meant to illustrate a range of public communication approaches in use by peer industries, what airports themselves have learned about public communication, and what lessons other industries have learned that are applicable to airports.

This chapter presents:

- A literature review of communications practices in the aviation, surface transportation, and environmental industries.
- Case studies of five airports, representing various service missions typical within the United States.
- A case study of a university that experienced communication problems similar to those faced by many airports.

The overwhelming message from both the literature review and from the individual case studies is that two-way communication with neighboring communities is necessary to facilitate practical development and is a "best practice" across public service industries.

Airport and Peer Industry Literature Review

In addition to the many documents provided by airports, three general summaries of communications practices within the aviation, surface transportation and environmental management industries were reviewed for this analysis.

The three documents selected for a literature review provide insight into the common issues and difficulties faced by three separate industries in their efforts to deal with community concerns and to grow effective community relationships through public engagement techniques.

Each review provides an introduction to the paper, followed by a summary of its findings and conclusions relevant to the airport industry. The studies are:

- **Airport Industry – Best Practices in the Airport Industry: An Assessment of Airport Community Involvement Efforts** (*12*)
  Finding Relevant to Aircraft Noise Communications: Airports as a whole are busy, confined by regulations and focused on airport operations. They view dealing with the community affected by noise as a necessary nuisance, but not important enough to require development of an ongoing relationship. This literature review is located in front of the case studies as a summary of the overall state of community involvement in airports.
- **Surface Transportation Industry - Best Practices in the Transportation Industry: Transportation Research Board White Paper** (*13*)
  Finding Relevant to Aircraft Noise Communications: The emerging model in the surface transportation industry "assumes that public input into the assessment of transportation needs and solutions is a key factor in most transportation decision making."
- **Environmental Industry - Best Practices in the Environmental Industry: Stakeholder Involvement & Public Participation at the U.S. EPA** (*15*)
  Finding Relevant to Aircraft Noise Communications: The environmental management and regulation industry, as exemplified by the EPA, faces similarly adversarial issues with the community as airports. EPA has wide responsibilities for air quality, water quality and waste disposal regulations and projects, but does not have jurisdiction over aircraft or airport noise. This evaluation concluded that best practices require giving citizens, industry, environmental groups, and academics much greater roles in environmental decision making. It states a belief in building trust with the community to ensure an effective working relationship.

Airport Case Studies

Over the last two decades, each of the case study airports has faced controversy over proposed or planned changes that would potentially create adverse noise impacts on noise-sensitive land uses around the airport. In each case, these issues are similar to those faced by all airports as they develop to better serve their communities. Staff at, and community representatives near, each airport were asked to reflect upon the communications program put in place by each airport to provide information to, receive comments from, and engage in discussion with each other about aircraft noise issues present at the facility.

The five airports selected for individualized case study represented a broad spectrum of aviation missions as managed by the probable airport manager users of this Guidebook and Toolkit. Each airport case study begins with a brief introduction and history of the airport and its noise program as a framework for the interview results. The descriptive material is drawn from the airport's written and website materials or from the author's knowledge of the industry. The next sections discuss who was interviewed and what the key issues were and continue to appear to be, followed by conclusions. For those who want more detail on the noise abatement program, the airport's website is indicated. The selected missions and case study airports are:

- **Large/Medium-Hub Airport With Passenger Service - San Francisco International Airport (SFO)** (*122*)
  Relevance to Aircraft Noise Communications: After several aircraft noise related lawsuits in the 1970s, this large air carrier airport's management has made building a long-term relationship with the surrounding communities a priority. It has been rewarded with relative peace and three decades of meaningful participation by key stakeholders. The airport has a strong history of "doing something about noise", which is very important to its neighbors.

- **Small/Non-Hub Airport With Passenger Service – Long Beach Airport** (LGB) (*123*)
  Relevance to Aircraft Noise Communications: After a series of lawsuits this small air carrier airport has reached a settlement agreement that includes a noise budget. As long as the airport and its users stay within the noise budget they can increase services. The proposed introduction of the airport as a Los Angeles area hub for a low-fare carrier led to community concern and controversy arising from the rapid increase of passenger service. The airport and airlines were encouraged to develop creative ways to reduce noise and help the community to stay involved to keep the basic agreement in place. The Settlement Agreement encourages the airport to provide adequate funding for the noise program and maintain a strong coordinated strategy for working with both the community and with airport users.

- **Cargo Hub Airport – Louisville International Airport/Standiford Field (SDF)** (*108*)
  Relevance to Aircraft Noise Communications: This air carrier airport is the home base for United Parcel Service's overnight package delivery service. The airport has an award-winning program for engaging the public after years of conflict with surrounding communities over nighttime flights and airport redevelopment issues. There are three primary factors that led to success in changing crisis to resolution: 1) a large scale working group process that involved the community, users, and the airport in developing a solution; 2) willingness of the major user to invest time and resources in solutions and to be open to ideas; and 3) creative involvement of an elected official who helped develop and implement creative solutions including relocation of a whole community.

- **Large General Aviation/Reliever Airport - Van Nuys Airport (VNY)** (*124*)
  Relevance to Aircraft Noise Communications: The public involvement and communications programs of this large general aviation reliever airport are still evolving in relation to some difficult-to-resolve noise issues under consideration as part of a 14 CFR Part 161 airport access study. Solutions acceptable to the community are not acceptable to many airport users and have not yet been approved by FAA. The airport noise office is moving more toward a professionally facilitated roundtable approach and their public relations office is working hard to become a presence in the community. They have found no easy and fast solutions to solving noise issues.

- **Smaller General Aviation Airport - Ohio State University Airport (OSU)** (*125*)
  Relevance to Aircraft Noise Communications: After years of service as being a training facility for aeronautical education students with an active smaller aircraft component, the airport has gradually grown to serve a greater portion of the aviation needs of Columbus, Ohio. The completion of an airport master plan calling for runway development and the attempted communication of information about that runway led to heightened controversy, particularly from an area well beyond the contours of significant noise exposure. That community, however, considers itself to be substantially affected by aircraft noise from the developing airport. Under threatened litigation and the public relations crisis, the airport and university have involved a broader array of stakeholders in its noise abatement planning process by including the opposition in an open, interactive process.

University Case Study

The final case study is a review of how a university overcame significant obstacles to its continued development that were created by its own internal processes of communications programs and public involvement.

- **Education Industry - Crisis in the College/University Relationship with the Community: A Case Study** (*14*)
  Relevance to Noise Communications: A conflict with university neighbors reached a head shortly after the University of Missouri at Kansas City (UMKC) decided to expand into a residential

neighborhood without involving the neighborhood residents in the planning process. UMKC administrators learned that they must plan ahead and develop a good interactive relationship with the community <u>before</u> there is a crisis. They discovered that a public relations crisis can develop very quickly and be made much worse if management does not make intelligent proactive decisions.

Literature Review of Peer Industries

Best Practices in the Airport Industry: An Assessment of Airport Community Involvement Efforts

In a paper written in 2005 by Melissa Burn, PhD candidate at the Institute for Conflict Analysis and Resolution at George Mason University (*12*), the author reports that most airports have strained relationships with their adjacent communities. Further, that the "reasons for the tension include adverse impacts due to noise and other effects of airport operations, lack of understanding each side's concerns and interests, and insufficient public participation in airport decision-making." (*12,* p. 1)

The paper goes on to assess the culture that produces that reaction, analyzes the results of a survey of airport operators, consultants, and neighbors, and gives implications, conclusions and recommendations.

Airport vs. Community Communication Goals Airports and communities often have radically different goals for public involvement. Most airports seek to convey information about decisions that already have been made, while the public seeks to have early input to the making of those decisions.

Study Findings

Because most airports are busy public facilities charged with responding to many different clients—airlines, general aviation users, passengers, elected officials, governmental regulators—on a frequent basis, the effects of aircraft noise on the populations surrounding the airport are typically low on the airport managers radar screen. Burn reported that:

- Most airports "want to increase traffic so that revenues increase, bringing expanded staff levels, greater access to federal grants for infrastructure improvements, and a higher status within their particular city, state or regional bureaucracy." (*12,* p. 3)
- "Airports are like utilities, highly regulated and largely reactionary rather than proactive." (*12,* p. 2)
- Because the amount of population that is affected by aircraft noise is relatively small in comparison to the total population served, airports see making noise more "as a necessary, though regrettable, part of doing business." (*12,* p. 3)
- Because airport staff members are usually "busy people with multiple competing demands on their time and attention, public dialogue is rarely a high priority." (*12,* p. 3)
- Public complaint about noise "becomes one of many things demanding the attention of the Airport operator." (*12,* p. 2)

Given the different responsibilities airport management must face in operating their facilities, Burn found an inconsistency in the way airports became engaged with the public when they were faced with aviation crises. Their attitude has been to place public engagement on the back burner and not establish on-going relationships to help diffuse crises as they arise. The typical approaches airports use for public involvement are summarized here.

- "Airports tend to conduct public outreach as though the only purpose were to educate the public about reality from the airport's perspective, in an effort to persuade people to let the airport get on with its business." (*12,* p. 3)

- "There is often little attempt to create an ongoing, cooperative relationship that might require the airport to share decision making with the surrounding citizens." (*12,* p. 3)
- Because community members are "often poorly informed about how airports operate and what options are available," and have unrealistic expectations for change, "they are easily dismissed by busy airport managers." (*12,* p. 3)
- "Most of the time, airport efforts at community outreach are sporadic and tied to a specific project. . . ." (*12,* p. 4)
- "The most common tools include press releases and websites to disseminate news of study progress, public informational workshops, public hearings, and multiparty advisory committees. Only a few airports use the dialogue mechanisms, such as advisory committees that include citizen representatives, and rarely continue them beyond the life of the specific study for which they were convened." (*12,* p. 4)
- "The general consensus among airports and the FAA is that these outreach programs need to be much more effective." (*12,* p. 4)

Study Survey. The paper reports the results of a 2004 survey of airport operators, consultants, and neighbors to investigate conflicts over airport noise. The respondents were self-selected from a data base of aviation industry e-mail addresses, which included airport staff members, consultants, and interested individuals, as well as websites for citizen groups concerned with airport noise and other issues. Some relevant findings of the survey include:

- Most airport public outreach programs are instituted as part of a clearly defined study or project.
- Two-thirds of the programs included public open house workshops.
- "The open house is typical of many airport outreach efforts in that it is designed to disseminate information widely and truthfully, but lacks effective mechanisms for engaging the community in a two-way dialogue." (*12,* p. 5)
- "Other examples of this one-way information flow include websites to post study progress reports, newspaper announcements and media broadcasts." (*12,* p. 5)
- If the relationship between the airport and its neighbors is good when a study/process begins, chances for success are higher.
- Where a prior relationship was reported to be good almost half of the respondents reported further improvement of the relationship during the study.
- Almost half of airport and consultant respondents thought the community had been given a meaningful role in decision making, where less than 10 percent of community members reported they had been given a meaningful role. This is an example of major disparities of perception found between the two groups.

Factors in Airport/Community Conflict. Burn identifies the following characteristics contributing to airport/community conflict:

- ". . . airports and communities typically speak past one another about basic values, norms for what is acceptable in the public space, and what role local agencies and communities should have in airport decision making." (*12,* p. 6)
- "Airports must respond to other voices such as the FAA, the airlines and the traveling public; they often pay little attention to their immediate neighbors. As a result, they fail to engage their communities in dialogue about airport plans until after the plans have been adopted." (*12,* p. 6)
- ". . . communities become polarized over airport noise and the consequences of this polarization." (*12,* p. 6)
- ". . . once conflict patterns such as mistrust, ingroup-outgroup identification, reduced empathy for the interests of the other party, a sense of aggrieved rights, zero-sum thinking, and other effects take hold, continued conflict is practically inevitable." (*12,* p. 6)

- The public holds the airport operator responsible for aircraft noise, regardless of the source, but the local airport operator may have only limited ability to affect traffic density and aircraft location, which most impact noise patterns.
- Those who most benefit from the airport, the greater public, may not be part of negotiations on noise issues.
- "The one aspect of the structure that community members *do* understand and find frustrating is their limited ability to have an impact on airport policy. Without regular input to the decision-making process, airport neighbors find that the only way to have a voice is by escalating the dispute until it rises to the attention of the city, county, state or independent authority that governs the airport, the FAA, or elected representatives in Congress." (*12,* p. 7)

Study Conclusions

To enhance the airport's ability to more efficiently address development or environmental mitigation efforts ". . . there is a need for both a greater commitment to genuine public participation (rather than just meeting the technical requirements of the funding grant) and a more refined use of the outreach tools available." (*12,* p. 12)

An "airport-community relations committee should include all stakeholders such as regulatory agencies, local governments, regional publics and political representatives, some of whom do not currently participate in airport public participation efforts." (*12,* p. 12)

The study recommends that standing committees on airport-community relations be established to build permanent relationships between the airport and its neighboring communities and aviation users. Further, permanent ongoing outreach should be punctuated by increased activity during a growth project or noise study effort.

Relevant Findings

The paper builds a convincing case, which is supported by the results of the surveys and interviews conducted to develop information for this study that a culture exists among airports that resists meaningful public involvement. The paper provides insight into the reasons for the way airports deal with the community. Its survey, though approached in a different way than the survey for this research, resulted in remarkably similar findings and insights.

The finding that a good on-going relationship is beneficial when shorter term studies or conflicts arise is a powerful justification for improving relationships before a crisis occurs.

Best Practices in the Transportation Industry: Transportation Research Board White Paper

The non-aviation portion of the transportation industry has begun to understand the importance of two-way communication in transportation planning. The "State of the Practice: White Paper on Public Involvement" (*13*), written by members of the TRB Committee on Public Involvement, says this about the state of practice in surface transportation:

> In the past decade, a radical transformation has occurred in the way transportation decisions are made. A new decision model has emerged and continues to be refined. The model assumes that public input into the assessment of transportation needs and solutions is a key factor in most transportation decision making. (*13,* p. 1)

The need for public input into aviation studies and problem solving is also a key conclusion of this project team based on interviews and research for this Community Response to Airport Noise Study.

Study Findings

Factors contributing to the changing approach to public involvement in surface transportation include:

- Federal Mandates: the Intermodal Surface Transportation Efficiency Act of 1991 (ISTEA) and the Transportation Equity Act for the 23rd Century (TEA-21) mandated emphasis on early, proactive, and sustained citizen input into transportation decision making and special outreach for traditionally underserved populations.
- A 30 year trend of empowerment of groups and individuals toward having a voice in policy decisions that affect them and their communities.
- Codification of the lessons learned in the 1970s and 1980s as a result of rapid social change and complexity of modern life, "lessons that many transportation agencies learned after the fact from project delays, lawsuits, and public outcry about transportation decisions made without citizen input". (*13,* p. 1)

The White Paper states that there is "general agreement that a well-conceived and well-implemented public involvement program can bring major benefits to the transportation policy process and lead to better decision outcomes." Some of the beneficial outcomes suggested are:

- Public ownership of policies/sustainable and supportable decisions;
- Decisions that reflect community values;
- Efficient implementation of transportation decisions; and
- Enhanced agency credibility;

The White Paper reports further that,

> The process of public involvement often transforms agency culture by forcing agency decision makers to interact with their constituents. As a result, transportation stakeholders develop a better understanding of agency operations, and agency officials have a better understanding of public thinking. This mutual education improves the agency's relationship with the public. (*13,* p. 2)

The following sections report the Committee's considerations regarding the best practices for public communications within the surface transportation industry.

What is Good Practice?

Key **objectives** of good public involvement practice revolve around outcomes and include:

- To build consensus on the path to decision. "In exchange for participation in a fair and open process, citizens often are willing to support the outcome of the process even if their preferred alternative is not selected."
- To inform citizens about transportation issues, projections, the planning process, and budgetary and engineering constraints
- To incorporate citizen input into the decision process. "The decision-making process must be open and clear and must reflect citizen input." (*13,* p. 3)

The White Paper identifies **guiding principles** for a successful public involvement program as follows:

- Distinguish public involvement from public relations and public information.
- "A public information campaign is a form of one-way communication between the agency and the public, generally striving to inform the public about ongoing issues or developments.
- Public relations programs usually involve the dissemination of information, but their emphasis is on the promotion of a particular policy or solution—selling a fait accompli." (*13,* p. 3)

- A good public involvement program essentially incorporates dynamic two-way communication, which promotes public feedback, and uses that feedback to transform the decision process and outcome.
- Be inclusive, involving decision makers and all interested stakeholders, and also as many groups and individuals in the community as is practicable.
- Put a heavy emphasis on partnering—achieving mutual understanding of the problem and formal or informal agreements to work together to find and implement a solution.
- Make communication with participants respectful. Perfect the art of listening to constituents. Always give all opinions serious consideration, and respond promptly and respectfully to input.
- Begin early and be proactive and ongoing with public involvement activities throughout the plan or project development.
- Make the decision process defined, structured, transparent, and clearly delineated at the start of each project. Structure decision processes so that outcomes reflect public input.
- Provide appropriate leadership to public outreach efforts.
- "An agency spokesperson or 'champion' must be available to articulate agency policy, perspectives, and operating procedures throughout the process." (*13,* p. 4)

Every public involvement effort should begin with an assessment that answers the following questions, which can be used to formulate a strategic public involvement plan.

Strategic questions to be addressed:

- What are the objectives of the plan or project?
- Who is the likely audience?
- What will be the level of impact on the community?
- Are there any special barriers to communication?

Challenges to Practitioners: Areas for Development

Every organization that seeks to modify its on-going processes will be faced with challenges to that effort. The following paragraphs discuss the Committee's thoughts about the most visible of these challenges.

Removing Institutional Barriers

"For many organizations this will involve a dramatic culture change as agency employees from the top down adopt a new policy development and implementation paradigm." (*13,* p. 5) The White Paper says that public involvement must be given more than lip service.

> Agencies must make a serious commitment to include the public when making decisions and change their organizations and practices to reflect that commitment. At a minimum, this means developing consistent policies that validate the legitimacy of public involvement, dedicating budget and staff to public involvement. They also must commit to partnering with the public and other agencies to improve decision making. (*13,* p. 5)

Ensuring a Broad-Based Audience and Improving Communication Tools

As more and more government organizations require public involvement, the public's ability to respond may become overloaded. Organizations must find improved techniques to reach the public while respecting their time constraints, helping them to correctly evaluate which issues are most critical to them. Organizations must find techniques to attract and communicate with a broader audience. Techniques to consider include electronic tools, mass communication techniques, public opinion surveys, and baseline research.

Dealing with Complexity

Public involvement practitioners "must develop ways to capture and maintain public attention and convey complex information, as well as receive complex feedback." (*13*, p. 5) The Internet and new multimedia programs should be considered.

Dealing Effectively with Issues of Timing

Practitioners need to develop innovative ways to sustain public interest in transportation information over what can be long planning processes and must also seek to streamline the planning and decision processes.

Developing Standards and Assessment Tools

Practitioners need to develop commonly accepted methods for evaluation of public involvement programs. The general justification that public involvement prevents delays, lawsuits, and costly reassessments of policies needs to be supplemented with quantified performance measures. These public involvement performance measures should relate to "how well the expectations of participants were met, costs in relation to benefits, and effects on decision making." (*13*, p. 6)

Developing Professional Standards and Training Programs

"The goal should be to ensure adherence to a consistent set of best practices." (*13*, p. 6)

Vision for the Next Decade

The lessons learned in the past 20 years should be applied to the future:

- Public involvement programs should become a routine part of the development of all transportation policy.
- There should be a common set of expectations about what constitutes good practice.
- Agencies should routinely set aside budgets for conducting public involvement programs within accepted parameters.
- Citizens should accept their responsibilities—to put in the time and energy to understand the needs of and solutions to transportation projects that affect them and their communities, and to accept the results of a fair and open process.

Conclusions

Almost all of the recommended best practices of this white paper for the surface transportation industry appear to be directly applicable to the air transportation industry.

Federal Mandates

Although society and other major industries and institutions are proceeding toward greater public participation, the federal mandate for public involvement in air transportation planning is not nearly as strong as for surface transportation. With other less complex and more attractive uses of aviation resources, such as marketing and public relations, which are perceived as being more directly tied to an airport's economic success, it is difficult to get airports to do more in the area of public involvement than is mandated.

Culture Change Required

A comprehensive, interactive approach to public involvement requires a cultural change from the top down. This is especially true of airports when the mandate is not coming from federal regulators.

Provide Appropriate Leadership

An airport's senior leadership must be highly visible in the process, not only to lead the culture change toward two-way involvement, but also to best represent the airport's issues and needs to the community.

Need for Assessment Tools

Airports spend substantial sums of money for public information, public relations, noise staff, and programs. As they feel the pressure from the community and from industry trends to do more, they badly need a mechanism to determine what public involvement and public information approaches have a real impact and are most cost effective.

Incorporate Dynamic Two-way Communication

Effective engagement with the public leads to understanding, stronger relationships, and greater compatibility between the transportation source and the community. This is a major lesson not only for surface transportation, but also for air transportation.

Best Practices in the Environmental Industry: Stakeholder Involvement & Public Participation by the U.S. EPA (*15*)

The EPA represents another large governmental agency that has learned a difficult lesson about public involvement. Though the range of environmental issues the EPA addresses is much broader than just noise, the level of public concern and the intensity of disagreements can be similar to that experienced by airports. The EPA began operation in 1970 and increased its efforts into this century to involve the public "by giving citizens, industry, environmental groups, and academics a much greater opportunity to play key roles in environmental decision making." (*15*, p. iii) The report is based on a review of EPA efforts to review stakeholder involvement and public participation approaches and identify lessons learned. The paper also has recommendations for future EPA projects, but it is the lessons learned that are most directly applicable to airports and will be the focus of this review.

Study Findings

Because the best practices paper had many succinct summary statements, this review quotes a series of lessons learned directly from the report.

Lessons Learned: Establishing Trust Is Integral

Trust between EPA and the public is a crucial component of any stakeholder involvement or public participation initiative in order to ensure an effective working relationship. (*15*, p. 4)

Lessons Learned: Credible Data and Technical Assistance Can Be Critical

Credible sources of information can serve a very important role in solving conflicts with stakeholders and the public. Without a concerted effort to ensure reliable, trustworthy data, the stakeholder process may prove frustrating for all participants involved. (*15*, p. 5)

Lessons Learned: Recognize the Links between Environmental, Economic, and Social Concerns

By working harder to integrate social, economic, and even cultural concerns of the community, EPA can enhance trust between industry stakeholders and the community. . . . (*15*, p. 6)

Lessons Learned: Successful Stakeholder Involvement and Public Participation Activities Require That Agency Staff Receive Training or Expert Assistance

A variety of skills and techniques in addition to adequate background knowledge are a must if the initiative is to be successful. (*15,* p. 6)

Other areas in which staff involved in public participation and stakeholder involvement activities could benefit from training include: listening and communication, partnering, process management, negotiation, consensus-building, vision-building, cross-cutting analysis, and multi-media approaches to environmental protection. (*15,* p. 6)

Lessons Learned: Several Factors May Limit Participation

Factors limiting the willingness or ability of citizens to participate in public involvement activities include:

- "Inadequate explanations of background and technical material
- Difficulty participating in technical discussions
- Inadequate minutes from meetings
- Overwhelming amounts of reading
- Perceived inability to influence issues
- Lack of time to participate" (*15,* p. 7)

Lessons Learned: Improving Stakeholder Negotiations

- "Clarify the type of process to be used, what the goals will be, and what the process can and can't accomplish
- Educate stakeholders on both the process and technical issues
- Use a trained facilitator throughout the negotiation – don't wait until troubles emerge
- Plan agency involvement carefully – high-level participation is critical
- Include a full diversity of stakeholders" (*15,* p. 8)

Lessons Learned: Building Better Partnerships

- "Establish clear visions, goals, and action items
- Encourage a vision that everyone can accept
- Develop a shared context of meaning for stakeholders in partnerships with ambiguous goals
- Closely involve local stakeholders
- Ensure that partnership goals, activities, and results will be effectively used" (*15,* p. 9)

Lessons Learned: Community Outreach

- "Know your audience
- Hold meetings at times convenient for community members
- Work hard to engage those community members not immediately receptive to your message
- Use websites to complement, rather than replace" (*15,* p. 9)

Lessons Learned: Effectively Involving the Public in Agency Decisions

- "Get the public involved early
- Ensure that public meetings and hearings allow public's concerns to be adequately addressed
- Clearly explain how public input will be used
- Give public adequate explanations if their input is rejected
- Re-double efforts to involve the public in Agency decision making if public participation is low" (*15,* p. 10)

Lessons Learned: Build Capacity of Citizens to Participate More Effectively in Decision-Making

- "Enables communities lacking organization and leadership to turn concerns into action
- Helps citizens better process information and provide input into Agency decisions
- Empowers communities to leverage additional resources
- Allows communities to capitalize on their existing civic assets" (*15,* p. 11)

The EPA Best Practices paper notes that one area that the agency had only a limited ability to measure was how well it had succeeded in involving the public. The paper suggests some useful questions to consider in measuring the effectiveness of stakeholder and public involvement.

Questions to Consider in Reviewing Outreach Effectiveness

- "What were stakeholder/public perceptions regarding their ability to participate in the process? To what degree were those expectations met? What was the level of effort required by stakeholders/the public to participate? Were the goals and steps of the process clearly explained? To what extent did the effort meet those goals? Was the process fair?
- Was the process competent? (e.g., was the process well-structured? was there proper leadership in place to guide the process?)
- What major factors contributed to the success or shortcomings of the stakeholder involvement/public participation effort? How could the stakeholder involvement/public participation effort have been designed differently to work more effectively?
- What resources (staff, time, extramural $) were spent to engage in a stakeholder involvement or public participation effort? What were the FTE (full-time employee) or dollar amounts required to perform the public participation or stakeholder involvement effort? To what extent can the level of resources be associated with positive results of the stakeholder involvement/public participation effort?" (*15,* p. 22)
- Performance measures suggested to evaluate the effectiveness of outreach programs included "How many stakeholders/citizens participated in the effort; were all significant stakeholder groups represented; and did the effort result in a product or agreement that furthered progress towards achieving positive environmental outcomes?" (*15,* p. 22)

Conclusions

The themes of the EPA's "Lessons Learned" are very familiar. They have been repeated over and over again in airport interviews, airport studies, surface transportation best practices, and in educational industry case studies. The themes of "trust" and "providing credible data" arose frequently in airport interviews. "Partnership building" was particularly emphasized by non-airport interest groups. The findings regarding the need for evaluation tools have been noted in other case studies, but this report is particularly helpful in suggesting questions to be considered.

Case Studies

Large/Medium-Hub Airport with Passenger Service—San Francisco International Airport (SFO)

Aircraft Noise Abatement Office. (http://www.flyquietsfo.com/) Accessed 7/22/2008. (*122*)

San Francisco International Airport (SFO) was selected as a representative case study airport because it is a large commercial airport in a densely developed area with a long history of frequent interaction with surrounding communities about aircraft noise and other airport issues.

For 30 years SFO has been developing and refining communications programs to address noise concerns of densely developed nearby neighborhoods. During the initial interviews to follow-up on the airport noise manager survey conducted for this study, other airports referred to SFO as a model for airport communications on noise issues. Using the SFO experience as a case study allows other large and medium sized airports to consider aircraft noise communication techniques that have been tested over decades. For both small and large airports, the lessons SFO management has learned reflect that successful communications are more about attitude and approach than about cost.

The airport dates from the late 1930s and is located on the west side of San Francisco Bay, south of the city. Not physically within the city limits of San Francisco, the 2,300 acre airport is in San Mateo County, with 20 incorporated cities nearby. The surrounding area is intensely developed to the west, northwest and south, with the San Francisco Bay on the remaining boundaries. San Francisco International claims to be the world's seventh busiest airport. According to a Fact Sheet distributed by SFO, in 2007 the airport was served by 55 airlines, of which almost three-fourths were scheduled domestic or international passenger air carriers. Cargo-only carriers represented over 18% of the airlines and the remaining airlines were commuter or seasonal/charter Air Carriers.

The Airport is owned by the City and County of San Francisco and governed by a five-person Airport Commission appointed by the Mayor of San Francisco. The Commission sets policy for the airport and selects the Airport Director.

Brief History of Noise Abatement

SFO started developing its community response to noise issues in the 1970s. From its once isolated location in the 1940s, the airport, along with the region and its surrounding population, has grown substantially. Although neighboring communities understand the economic benefit of the airport, they also have ardently sought programs to reduce noise.

Programs that SFO has been developing and refining to minimize the impact of aircraft operations on surrounding neighborhoods include:

- Adoption of the first set of noise abatement regulations in 1978.
- Substantial reduction of the impact of noise on residential areas through use of over-water flight tracks, the introduction of quieter aircraft, special regulations for night operations, and an extensive residential soundproofing program.
- Preparation of a Part 150 Study comprehensive noise abatement and land use compatibility plan (It was the first airport in the country with an approved Noise Compatibility Program).
- Creation of its own airport regulation phasing out older, noisier aircraft by 2000, enacted prior to any federal regulations on the subject.
- Retention of industrial areas, which are less sensitive to noise, under flight paths.
- Installation of the first passive radar aircraft identification system in 1987, since upgraded, allowing the airport to correlate noise events and complaints to individual flight operations and aircraft types.

Approaches SFO has used to develop and maintain a collaborative relationship with elected officials and the general public include:

- Developing, participating in, and supporting with staff and financial resources the Airport/Community Roundtable, one of the oldest established airport/community forums in the nation, whose meetings serve as public forums on noise reduction.
- Putting the passive radar aircraft identification system on-line as the "Live Radar Flight Tracks", allowing the public to view planes in the area and their altitudes.

Interview Results

Interviews for this case study were focused on including the primary staff persons responsible for management and communication of the noise abatement program, as well as representation of a formal community group. SFO completed the on-line survey in the summer of 2007, and was selected for the original fall, 2007 follow-up interviews. The following individuals were interviewed at that time or during the spring of 2008 to prepare the case study:

- Aircraft Noise Abatement Manager, San Francisco International Airport;
- Chair, Foster City Noise Abatement Committee; and
- Roundtable Coordinator, San Francisco International Airport.

Key Issues.   The relationship between the SFO noise abatement staff, airport-based stakeholders and surrounding communities has been in place for many years. Most of the painful confrontations many other airports are now facing have already been dealt with by SFO and its public engagement program. The techniques used by SFO to communicate with the public offer useful tools to any other airport that is confronted with serious public concerns over airport noise/land use compatibility.

Findings.   The interviews started with a basic set of questions but were open-ended so as to allow for exploration of the particular situation at SFO. The following observations were drawn from the interviews to highlight the primary ideas about communications techniques from this airport. The lessons are presented below as techniques that worked and techniques to avoid.

Communication Techniques That Worked for SFO

- A highly interactive communications approach based on the roundtable model, when combined with a heavy emphasis on actually reducing noise, has been very effective.

Communication Techniques SFO Chose to Avoid in the future

- Controlling the flow and content of information makes people suspect something is being hidden.
- Allocating major resources to techniques (attending fairs, Airport Day, etc.) that do not have a direct impact on people's feeling about noise, without a good supplemental reason, are not effective. They are part of being a good neighbor and help promote good will, but will not make people complain less about noise; neither do they respond to community desires that something positive is being done to reduce noise effects.
- Adopting another airport's techniques without tailoring them to the local situation is not helpful. Questions to ask in structuring a roundtable or forum are: To whom is the group responsible? Who do they advise? How should the Roundtable or Forum reflect the membership and airport geographic locations? How does the airport's governance structure relate to the program?

Summary

SFO was selected as a case study because it is a large commercial airport with a long history of frequent interaction with surrounding communities. Within the aviation industry, its programs have become highly visible representations of an active public involvement program that seeks to address community concerns while maintaining the integrity of aviation needs. Over the 30 years following the initiation of its aircraft noise communications program, it has moved largely from a relationship of controversy and contention with its neighbors to one of cooperation and compromise. Other airports have named it as a model for airport communications on noise issues. Further information and reference materials for SFO can be found among the best practice tools referenced in Chapter 4 and in the Bibliography (found in the Toolkit), as well as on the airport's noise management website at www.flyquietsfo.com.

Small/Non-Hub Airport with Passenger Service—Long Beach Airport (LGB)

http://www.longbeach.gov/airport/noiseabatement/default.asp Accessed 7/22/2008. (*123*)

Long Beach Airport (LGB) in southern California was selected as a case study because it is a small-hub commercial passenger airport with a large general aviation component that experienced a sudden upsurge of passenger flights by scheduled air carriers. Because the airport is completely surrounded by dense development, the community reacted strongly to the introduction of new flights and the airport has developed a communications program for the public and a negotiation process with the airline to respond to the concerns. As a case study it illustrates a combination of solutions for addressing the public, the airlines, and the airline user group.

Long Beach Airport was built in 1923 and expanded in the late 1920s when the city built hangars and administrative facilities for the Army and Navy. It was enlarged to 500 acres in 1941. It is now completely surrounded by dense development of largely industrial and golf course uses, but dense residential development lies within 1,500 feet of the runway in some directions.

The airport serves nearly 3 million commercial airline passengers annually, with flights to destinations throughout the United States. It also is among the top five busiest general aviation airports in the world, with approximately 371,000 annual general aviation operations in 2007, including Life Flight organ donor and critical care patient delivery flights, law enforcement, and search/rescue flights. It also is a center for air cargo carriers DHL, Federal Express, and UPS, which transport more than 49,000 tons of goods each year.

It is one of the few airports that continues to be an important aircraft manufacturing and flight-training center, hosting the Boeing Company, Gulfstream Aerospace Corporation, and Flight Safety as tenants.

Brief History of Noise Abatement

The City of Long Beach began efforts to manage aircraft-related noise through adoption of a noise ordinance more than 20 years ago. These efforts to control airport noise were challenged in the courts for over 12 years by the airlines and other user groups. Ultimately, an Airline Settlement Agreement struck a balance between air commerce needs and community noise exposure concerns. The resulting Airport Noise Compatibility Ordinance (LBMC 16.43) was passed in 1995, making Long Beach one of the strictest noise-controlled airports in the United States. In the meantime, Congress had passed the Airport Noise and Capacity Act in 1990 giving authority over airport access and noise control actions to the federal government and FAA. However, the City was able to work with the FAA to get the ordinance "grandfathered", and since that time no other city has succeeded in enacting an airport noise related ordinance that controls the number of daily commercial flight operations.

According to an earlier version of the airport's website, the 10 key components of the Long Beach Airport Noise Compatibility Ordinance are: (*123*)

Long Beach Airport Noise Compatibility Ordinance Provisions

1. The Long Beach Airport is operational 24 hours a day.
2. Commercial carriers are allowed at least 41 flights daily and commuter carriers are allowed at least 25 daily flights.
3. Single Event Noise Equivalent Levels (SENEL) are established for four time periods. The nighttime period from 11 p.m. to 6 a.m. is the most sensitive and therefore has the most restrictive allowable noise limit.
4. A Violation Process is established.

5. An Alternative Enforcement Procedure is established including referral to the City Prosecutor for action.
6. Five airport user groups were established and assigned an annual noise budget for takeoff and landing noise. The five user groups are air carriers (commercial airlines), commuter carriers, charter operators, industrial/manufacturing operators and general aviation (which includes all other users). The noise of military operations, public aircraft, law enforcement, and emergency life flights is excluded in calculating CNEL and in assessing compliance with CNEL goal and annual noise budget.
7. As an incentive for airlines to fly quietly, the Airport Noise Compatibility Ordinance provides that additional flights only can be added if it is determined by the City that the cumulative noise level would remain below the annual noise budget standard with the added flight or flights included.
8. Single event noise tracking, real-time noise, and actual recorded noise are required, so the airport has installed 18 noise monitors and a flight tracking system.
9. Limitations on hours of training and run-ups are established, including early curtailment on weekends and holidays, and all but one runway is closed during late night hours.
10. A pilot education program is established as an on-going program to teach pilots about community noise issues. This program involves working with pilots on preventing and reducing noise impacts in the community.

LGB was selected as the southern California hub location for Jet Blue Airlines in 2001. Jet Blue initiated service with many new flights to the east coast. The airport previously had very limited commercial passenger service, only 14 flights daily, which increased to the 41 flight limit with the introduction of service by Jet Blue. The airport, however, had a budget allocation of noise based on a preexisting Airline Settlement Agreement. The "noise budget" allows up to 41 carrier flights per day plus 25 commuter flights, but also provides that additional flights can be added if it is determined by the City that the cumulative noise level would remain below the annual noise budget standard with the added flight or flights included. The growth of Jet Blue resulted in public concern about noise levels, but also business support for the additional low cost service.

LGB has worked to maintain the Settlement Agreement through a combination of public communication and work with the airlines. For the first year they worked to educate. Staff engaged in intense public education outreach about noise issues and the Noise Ordinance that emphasized that an increase in flights was permitted, so long as the cumulative noise levels remained below the annual noise budget. LGB also emphasized the uniqueness and value of the local control over aircraft noise that the Noise Ordinance provided. At the same time they worked with Jet Blue and other commercial airlines, educating them on the requirements of the Ordinance, warning them of violations, and fining them for flights that violated its various requirements, such as the curfew. Jet Blue spent $600,000 in fines that went to the Long Beach Library Foundation and was dispersed into the community for technology in family learning centers. Subsequently, Jet Blue has maintained the same number of flights, but adjusted its schedule to direct late night flights into nearby Los Angeles International Airport.

There is also a LGB Aviation Noise Abatement Committee that includes all interested airport tenants, users, and operators who work cooperatively to police themselves on noise issues and develop technical solutions to noise problems. LGB reports that the impact of their noise communications program is fewer requests from the community for meetings, a change in public perceptions, less intense complaint calls and a less angry tone of communications from the public. Staff also believes that external factors outside the control of the airport, such as the state of the economy, may have had an impact on solutions. The airlines in Long Beach may well have been willing to settle with what became the ultimate solution because airlines were facing difficult economic conditions.

Interview Results

The case study interviews included the primary people responsible for management and communication of the noise abatement program, representatives of formal community groups, as well as others with insight into the special issues at the airport. For the spring 2008 case study interviews, the following persons were contacted:

- Public Information Officer, Long Beach Airport
- Former Director, Long Beach Airport
- Chair, Long Beach Airport Advisory Committee
- Representative, Jet Blue Airlines, Long Beach Airport
- Founding member of ANAC (Aviation Noise Abatement Committee)

Key Issues.   In determining what particular lessons were learned from this case study, it is important to understand the issues that complicate the lessons. Long Beach is unusual in its situation as an airport with a grandfathered, locally controlled noise budget. Its situation evolved out of a long history of lawsuits, but the "Noise Budget" appears to have been accepted by the airport, airport users and the community neighbors. All groups have an incentive to work together because all fear loss of local control to federal oversight that would come with change of the current rules. It gives the community the assurance that noise levels will not rise above a baseline level. It allows the signatory users flexibility in operations as long as they do not impact the overall noise levels and gives them incentives to reduce their noise levels with the potential to increase the number of flights. The airport and the City have an incentive to fund the noise management staff at a level that allows for extensive interaction with the community and with the airport users. The downside is that as a "grandfathered" solution, FAA is unlikely to approve another action of the same type.

Findings.   The interviews were open-ended to allow for exploration of the particular situation at LGB. The observations presented here were drawn from the interviews to report a selection of the primary ideas about communications techniques from this airport. The lessons include techniques that worked and those to avoid.

Communication Techniques That Worked for LBG

- A comprehensive strategy for dealing with noise that includes education and engagement on the public side and monitoring, notification, negotiation, and enforcement on the user side, with widespread buy-in to the approach.
- The working group model is helpful if it includes meaningful roles for the public and airport users and incentives for them to work together, and when there is an ability to implement the results of their efforts.
- Invite participation by individuals who are known to be rational leaders of a variety of broad-based community groups, and include representatives of airport user groups. This will more likely lead to widespread acceptance of somewhat controversial solutions and a product that actually can be implemented.
- Consider organizing an airport user group. Members can self-police and identify problem operators. They can suggest creative solutions to noise issues because they have expertise, contacts, and resources. Peer review is a proactive business-friendly approach that is more successful than penalties.

Communication Techniques LGB Chose to Avoid in the future

- Allowing membership of people with no ability to give and take.

Summary

Long Beach Airport was selected as a case study because it is a commercial passenger airport that experienced a sudden and significant introduction of new passenger flights by large aircraft.

Further, it has one of the few noise budget agreements that are in place in the United States. The concern of losing local control over the noise conditions has led the airport, its neighbors, and its users to proactively seek accommodation by working together to meet noise management goals. The airport has developed a communications program to educate the public about the opportunities and constraints that are in place, as well as a negotiation process with the airlines to address the issues as they arise. Further information and reference materials for LGB can be found among the best practice tools referenced in Chapter 4 and in the Bibliography (found in the Toolkit), as well as on the airport's noise management website at www.longbeach.gov/airport/noiseabatement/.

Cargo Hub Airport—Louisville International Airport/Standiford Field (SDF)

Noise Compatibility Program, http://www.flylouisville.com/about/noiseprogram.asp Accessed 7/22/2008. (*108*)

The communications program for noise at Louisville International Airport (SDF) was selected to be a case study because it illustrates unique issues associated with large cargo hub airports. Airports with significant all-cargo carrier activity can generate disproportionately more comment and complaint from the public because of the increased number of night flights. SDF illustrates a unique approach to communications that includes extensive involvement of airport users and the community in developing mutually agreeable solutions, as well as the involvement of elected officials in a unique land use management solution – the relocation of an entire town. The techniques that SDF used are relevant to other airports with a high level of public controversy about significant noise effects, and more particularly those airports with a substantial level of cargo service, nighttime operations, or substantial relocation issues.

SDF has commercial passenger service (3.8 million passengers per year), general aviation activity, serves as a base for the Kentucky Air National Guard, and as all-cargo operations. The airport and an associated general aviation airport, Bowman Field, together are the largest employment center in the Louisville Metropolitan area generating jobs, and state and local taxes.

According to the SDF website, the airport ranks third in North America, and ninth in the world, in the total amount of cargo handled as home of United Parcel Service's (UPS) international air-sorting hub. The airport handled 4.5 billion pounds of cargo, freight and mail in 2007.

In 1981, UPS began a new overnight package-delivery business with air hub operations at the airport. In 2005, the company moved its heavy airfreight hub to the airport after closing the Dayton, Ohio, air hub. In May 2006, UPS announced a $1 billion expansion that would increase sorting capacity over the next five years and create more than 5,000 additional jobs in addition to the over 1,000 jobs already in existence.

The airport is owned and operated by the Louisville Regional Airport Authority (LRAA), an independent public agency. As such, the Authority is responsible for the day-to-day operation of, as well as the long-term planning for, the airport. The Authority is self-funded and derives operating revenue from a variety of user fees. It does not receive local or state funding for the routine operations of the airport. An 11-member board of directors governs the Authority and sets policy, approves the budget and hires its executive director, who serves as the organization's chief executive officer. The board is comprised of the Mayor of Louisville, seven mayoral appointees, and three gubernatorial appointees, one of whom is a member of the Airport Neighbors Alliance Executive Committee.

SDF is situated on 1200 acres, 10 minutes south of downtown Louisville. Although most of the surrounding land is industrially used, the airport is in the middle of the city and there are close-in residential uses to the east, west and north. The Kentucky Fair and Exposition Center is

just to the north and the University of Louisville is northwest of the airport along the extended centerlines of the primary parallel runways. Industrial uses and a landfill are located immediately to the south, beyond which is an area that has undergone the substantial change to be described in the following section.

Brief History of Noise Abatement

The airport was built for the military in 1941 and was turned over for passenger service as Standiford Field in the late 1940s. There was steady growth of the airport and related facilities through the 1970s. The opening of UPS hub service in 1981, along with continuing passenger service growth, put pressure on the airport to improve and expand its facilities. In 1988 the Louisville Airport Improvement Plan called for the building of a new airport on top of the old, while keeping the old open to operations. That program, coupled with a large urban renewal project adjacent to the airport, generated a significant public reaction. The first phase of the FAA-approved program for airport expansion began in 1991 with the voluntary relocation of more than 1,500 homes and 150 businesses.

In 1993, the focus switched from an airport expansion-related relocation to a noise-related relocation under the airport's first Part 150 Program. Under that program, people living within the airport's 65 Ldn (day-night average sound level) contour were eligible for relocation. Over the next four years the FAA approved the expansion of voluntary relocation to include a total of over 2,000 homes.

With the extensive voluntary relocation, there began to be a shortage of homes in the right price categories available as relocation destinations. To address those issues, one of the cities targeted for relocation, the City of Minor Lane Heights, located to the south of the airport along the extended centerlines of the parallel runways, developed legislation to allow it to move away from the airport to a new location about four miles southwest of SDF. The airport helped identify appropriate property and the Kentucky General Assembly approved the move. The program was funded in 1997 and 1998 with an FAA Innovative Financing Grant for $10 million, matched with $10 million by the Airport Authority. With those funds, the Authority purchased and developed the infrastructure on a 287-acre site, which became known as Heritage Creek. Under the Heritage Creek Program, the Airport Authority reimburses families from Minor Lane Heights who sought to build new homes in Heritage Creek. In 1999 the City of Minor Lane Heights officially annexed the Heritage Creek area for its new city. About 25 homes remain in the previous Minor Lane Heights location near the airport, occupied by owners who have chosen not to relocate. The offer to relocate remains in effect.

In 1998 and 1999 SDF prepared an update of the Part 150 Study using a Noise Compatibility Study outreach program that involved over 1,000 people. The purpose of the program was to create a plan with the least amount of aircraft noise over the fewest number of families. In May 2004, the FAA approved many of the recommendations in SDF's proposed Noise Compatibility (Part 150) Program Update.

The National Organization to Insure a Sound-controlled Environment (NOISE) named the Louisville Regional Airport Authority its 2005 Mary E. Griffin Airport Operator of the Year. NOISE is the United States' oldest nationwide community based association committed to reducing the impact of aviation noise on local communities. The resolution said, "NOISE seeks to honor airport operators which engage local communities and consider their concerns about noise impacts as a strategy for a healthy long-term relationship with the community."

The award resolution detailed the following among the reasons for the award: (*108*)

- "Through its broad-ranging Noise Compatibility Study Group, and successor Community Noise Forum, the Authority has provided means to compile a Noise Compatibility Program of unprecedented scope and prospective impact;" and

- "The Authority has developed and administered an extensive program of voluntary residential relocation, including reestablishment of an entire small city in a new development outside the noise-impacted area;" and
- "By organizing its staff to provide responsive support to community concerns and develop further measures to enhance noise reduction measures, the Authority has striven to become a good neighbor."

Interview Results

The case study interviews were focused on including persons responsible for management and communication of the noise abatement program, representation of formal community groups, as well as others with insight into the special issues at this airport. Although SDF completed the on-line survey in the summer of 2007, they were not selected for the original fall, 2007 follow-up interviews. For the spring, 2008 case study interviews, the following individuals were interviewed:

- Noise and Environmental Programs Officer, Louisville Regional Airport Authority;
- Chair, Louisville Community Noise Forum;
- Board Member, Louisville Regional Airport Authority;
- Mayor, Heritage Creek (Minor Lane Heights);
- UPS Airport Properties representative, Louisville and Minneapolis.

Key Issues.   In determining what particular lessons may be derived from this case study, it is important to understand the issues that complicate the lessons. Growth pressures on the airport caused, in large part, by location of a UPS hub in the early 1980s and subsequent expansion resulted in the decision to rebuild and reorient the airport on its existing site and to expand the facility. The resulting residential relocation was initially for airport expansion and later for noise abatement. Because the airport was surrounded by the city and its major tenant UPS operated a nighttime operation unacceptable to the public, large numbers of people were directly affected by the rebuilding and expansion.

Those community representatives interviewed perceived that they had little warning and no involvement until the plan was announced in the media and its likely impact on them disclosed. Some believe that the airport did not willingly work with the community early on, but changed its approach in response to community pressure. From the resulting public uproar and mistrust on all sides, an approach of listening, talking, cooperating, and trust gradually evolved. There were three primary factors that led to success in changing crisis to resolution. First, a large scale working group process that involved the community, users, and the airport developed a solution. Second was the willingness of the major user, UPS, to invest time and resources in solutions and to be open to ideas. Finally, the creative involvement of an elected official who helped develop and implement creative solutions was critical.

Representatives of the airport, UPS, and the community all agree that they now have a good relationship that is characterized by trust. The process was neither easy nor perfect, but it provides lessons for others. One example of how communications have improved was when, after a series of meetings, a member of the public jumped in to correct the facts and misperceptions about noise made by another member of the public, before the airport users and airport management had a chance to respond.

Findings.   The interviews were open-ended to allow for exploration of the unique situation in Louisville. The observations that follow in the matrix were drawn from the interviews to include a selection of the primary ideas about communications techniques that successfully worked at the airport as well as those that the airport found it should avoid.

Summary

SDF was selected to be a case study because it illustrates issues associated with large cargo hub airports, has instituted a unique relocation program and has overcome a confrontational environment through improved communication. SDF illustrates a unique approach to communications that includes extensive involvement of airport users and the community in developing mutually agreeable solutions, as well as the involvement of elected officials in relocating an entire town. The techniques that SDF used are relevant to other airports with a high level of public interest in significant noise effects, particularly those with a substantial level of cargo service or substantial relocation issues. Further information and reference materials for SDF can be found among the best practice tools referenced in Chapter 4 and in the Bibliography (found in the Toolkit), as well as on the airport's noise management website at www.flylouisville.com/about/noiseprogram.asp

Communication Techniques That Worked for SDF

- A very strong working group with very active community and user participation. Setting up ground rules on how they would make decisions helped them succeed. Giving responsibility to all the group members was also a key to success. The SDF Noise Compatibility Study group "gave ownership" to the community for the solutions. The community representatives took responsibility to become partners in the study, teach themselves and learn about aviation and noise issues, and chair committees on a rotating basis.
- The participation of the primary airport user, UPS, was a model for the investment of time, leadership, and resources for testing ideas. Being willing to invest time (the process can take years), key personnel (personable spokesperson and negotiators, chief pilots and other experts), and resources (offering to do testing on new techniques) is important. Willingness of the user to consider most ideas as long as they are safe, maintain the ability to fly and are economically viable will be the framework for a workable process.
- The leadership of elected officials was essential to the unique solution of relocating an entire community. Leadership of elected officials can be comprehensive, creative, and capable of bringing along an entire community, saving airports much time.
- Willingness of both the airport and the community to engage in effective, sincere communications was a key to success. From the community point of view, the change in approach of airport and consultant spokespersons from one-way communication that was perceived as arrogant and confrontational, to those who were willing to actually work with the community and users was a key to success. From the airport's point of view, the willingness of the community to also be open and negotiate in good faith was important.

Communication Techniques SDF Chose to Avoid in the Future

- Noninteractive meetings where people are only told about the plan and its results are the least helpful communication technique.
- Avoid using a process in a Part 150 Study that is entirely consultant driven and does not have meaningful community input throughout.

Large General Aviation/Reliever Airport—Van Nuys Airport (VNY)
Noise Management at http://www.lawa.org/vny/noiseMain.cfm Accessed 7/22/2008 (*124*)

Van Nuys Airport (VNY) was selected for study as representative of large general aviation airports. It has a long history of controversy over aircraft noise in its community. Its Part 150 Study, begun more than ten years ago, is not yet approved, and also has a Part 161 Study in progress. The public strongly advocates restrictions on operations, but general aviation users and the business community are greatly concerned about the implications of such restrictions on their use

of the airport. VNY's evolving communication approach can provide ideas for other general aviation airports with similar situations.

Located in the San Fernando Valley north of downtown Los Angeles, VNY is the general aviation airport in the Los Angeles World Airports (LAWA) transportation system that also includes Los Angeles International Airport (LAX), Ontario International Airport (ONT) and Palmdale Regional Airport (PMD). To administer its noise management program and community response efforts, VNY pools resources with the other airports, including a technical staff that oversees LAWA's noise management branch office supported by public and community relations, airfield operations, and administrative staff at VNY.

VNY is one of the world's busiest general aviation airports, averaging approximately 400,000 takeoffs and landings annually. More than 100 businesses are located on the 730-acre airport, including five major fixed-base operators and many aviation service companies. The airport opened in 1928 on 80 acres as the privately owned L. A. Metropolitan Airport. It has subsequently become surrounded by intensely developed land. Immediately to the south for a distance of approximately 2 miles, the area is largely golf courses and parks, while to the west, north, and east the uses are mixed industrial, commercial, and residential development. Seven miles directly to the east is Bob Hope Airport (BUR), a significant air carrier facility, with a primary instrument approach directly over the top of VNY at 2,200 feet above the ground. Southerly departures from BUR (used frequently) turn to the right to fly over or to the east of VNY.

The LAWA, known in the City Charter as the Airports Department, is a proprietary department of the City of Los Angeles, controlling its own funds. The airport system operates under the direction of a policy-making Board of Airport Commissioners appointed by the Mayor of Los Angeles and approved by City Council.

Brief History of Noise Abatement

In August 2001, LAWA completed a Part 150 "Airport Noise Compatibility Planning Study" for VNY to review the airport's noise abatement program's status, comprehensiveness, and effectiveness. LAWA submitted a revised version that addressed FAA comments in January 2003. The FAA had not completed its review by the summer of 2008.

A 14 CFR Part 161 airport access study was undertaken as one of the mitigation measures of the Part 150 Noise Compatibility Program. Seven of the noise control measures proposed in the Part 150 Study require LAWA to conduct a Part 161 evaluation and receive FAA approval prior to implementation. To these, two additional measures were added by the 2006 VNY Master Plan. The nine proposed measures evaluated in the Part 161 Study are:

- **Incentives/Disincentives in Rental Rates:** Establish a set of incentives and disincentives through differential rental rates to encourage the greater use of quieter aircraft and less use of noisier aircraft at VNY.
- **Incentives/Disincentives in Landing Fees:** Establish a system of differential landing fees for aircraft using VNY with higher landing fees for noisier aircraft and lower landing fees for quieter aircraft.
- **Establish Fines for Violations of VNY Noise Abatement Policies:** This would make the voluntary "Quiet Jet Departure" program mandatory and establish penalties.
- **Establish Maximum Daytime Noise Limits:** Establish a maximum daytime noise limit for all aircraft operating at VNY of 77 dBA.
- **Establish a Limit on Stage 3 Jets:** Establish a cap on the number of Stage 3 jets that may be based at VNY.
- **Expansion of the VNY Curfew:** Amend the existing curfew ordinance to expand the hours of the current curfew to include all nonemergency jets and nonemergency helicopters as aircraft that would come under the provisions of the curfew during the hours of 10:00 p.m. to 7:00 a.m.

- **Establish a Cap or Phase-Out of Helicopters:** Establish a cap on the number of or a phase-out of helicopters from VNY.
- **Phase out Stage 2 aircraft in shortest possible time.**
- **Extend the curfew to 9 a.m. on weekends and holidays.**

In addition to the required cost-benefit analysis required by Part 161, two special considerations are included in this evaluation: (1) separate evaluation of the effect of the 77 dBA maximum daytime noise limit for Stage 2 and 3 jets and (2) identification of the effects of proposed restrictions on historic airplanes. The Part 161 Study is to address these nine elements in a "severable" fashion, to permit the FAA to review each proposed measure separately and so that any required FAA approval or disapproval will not affect the FAA's considerations of other measures. The proposed restrictions would be established through new or amended City Ordinances, regulations, lease conditions, or use agreements, with sanctions for noncompliance.

The Los Angeles Airport Commissioners, who oversee Van Nuys Airport, are simultaneously pursuing a ban of Stage 2 aircraft, although the legality of such a local ban and the potential economic impact of a ban on the businesses at VNY are still being debated at the time of this writing.

According to interviewees, the public is most concerned about eliminating Stage 2 aircraft, dealing with helicopters, and extending the curfew. Neighbors are supportive of the proposed noise control measures. Users and the economic development interests, however, are concerned about the operational and economic impacts of the measures.

Without FAA approval or City action it will be difficult to achieve change on major noise measures. VNY has taken a more conservative approach to involvement in the studies than some other airports and still has a noise advisory group as opposed to noise roundtable. There also does not appear to be a strong user involvement as in some other airports. Currently, because noise abatement and public relations staff have good reputations for reaching out to the public and supportive leadership on the advisory committee, conflict with the community appears to be modest.

Interview Results

The Case Study interviews were focused on including the primary people responsible for management and communication of the noise abatement program and representation of community interest groups, as well as others with insight into the noise issues at VNY. Case study interviews built on interviews in the fall of 2007 conducted as follow-ups to the airport noise officer survey. Those interviews included LAWA's Environmental Affairs Officer and the chair of the Van Nuys Airport Citizens Advisory Committee. In new interviews conducted for the case study review, the LAWA Environmental Affairs Officer was re-interviewed. In addition, the following were interviewed:

- Staff for Part 161 Study, LAWA;
- Noise Abatement Officer Van Nuys;
- Director of Public and Community Relations for Van Nuys; and
- Long time resident and involved citizen in the Van Nuys Airport area.

Key Issues. VNY is a major economic engine for a densely populated area. It is also one of several airports in a fairly small geographic area. There are strong constituencies on all sides of any question relating to noise and no solution is clearly best for all.

Judging from the press and interviews, there does not appear to be a large organized anti-airport group, but even media attention on a new terminal or proposals from other airports such as Burbank to shift night flights to VNY could upset the current equilibrium. Some of the public is very negative about the airport, but that does not appear to be a large percentage of the total population.

VNY has been unable to make major changes for noise abatement while the Part 150 and Part 161 studies are underway, but not yet approved by the FAA. No one has suggested a conclusion of the FAA's review is eminent, or that the recommendations of the studies are likely to be approved when completed. Even if approved, implementation through "new or amended City Ordinances, regulations, lease conditions, or use agreements, with sanctions for noncompliance," could take substantially more time. (*124*)

VNY's governance structure is as one of the airports under the City of Los Angeles's Department of Airports system, whose airport general manager is appointed by the Airport Board subject to confirmation by the Mayor and City Council, and can be removed by the airport's Board subject to confirmation by the Mayor. Because VNY's governance structure ties it closely to the Mayor and Council, the public has a direct channel of influence through their elected officials to address their concerns about noise. Others perceive that the noise issues are not balanced fairly with economic development. For VNY, the problems are not yet resolved as they consider new communication approaches, including professional facilitation to work with the current or a reorganized noise forum.

Findings.   The interviews were open-ended to allow for exploration of the particular situation at VNY. The conclusions that follow were drawn from the interviews to include a selection of the primary ideas about communications techniques the airport has used. The observations reflect techniques that have worked for VNY and techniques that VNY chose to avoid.

Communication Techniques That Worked for VNY

- Make sure that FAA is part of any noise forum or study group. The Agency is key to getting changes. To keep them involved there must be belief at the highest levels that it is a valuable exercise and has the potential to succeed.
- Consider supplementing the efforts of a small noise staff with other key parts of the airport that work with the public. It is essential that they all have a similar public service orientation. Both the Noise staff and the Public and Community Relations staff at VNY saw themselves as being responsible for working with the public on noise issues and took pride in their efforts to be the personal face of the airport to the community.
- Pursue voluntary compliance, which requires good communication between the airport and users, as the best short-term hope for noise abatement. Some noise concerns, including Stage 2 aircraft phase-out, helicopter operations, and extension/expansion of curfews (closing hours for flights and arrivals on weekends and holidays), have stakeholders who are proponents or opponents. The measures may not have federal support, and consequently may take a long time to address through voluntary action.

Communication Techniques VNY Chose to Avoid in the future

- Do not allow noise consultants to do their analysis and present it without early public involvement. That approach can conflict with building strong community relationships.

Summary

VNY was selected for a case study as the representative of large general aviation airports for these analyses. It has Part 150 Study and Part 161 Study in progress or undergoing federal review, but few expect recommendations to be approved without comment and change. The airport's evolving communication approach can provide ideas for other general aviation airports facing similar public controversy and challenge. Further information and reference materials for VNY can be found among the best practices referenced in Chapter 4 and in the Bibliography (found in the Toolkit), as well as on the airport's noise management website at www.lawa.org/vny/noise Main.cfm.

Smaller General Aviation Airport—Ohio State University Airport (OSU)

Noise Management. http://www.osuairport.org/NoiseManagement. Accessed 10/3/2007 (*125*)

Ohio State University Airport (OSU) was selected for this case study because it is a small general aviation airport whose functions have changed over time, from primarily a training facility for the University to serving a broader general aviation base. The University was unprepared for public controversy arising from its preparation of an airport master plan and the associated development of a runway. The planned airfield improvements generated negative public reaction, particularly from one area of the community. The airport initiated a Part 150 study update and other measures to improve communications with the public regarding airport noise issues. Its experiences are particularly relevant to smaller airports that anticipate changes in their missions, airfield improvements, or an increased volume of flights.

The OSU serves an estimated 100,000 operations per year, including corporate activity, student training, and pleasure flying. The OSU Department of Aerospace Engineering and Aviation Gas Turbine Laboratory, several facilities operated by the OSU College of Agriculture, the Ohio Department of Transportation's Office of Aviation, 14 corporate flight departments, and four flying clubs are based at the airport. The airport is the base to 230 aircraft, including single- and multi-engine piston, turboprop, and jet engine aircraft and helicopters. It is a designated general aviation reliever for Port Columbus International Airport.

The airport was opened in 1943 as a flight training facility for military and civilian pilots, operated by the OSU School of Aviation. It now operates as a self-supporting entity of the university through the Department of Aerospace Engineering and Aviation. The Department oversees all aspects of the airport from airport management, to fixed base operations, to airport maintenance.

The 500 acre airport is located 6 miles northwest of Columbus, Ohio, in a mostly residential suburban area. Adjacent uses are primarily single family residential with a cluster of apartments and commercial to the southwest and suburban retail to the northwest. Worthington, the community with the most organized concerns about the airport, is approximately two miles to the northeast of the airport.

Brief History of Noise Abatement

In 2004 OSU prepared a Master Plan and forecast of aviation activity to address airfield and airport development issues. The Master Plan analysis identified the north airfield as the location for corporate hangar development and determined that the northern runway should be extended to accommodate this development. The development would likely have shifted business jet operations to the north runway, resulting in overflights of areas not previously so affected. The airport initiated an Environmental Assessment.

During the preparation of the Environmental Assessment, community opposition became vocal about the proposed development and probable aircraft overflights. In response, the airport hired a noise/public outreach person and installed a flight monitoring system. The aircraft tracking system became fully operational in the fall of 2006. The airport also initiated an update to the 1990 Part 150 Noise Compatibility Program, which is scheduled for completion by the end of 2008.

Interview Results

The interviewees for this case study were selected to include the primary people responsible for management and communication of the noise abatement program and representation of formal community advisory and other groups. Although OSU completed the on-line survey in the

summer of 2007, they were not selected for the original fall 2007 follow-up interviews. For the spring 2008 in-depth case study interviews, the following individuals were interviewed:

- Airport Director, Ohio State University Airport.
- External Relations Director, Ohio State University Airport.
- Chair, OSU Airport Advisory Committee.
- President, Northwest Civic Association.

Key Issues.   In determining the particular lessons that evolved from this case study, it is important to identify the factors that influence those lessons. First, the airport is rare in that it is privately owned by a university. Interviewees for this case study reported that before the airport completed its new Master Plan in 2004, there were few voiced concerns in the community about the airport. The airport had no assigned noise staff and the airport manager did all of the community outreach. As part of the early outreach, he invited concerned neighbors in areas immediately surrounding the airport to take part in the writing of the Master Plan based on the neighborhood's position and feasible actions. More than half of the neighbors' concerns were addressed, and the nearby neighborhoods and the airport have continued to work together ever since.

When the airport began implementing the Master Plan actions new opposition arose, not from abutting neighborhoods that had participated in the planning process, but from another area approximately two miles away, which would potentially be under the flight path of aircraft using the extended runway. The opposition organized, hired an attorney and approached the City Council of Worthington, Ohio. That City also retained counsel. The airport committed to conduct a Part 150 Noise Compatibility Study.

The airport designed the Part 150 Study committee to include not only other airports in the region and the FAA, but also pilots, councils of government, civic associations, and the opposition group. While the study progresses, the opposition remains organized. The airport estimates that the percentage of the community which is either strongly against or strongly for the airport is probably no more than 10 percent each. One of the primary reasons cited for opposition is the changing role of the airport from solely as a university based flight training airport to an evolving role of broader general aviation services, including operations by business jets. The OSU communications efforts will continue to evolve through the completion and approval of the Part 150 Study.

Findings.   The interviews allowed the exploration of the particular situation at OSU. The following techniques were drawn from the interviews to include a selection of the primary ideas about communications applicable to this airport. Through experimentations, the Airport identified communications techniques that worked in their situation and techniques that were not successful.

Communication Techniques That Worked for OSU

- When considering strategies for dealing with the community on controversial issues, identify the widest possible group who might be impacted and how they might be involved or addressed. OSU Airport was confronted with unexpected opposition further from the airport than they expected.
- Involve those groups at the very beginning of a planning process to get buy-in before positions have hardened. At that point, really listening, determining what is feasible to do, and recruiting the public to help put those parts of the plan together can build long-term relationships. This technique was effective for nearby neighborhoods.
- Get professional help with communications even if the airport is small, if there are plans for any change in the configuration of the airport, or if there are any changes in land use within 5 or more miles of the airport under the primary flight paths. OSU Airport found the level of community reaction was very high and the controversy caught them off guard.

- For small airports, hire community/public relations staff for the noise program. Small airports need community/public relations staff more than they need technical people. The aviation side of noise can be learned, but it is hard to teach an aviation expert community relations.

Communication Techniques OSU Chose to Avoid in the future

- Don't use airport staff as facilitators at controversial public meetings.
- Don't react defensively to unreasonable public accusations.

Summary

OSU was selected as a case study airport because it is representative of many small general aviation airports that have seen their missions evolve over time, or hope to grow in the future by growing corporate aviation traffic. The introduction of new very light jets will introduce jet noise into many more airports that have not previously experienced such events. Communities will react to their introduction. The lessons learned at OSU Airport are applicable to any smaller airport that faces such growth challenges – either on the airport or by encroaching land uses. Further information and reference materials for OSU can be found among the best practices referenced in Chapter 4 and in the bibliography (located in the Toolkit), as well as on the airport's noise management website at **www.osuairport.org/NoiseManagement/.**

Education Industry—Crisis in the College/University Relationship with the Community: A Case Study (*14*)

Airports often face the same issues as other institutions and can learn from their mistakes. A 2006 paper entitled, "Crisis in the College/University Relationship with the Community: A Case Study" (*14*) by Kathie A. Leeper and Roy V. Leeper is an illustration of a university experience similar to what airports that develop master plans for expansion also may encounter in dealing with their neighbors. The paper's abstract summarizes the findings:

> Crises can arise in relationships between colleges and universities and their surrounding communities, especially when campuses need to grow. *If these institutions have focused strictly on sending their messages out rather than establishing two-way communication with important publics, they may suddenly find themselves embroiled in conflict and confronted with a crisis.* Colleges and universities must rethink and restructure their communication and public relations functions to include two-way communication and community engagement as a means of avoiding certain crisis situations. (*14, p. 129*)

The need for increased engagement between the airport and its stakeholders and neighbors is also the principal recommendation that this ACRP study has drawn after over 40 interviews with airports and their interest groups.

Case Study Summary

The case study, as reported in the 2006 paper, describes the dramatic events of June 1998 through May 1999, generally as reported in the *Kansas City Star* (*The Star*) newspaper. It began when the University of Missouri at Kansas City (UMKC) made unilateral public announcements regarding expansion into surrounding neighborhoods based on a master plan of which the public had no knowledge. The public reaction was furious and immediate and quickly became highly organized and highly visible. The case study describes how the situation unfolded, what the role of the media was, how the university changed and the public reacted, and compares it to a similar university master plan for expansion in an adjacent area with a very different process and result. In addition to the Leepers' paper, the authors of this document were involved in UMKC's eventual successful approach to reconciliation with the neighborhoods and add their perspective to this case study. UMKC is an urban university in Kansas City, Missouri, of 14,000 students primarily surrounded by residential development. Its locational

situation is not unlike many urban airports. A chronological summary of major events related to the case study follow.

The authors of this ACRP document, when employed by the Kansas City, Missouri's City Planning and Development Department, were involved in the "Afterwards" part of the process. They were requested by the University to help design and implement an effective two-way communications plan that would enable dialogue with the public and incorporate the importance of public engagement in decision making.

Initially, a kick-off meeting was conducted in which community leaders and the university's new chancellor had the opportunity to meet and discuss the issues at hand. This meeting was opened to the public as a successful attempt to clear the air after the initial expansion plans were dropped, and began to restore UMKC's credibility with the community. At the meeting, groups were formed to discuss the best approach for the university to move forward and to establish a framework for dialogue between the parties (Table 5-1).

Table 5-1.   Dialogue framework.

Timing	UMKC Administrative Action	UMKC Staff Action	University Neighbors and Public Reaction
First two weeks (June 14-27, 1998)	University administration announces action and insists on its right to act autonomously, is inflexible, denies full knowledge of Master plan in the face of proof and shows insensitivity to the impacts of expansion.		Neighborhoods are furious and get organized
Next six weeks (July 1 – August 12, 1998):	Involvement of University systemwide leadership, self-justification but beginnings of call for dialogue		Community reacts with skepticism first meeting with mediator
Next six weeks (Through October, 1998):		Faculty enacts "no confidence" vote for University Chancellor, based in part in their claim of no involvement in decision-making	
Next 3 months (Through January, 1999):	University Chancellor announces retirement, still does not recognize the essential problem with the community and retires.		
Next 4 months (Through May, 1999):	Interim Chancellor communicates, expansion plan is withdrawn		
Afterwards	New Chancellor brings in the City of Kansas City planning staff to help craft a successful new approach to planning and working with neighborhoods		Neighborhoods work within the process to achieve mutually acceptable goals and development

With the feedback and ideas gathered from the kick-off meeting, the authors helped neighborhood and University leaders form a group of stakeholders that met monthly, which led to the development of UMKC's "Partners Project For Planning – Master Plan". This land use and campus planning document was written to document the new and improved collaborative planning process between the University and its surrounding community.

UMKC also added an Office of Community and Public Affairs in 2003, with the goal of focusing on communication between the University and surrounding neighborhoods. The Office launched a website recognizing the importance of two-way communication with the public and building engaged relationships with key stakeholders.

The Leepers' paper reviewed a contrasting illustration of how collaborative planning can reduce conflict by recounting nearby Rockhurst University's successful master planning and expansion process. The boundaries of Rockhurst University are within one to three blocks of UMKC in a number of locations. In late 1999, Rockhurst announced the successful conclusion of a year-long series of negotiations that resulted in agreement with the neighbors to expand, and would include purchase and demolition of 25 houses – a project effort comparable to that desired by UMKC, but without the crisis in public relations and delays in progress.

Key Issues.   Several factors contributed to the size of and speed that the UMKC crisis arose and the difficulty encountered in resolving it. They include:

- The University Administration's assumption of absolute autonomy. It assumed because it had a legal right to pursue its master plan, that it could proceed in secrecy without consideration for impacts on surrounding areas.
- The University's failure to really listen to the community and insensitivity in speaking to the public.
- The University's failure to be transparent about the Master Plan even as information was trickling out to the public. When the press and the public asked for information, it was denied.
- The failure of University leadership to be willing spokespersons who would meet with the public. This gave the impression to the public that the leadership was afraid to take responsibility for University decisions. Eventually, it was a higher level of University system governance that moved to soften the University stance.
- The University's seeming inability to develop a coordinated communications strategy for working with the media and the neighborhoods when it was clear that there was a crisis.
- The University's failure to understand how fast a community can be organized. As the Leepers' paper said, "Failure to recognize the power of activist publics and the speed at which they can organize and develop may have led to UMKC's initial dismissal of the neighborhood as a public to be consulted." (*6*, p. 134)
- The University's assumption that because they provided services to the public, were open to the public, and provided an economic benefit to the area, the public will perceive them to be community oriented. The Leepers say that the UMKC example demonstrates that is no longer sufficient.

Findings.   The "Conclusions" in this case study identify those techniques that worked for UMKC and those that failed as they attempted to move their development program through a public involvement crisis of their own making. These are specifically lessons that can be applied to any public service organization, including airports, that have impacts upon surrounding areas in any way.

Communication Techniques That Worked for UMKC

- Establish an ongoing relationship. The Leepers write ". . . the importance of establishing and maintaining a strong relationship with the community surrounding a college or university is clear."(*14*, p. 140) This also applies to airports.

- Maintain two-way communication. The Leepers quote K. Fearn-Banks in a 2002 book *Crisis Communications* (*p. 3*) as saying, "Companies with ongoing two-way communications often avoid crises or endure crises of shorter duration or of lesser magnitude". (*14,* p. 140)
- Build a relationship of trust based on an open and honest sharing of information. The Leepers quote D. Hale in a 2002 article entitled Public Relations in Higher Education: A retrospective and forecast (pp. 5-6), "The success of our institutions is rooted in the relationships we build with our key publics. And those relationships are built on trust, on developing a mutually beneficial relationship based on an honest and open sharing of information". (*14,* p. 140) As demonstrated by UMKC, trust can be lost very quickly (2 weeks) and take a very long time to regain (2 years).
- Monitor, communicate, and make decisions <u>with</u> key public. As the Leepers say, "The realities are that unless organizations concern themselves with monitoring, communicating, and making decisions with key publics in the community, problems may result." (*14,* p. 140)
- Do not ignore or try to hide from the media. When there are major changes in operations or land use planned, do not just let the media discover it but develop a good proactive approach that considers the potential reaction of the community.
- Assure that the perceived leadership of an organization, the one who has authority, takes a lead in meeting with the public on major issues.
- Make sure that the public has a forum to speak and respond that is perceived as reasonable in terms of timing, access and location.

Communication Techniques That UMKC Chose to Avoid in the Future

- One-way communications do not work. According to the Leepers, "From a public relations perspective, an organization may no longer be able to function effectively when communication is basically one way and a community relationship is not fostered." (*14,* p. 131)
- Do not let the public first find out about the institution's major plans in the media or by a letter telling them what has already been decided.
- Assign sensitive and public service oriented spokespersons.

Conclusions

The literature reviews and case studies illustrate a range of public communication approaches and what lessons airports and other industries have learned that are applicable to airport situations. The overwhelming message from both the literature review and from the case studies is that two-way communication with neighboring communities is essential and has become a "best practice" across public service industries. The findings are:

- Airport staffs as a whole are busy, confined by regulations, and focused on airport operations. They view dealing with the community affected by noise as a necessary nuisance, but often not important enough to warrant development of an ongoing relationship.
- Other industries recognize that the insertion of public input into the early assessment of transportation or environmental needs and solutions is a key factor in decision making.
- Other industries concluded that best practices require giving citizens, industry, environmental groups, and academics much greater roles in environmental decision-making. Building trust with the community is fundamental to ensuring an effective working relationship.
- Three primary factors that lead to airport success in changing crisis to resolution are: 1) use of a comprehensive working group process that involves the community, users, and the airport in developing a solution; 2) willingness of the major users to invest time and resources in solutions and to be open to ideas; and 3) creative involvement of senior airport management and local elected officials who take ownership of the development and implementation of creative solutions.

- Planning ahead and developing a good interactive relationship with the community *before* there is a crisis is critical. A public relations crisis can develop very quickly and be made much worse if management does not take an intelligent lead. These crises can be alleviated if there is a pre-existing atmosphere of collaboration and cooperation between the airport and its neighbors.
- There are not always easy and fast solutions to solving noise issues.

The themes among the literature reviews and case studies all are common and the lessons learned are similar. The following is a consolidated list of themes and lessons from the literature reviews and airport case studies.

- **Airport Culture:** The comprehensive, interactive approach to public involvement requires a cultural change from the top down, especially as the aviation industry has no strong regulatory mandates to require interactive engagement.
- **Improve Relationships Before Crisis:** Build a relationship before there is a crisis. Make communication mean constructive involvement and building trust. Approach people well in advance of change – do not present a plan or process as a completed effort.
- **Listening:** Being a good listener is an essential part of two-way communications. Listen carefully and understand what the community's perceptions, suspicions, and emotional responses are and address them forthrightly.
- **Roundtables and Working Groups:** A roundtable or working group gives public and community representatives a place to express their issues and work out problems. Carefully select airport spokespersons and key negotiators for their ability to deal calmly with sensitive issues. Include representatives of any organized opposition. Give ownership of the process and responsibility for its results to all the group members.
- **Data:** Provide the community with good, understandable, timely, and relevant data related to noise issues. Use data to build trust and reconcile expectations: be open and direct. Use credible information.
- **Developing a program:** Design a program that fits the airport's situation. There is no simple public involvement process that meets the needs of every airport. **One size does not fit all situations.** Design effective community meetings and make sure that the public has a forum to speak and respond that is perceived as reasonable in terms of timing, access and location.
- **Evaluation Techniques:** Determine what impacts a person's feeling about noise and what the best method of communication is to address the specific concerns about their issues.

Noise Management
and Public Response

Noise frequently first becomes an issue for the airport manager through complaints about the loudness, proximity or frequency of overflights near an airport. Managers become involved because the public who present these complaints assume that the airport administration has control of the aircraft flight patterns and operations in use at the airport. The public has a difficult time understanding that the many entities present at the airport are distinctly different from one another, with different authorities and levels of influence over conditions. Instead, the public views the airport as one organization that has the authority to manage all activities that take place within its boundaries and within the airspace around it. This misunderstanding often leads to frustration, not only on the part of the public who want to make conditions they complain about better, but also for the airport manager who must deal with multiple entities to see if anything can (or should) be done to respond to the public concerns.

Most public airports in the United States are owned and operated by public governmental bodies—city or county departments, independent airport authorities, or agencies of state or national government. The others are operated by private companies or individuals. As such, airport management personnel generally view themselves as public servants and their role as one that is customer-oriented, with the mission to provide for the safe, smooth, and efficient operation of the airport facility. Often, they are also public employees, with responsibilities to the elected officials and departmental managers responsible to the public at large. Political influences occasionally demand that airport management be responsive to public noise complaints or other concerns and seek to resolve the issues raised by them through restrictions of, or negotiated modifications to, the flight activities that generate the complaints. To do so, the manager will be faced with political demands on one side and a host of restrictions on his ability to act on the other. There will be regulatory limitations on the manager's ability to act independently in any way that has been preempted by the federal government, the manager will have little or no control on how the property beyond the airport's boundaries is developed, and the manager will have to deal with his client base – the users of the airport that provide the aviation-supported services demanded by the community.

Several principles may be brought into play by the airport managers in their effort to manage their relationships with the public and users, politicians and regulators, land owners and environmental advocates and still meet the needs of the community for safe and efficient aviation services. Although some airports may be equipped and staffed to address the issues on a daily basis, planning for the compatibility between the airport and its neighbors is an infrequent activity for most airports, usually happening only once every five to 10 years in a comprehensive analysis. The elements of noise compatibility planning include the definition of existing and projected aircraft noise levels around the airport, the identification of land use patterns and their relationship to the noise exposure levels, and the development of operational or land use management measures to enhance the compatibility between aircraft noise levels and underlying land uses. Throughout the planning process, the well-designed planning program incorporates a

comprehensive set of public communication techniques to allow the public to understand the foundation of the measures developed and their anticipated effect on future conditions.

Noise abatement planning in the United States is largely conducted under the provisions of 14 CFR Part 150 Airport Noise Compatibility Planning or as a part of the mitigation planning process as Environmental Assessments or Environmental Impact Statements are prepared for the development of airport facilities or other significant federal actions on the airport. Flow charts of the planning process for each type of study are similar and require consultation with the public and agencies as a significant element of their study design.

Flow Chart Examples:

- 14 CFR Part 150 Exposure Map (NEP) and Noise Compatibility Study (NCP) (*126*)   6-1
- EA and EIS NEPA Process (*127*)   6-2

Legislative Control of Aviation

Over the years since the public first became concerned about the intrusion of aircraft noise into their lives, governments have been asked to implement measures that control the amount, location, and time of noise exposure that people living around the nations airports experience. A series of legislative measures have been approved by Congress and state legislatures, which have subsequently been implemented by various regulations and guidance circulated by the FAA and state agencies to control noise exposure patterns. The primary measures among these are discussed briefly below. For additional information, the reader may access substantial information about any of them through internet search engines.

Congressional and Federal Regulatory Actions

- Federal Aviation Act of 1958 (*128*) (PL 85-726) – The Act established federal responsibility for safety and the development of civil aeronautics within the borders of the United States. It further established precedence of federal regulation and control over local authority on aircraft in flight mode (landing, takeoff, and in-flight).
- Aircraft Noise Abatement Act of 1968 (ANAA) (*129*) (PL 90-411) – This Act added aircraft noise to the areas under the jurisdiction of the Federal Aviation Administration. It resulted in the promulgation of 14 CFR Part 36 to establish noise level standards at the aircraft source, as well as the technologies to determine the levels associated with each aircraft type.
- 14 CFR Part 36 – Noise Standards: Aircraft Type and Airworthiness Certification (*3*)– Regulation published in 1969 to implement provisions of the ANAA to establish noise level limits for each aircraft type as measured under approach and takeoff paths and sideline to takeoffs.
- National Environmental Policy Act of 1969 (NEPA) (*2*) (PL 91-109) – The environmental consequences associated with federal development actions are required by the Act to be evaluated. This Act gave birth to the Environmental Protection Agency (EPA), which developed guidelines to consider environmental policy during development of federal projects or projects funded with federal monies. As applied to aircraft noise conditions, assessments required by NEPA are regulated by the Federal Aviation Administration through FAA Order 1050.1E and Order 5050.4B.
- Airport and Airway Development Act of 1970 – (AADA) (*130*) (PL 91-258) – This Act provided for the funding of airport development programs under the Airports Improvement Program (AIP) by providing federal funding assistance to local sponsors of airport capital or planning projects. The Act did not include funding for noise abatement planning.

- Noise Control Act of 1972 (*131*) (PL 92-574) – This Act amended the Federal Aviation Act to include "public health and welfare" as a consideration for noise abatement planning. It expanded 14 CFR Part 36 to add Stage 3 aircraft and added EPA to the rulemaking process to consider aircraft noise impacts in airport planning.
- Aviation Noise Abatement Policy of 1976 (*132*) (ANAP) – FAA policy statement to establish a gradual phase out of older, louder Stage 1 aircraft from the operating fleet by the end of 1988.
- 14 CFR Part 91 – General Operating and Flight Rules (*4*) – Regulation published in 1976 to require the gradual phase out of Part 36, Stage 1 aircraft over 75,000 pounds from the operating fleet by the end of 1988. The measure gave birth to the engine retrofit industry as owners of Stage 1 aircraft sought methods to modify their aircraft to continue their use under the new regulation. The measure was subsequently expanded by later legislation to require the phase out of Part 36, Stage 2 aircraft weighing more than 75,000 pounds not later than December 31, 1999.
- Airline Deregulation Act of 1978 (*133*) (PL 95-504) – This Act eliminated federal control of route structures and pricing for commercial aviation and placed the industry on a competitive basis. The Act gave rise to a proliferation of low-fare and start-up carriers as routes became available to any user. The Act prohibited the regulation of noise levels through price controls, or charges based on route or aircraft type.
- Quiet Communities Act of 1978 (*134*) (PL 95-609) – This Act provided for collaboration between the FAA and the EPA in the development of aviation noise abatement plans and actions, and provided funding for noise abatement and mitigation actions. The EPA's noise office was defunded in 1982, but the authorization has remained in place should the office be refunded at some future time.
- Aviation Safety and Noise Abatement Act of 1979 (*6*) (ASNA) (PL 96-193) – This Act extended funding for planning for noise mitigation and abatement actions for an additional time. It also brought foreign carriers under the provisions of 14 CFR Part 91 for the phase out of the loudest aircraft, effective in 1980. The extension of funding resulted in the promulgation of 14 CFR Part 150, *Airport Noise Compatibility Planning,* in 1981 to guide the development of airport noise abatement programs.
- 14 CFR Part 150, Airport Noise Compatibility Planning (*135*) – This regulation establishing the airport noise compatibility planning program and its guiding criteria was promulgated by the FAA in 1981, subsequent to its authorization under ASNA. The regulation sets forth the requirements that program sponsors must first identify the current and anticipated noise exposure patterns at the airport, based on annual average conditions, using tools and methodologies prescribed by the regulation. Secondly, the sponsor may prepare a Noise Compatibility Program for review and approval by the FAA to make noise mitigation projects eligible for federal funding. These may include acquisition in areas of significant noise exposure, modification of flight paths and runway use programs, structures and facilities to mitigate noise, sound insulation programs, or any number of other project categories. This program has become the primary vehicle for airports to become eligible for AIP and PFC funding for noise abatement and mitigation projects.
- Airport and Airway Improvement Act of 1982 (*136*) (AAIA) (PL 97-248) – This action reauthorized the AADA and added coordination between multiple modes of transportation, as well as setting aside a portion of the AIP funds for noise abatement planning projects.
- National Parks Overflights Act of 1987 (*137*) (PL 100-91) – This Act forms the basis of requirements for detailed assessment of supplemental noise metrics in national parks environs, and the development of a Flight Management Plan for the Grand Canyon National Park. The criteria of the Act have been extended to all national parks, as well as other scenic national properties including monuments and wilderness areas. Many airports in the West now need to consider the effects of their development actions relative to their potential impacts on these national properties.
- Airport Noise and Capacity Act of 1990 (ANCA) (*5*) (49 USC 47521) – This Act forms the basis of the FAA's criteria for review and approval of actions that restrict access to any airport

that receives federal funding. In exchange for a scheduled phase out of Stage 2 aircraft by the end of 1999, airports were prohibited from implementing new access restrictions on Stage 3 aircraft unless an application is prepared and approved under 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions.

- 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions (*138*) – The regulation restricts the ability of an airport that is or has received federal funding for airport improvement projects from implementing any restrictions on access to its facility under local police powers. The regulation requires that any airport desiring to implement a restrictive measure (curfew, aircraft type prohibition, noise cap, etc.) must first complete a rigorous application that evaluates the benefits and costs of each such action. The sponsor must consider not only the effects of the action in the local environment, but also on the national transportation system. For Stage 2 aircraft, the required evaluations are less extensive than for restrictions proposed for Stage 3 aircraft, but in practice, the FAA reviewers have set a high bar for approval of restrictions on both aircraft groups. In late 2008, no airport had received approval for any new restriction on Stage 3 aircraft, and only Naples Municipal Airport (Florida) had achieved a restriction on Stage 2 operations, but even then after years of litigation.
- Federal Aviation Reauthorization Act of 1996 (*139*) (PL 104-264) – This act restructured the Air Traffic Organization (air traffic control), modified the funding program, provided for environmental streamlining to speed project review, and established a research program for aviation initiatives.
- Vision 100 Century of Aviation Reauthorization Act of 2003 (*140*) (PL 108-176) – This Act continued funding of airport grant programs and addressed airline and airport safety issues, as well as continuing the research component of the planning analyses.

During the period since 2003, Congress has passed continuing resolutions to fund the several reauthorizations of Vision 100 to continue program funding without interruption.

FAA Orders and Guidance on Environmental Planning

In addition to the regulation of aircraft noise assessment set forth under 14 CFR Parts 36, 91, 150, and 161 described in the previous section, the Federal Aviation Administration has established Environmental Orders and supplemental guidance for the evaluation of aircraft noise within the larger context of the assessment of all environmental consequences of an airport-related development or planning action. These orders are:

- FAA Order 1050.1E, CHANGE 1 – Environmental Impacts: Policies and Procedures (2006) (*141*) – This Order provides specific guidance and instructions to the preparers of Environmental Impact Statements, Assessments, Categorical Exclusions, and other findings. It delineates specific detailed requirements for information that must be incorporated into environmental documents and provides standards of significance to be addressed for each environmental category. For noise, the standard of significance has been determined to be a change of 1.5 dB of DNL resulting in an annual average DNL of 65 dB or more, when compared to an established baseline condition for the same period of time. 6-3
- FAA Order 5050.4B – NEPA Implementing Instructions for Airport Actions (2006) (*142*) – This Order provides FAA organizations with Agency policies and procedures to comply with NEPA and CEQ implementing regulations. It is intended primarily as guidance to the processing of environmental evaluations for the FAA reviewer and planning professional to assure consistent and accurate processing of all environmental evaluations for airport-related projects. 6-4

- Environmental Desk Reference (2007) (*143*) – The FAA released a reference document late during 2007 that was intended to provide applicable special purpose laws relating to environmental evaluations in a single location for FAA staff, airports, and preparers of environmental documentation. It presents the information based on the 23 environmental categories typically included in an Environmental Impact Statement by providing information in each of the following sections: 🖱 6-5

  - Introduction and Definitions
  - Applicable Statutes and Implementing Laws or Regulations
  - Applicability to Airport Development Actions
  - Permits, Certifications, and Approvals
  - Environmental Compliance Procedures – Environmental Analysis
  - Determining Impacts
  - Determining Impact Significance
  - Environmental Impact Statement Content

- The Part 150, Airport Noise Compatibility Planning process, has evolved over the years since its initiation, but the guidance document (FAA Advisory Circular 150-5020-1) (*144*) is outdated. An update is in preparation, with completion and release expected during 2008. The reader may find the documentation provided in the current Part 150 planning guidance of use. 🖱 6-6

- The 14 CFR Part 161, Notice and Approval of Airport Noise and Access Restrictions (*138*), requirements are often cited by the public as a mechanism for airports to implement curfews, noise level limitations, runway use requirements and similar actions as a means of abating noise in communities. The regulation is provided on the accompanying Toolkit. 🖱 6-7

State and Local Action

Several states and communities have established environmental regulations similar to those enacted by the NEPA, for environmental review, or for land use management. For airports, these regulations are frequently focused on reporting the effects of current environmental consequences on surrounding communities. There may be differences between the standards adopted by the FAA in its Order 5040.4B regarding levels of significance, or there may be additional reporting required for airports within the state. Frequently, the anticipated future consequences of airport development projects must be reported against current conditions (under NEPA, future consequences are reported against future baseline conditions). Owing to the great diversity between state and local programs, the airport manager should establish contact with local legal advice and assistance of State aviation organizations to assure that state and local requirements are met for the evaluation of aircraft noise.

In general, courts have established federal preemption over state and local actions to restrict noise associated with aircraft in flight. The U.S. Supreme Court (*City of Burbank v. Lockheed Air Terminal* (1973) (441 U.S. 624, 93 S.Ct. 1854, 36 L.Ed.2d 547) (*145*) opened the door to the theory that communities cannot use police powers to control aircraft noise if the community is not the owner or operator of the airport. Further, the U.S. Court of Appeals found in *Leudtke v. County of Milwaukee* (1975) (7th Cir.; 521 F.2d 387) (*146*) that the airport and the airlines could not be held liable for violation of a state law if operations were conducted in compliance with federal laws and regulations (subsequently, the preemption of state-law relief was expressly overruled). Extensive additional information on these and similar cases, with an emphasis on federal and California litigation, may be found at http://airportnoiselaw.org.

Mandatory and Voluntary Noise Abatement Actions

Mandatory noise abatement actions are those measures that are required of all, or a category of, operators at the airport. If new, they fall under the requirements of 14 CFR Part 161 to be fully evaluated for their benefits and costs prior to approval by the FAA and implementation. In the United States, there has been a strong resistance among aviation operators to noise abatement actions which prohibitively restrict their use of an airport, while neighbors have often sought such prohibitions to assure a consistent and predictable level of quiet in their communities. The FAA, courts and regulators have typically sided with the airport or the user against mandatory restrictions on operations. Even so, the typical airport manager or owner continues to face public complaints and opposition to airport activity and its perceived impacts on those who live nearby. Both the airport operator and the public should be aware that restrictive actions may have an impact on airport efficiency and may result in increased delay or cancelled operations.

In many cases, airport sponsors have sought abatement of aircraft noise through the development of voluntary actions that seek to implement the intent of mandatory actions without facing regulatory opposition to restrictions. The aircraft operating programs of many Part 150 studies or EIS mitigation plans use voluntary actions to achieve a portion of the desired noise reduction. For example, rather than implementing a mandatory "formal" runway use program which specifies for given conditions or times of day the runways to be used for landing and take-off, a voluntary program may be negotiated with the users to seek their participation in an "informal" runway use program that may be approved under Part 150 or an EIS to result in much of the noise reduction sought with a formal program. The use of the informal program would be at the discretion of the user, however at busy towered airports, if the FAA and the users are party to the development of the informal program, it is likely that it becomes the normal mode of operation and deviations from it become difficult to accommodate because they must be worked safely into the arrival or departure traffic flows. Similarly, airport operators may seek cooperation with users to use quieter aircraft types, to fly preferred routes, or to reduce ground level noise through various voluntary agreements. It is important to remember that voluntary agreements are exactly that – voluntary, and that some operators may choose not to participate in the program. Of equal importance, however is that the establishment of any program will likely lead to the improvement of the noise conditions that the manager is seeking to alleviate, so long as it is safe and conducted in a controlled environment.

Airport Role in Comprehensive Planning

The compatibility between the noise generated at or near an airport and the usage of land in the airport vicinity is based on both the amount of noise generated and the locations of sensitive land uses. For many years noise abatement planning focused on the modification of flight paths, runway use patterns, and aircraft activity, but with the completion of the phase-out of older, louder Stage 2 aircraft at the end of 1999, much of the achievable noise exposure reduction available under current technology and regulations had been accomplished. Although research is continuing into additional noise reduction technologies at the aircraft source, the regulatory agencies, airports and users have begun to increase the pressure to attain balance between actions that had been taken at the source and focus more control of incompatibility on the receiver. Consequently, the management of land use development has taken a greater role in the noise compatibility programs of the new century.

During the period of the 1970s, 80s and 90s, noise exposure patterns gradually shrank as quieter Stage 3 aircraft became greater and greater portions of the operating fleet. The shrinkage of

the contours of significant noise exposure, within which development of incompatible land use had been constrained by early program actions, resulted in more and more land becoming available for development into noise-sensitive uses. In many cases, local authorities yielded to residential development pressures to allow construction adjacent to or within the 65 DNL contour on land that updated contours now showed as being compatible. The result was the creation of a smaller envelope of area within which significant noise levels could remain compatible with underlying uses. Growing operations or changing missions of airports may now lead to an increase in the noise contour sizes for the first time in many years.

Many airports how have smaller contours than in the past and more operations. The airport surveys conducted for this study have shown that many noise complaints are made about the frequency of operation, rather than the overall noise level. Consequently, as the contours shrink and numbers of operations increase, land is opened for more noise-sensitive development to be located closer and closer to the routes of flight and the runway ends. This will likely lead to an increase in noise complaints as operations increase and residences are allowed to develop near the airport in previously incompatible areas. Some airports, like Dallas Fort Worth International Airport and Los Angeles International Airport have maintained contours from many years ago as the control for land use management and mitigation planning, even though more current contours might indicate less area within them.

The FAA has established a policy to not fund mitigation of residential properties that have been constructed within the published area of incompatibility at an airport. Air carrier and other user groups are demanding that communities do their share to control the introduction of new noise-sensitive uses into areas exposed to high noise levels. To respond to these demands, airports may take a role in the comprehensive planning process to work closely with community planners to develop risk adverse plans for the airport environs. The flight patterns for airports are well established, the noise contours are easily projected, and the land uses already present are known. Airports in many communities are working to review planning proposals and make known the potential for elevated noise exposure over areas before they enter the development phase. These actions may occur in collaboration with planning staff, with community zoning and subdivision regulators, or with developers themselves to seek the greatest level of compatibility between the airport and its surrounding uses. To be fully successful, the political powers within the community must be on board with the decision to limit the risks to the economic engine for the community that resides in the airport.

Stakeholder Involvement and Jurisdictional Coordination

Interviews and surveys conducted in support of this study indicate that communications about noise and the efforts to manage it are critical to efficiently accomplishing abatement goals. Clear descriptions of the roles and expectations of each participant in the noise management process—the producers of aircraft noise, the recipients of aircraft noise and the controllers of the location and intensity of that noise—are all essential to the success of any program. Honesty and clarity in communication with airport neighbors has been cited by many airport noise managers as the most important element in assuring that changes to noise patterns are understood and the public is aware of what to expect.

A clear communication and discussion with aircraft operators about their capability and willingness to actively participate in noise abatement actions leads to a more effective program by limiting expectations to achievable results. This is also true of interactions with air traffic management personnel regarding their ability to efficiently move traffic through the airport and over areas of greatest compatibility.

Implementation Responsibilities and Constraints

The management of noise and its effects at an airport is the responsibility of several parties. While the public may see the airport as a single entity, the airport manager is faced with the need to coordinate activities across regulators, users, local governments, and neighbors to address the issues of noise. Table 6-1 provides an overview of the responsibilities of the U.S. Congress, the FAA, state and local governments, the airport operator, aircraft users and manufacturers, and airport neighbors in the management of a number of different topics that often arise in discussions of how to control aircraft noise. Interestingly, the Airport has direct control only over the noise produced by aircraft that are not in flight mode (i.e., during maintenance run-up activity), construction of noise abatement facilities, and management of the use of land which it owns or operates. It may advise, request or negotiate for modifications in actions controlled by others. The federal government sets policy regulating allowable noise levels, controls airspace and airport operating patterns, and provides a major part of the funding for noise abatement actions conducted by the airport. It also reviews and may approve or deny any proposed restrictions on aircraft flight activity at an airport. Local governments control the use of land around the airport through zoning, subdivision control, and comprehensive planning actions. Aircraft operators/pilots have ultimate responsibility for all phases of the flight of the aircraft, but operate within the environment set by air traffic control direction or rules; they are also responsible for their selection of aircraft type and, implicitly, its noise level. Aircraft manufacturers are responsible for producing aircraft that meet federally specified noise levels. Airport neighbors are responsible for reviewing and commenting on airport environmental actions, as well as taking due diligence in the acquisition of property; property owners may have additional responsibilities if property is part of a mitigation program such as sound insulation or acquisition by the airport.

Information to Respond to Typical Public Concerns About Noise

When dealing with the public, the airport manager will often be confronted with comments about issues with which he has limited experience. Such issues include:

- The difference between cumulative and single-event noise levels and when each is useful;
- The thresholds of significant noise level and how it's used;
- The difference between noise impact (within 65 DNL contour) and noise effect (outside 65 DNL contour);
- The difference between compatible and incompatible land use;
- The differences between thresholds of evaluation for different FAA divisions;
- The precedence of federal and state standards and when they are applicable;
- The difference between noise measurements and computer modeling of noise levels, and why one may be preferable to the other in given cases;
- Aircraft contribution to vibration and rattle;
- Sound insulation programs and how do they work;
- The difference between interior and exterior sound levels and the abatement of each; and
- Contour and impact area change over time and the differences between federal and local response to change.

The following sections discuss each of these issues.

Cumulative versus Single Event Noise Levels

Observers frequently complain that cumulative noise measures such as DNL or CNEL or LEQ do not adequately reflect the noise levels heard. When they compare the significant DNL level of

65 decibels to a single event of 65 L_{max} they often consider the two to be equivalent. Most people fail to understand the integration of all noise events into the calculation of the cumulative noise levels. The misunderstanding is even more aggravated by calling the cumulative noise level the "average aircraft noise level", when in truth, it is the total aircraft noise energy distributed over 86,400 seconds during a day, and includes the many seconds during the day when aircraft noise is not present.

The components of the cumulative noise measure must be clearly understood to be a derivative of the sum of the noise energy of every event that occurs during the period under consideration, divided by the number of seconds during that period. These factors are further complicated by the logarithmic nature of noise energy computation. Consider the example of a rain barrel that has a capacity of 10 billion rain drops to help explain the DNL.

Assume an empty rain barrel that will be filled with drops of water proportionate to the amount of noise energy generated during each second of a single aircraft event, using a base of 1 decibel. Based on the accompanying chart (Table 6-2), an event lasts 10 seconds and the average energy per second is 30 decibels, resulting in a total of 10,000 units. Assume one drop of water represents a unit. Therefore, 10,000 drops of rain are poured into the barrel and the level rises imperceptibly. The next 100 events last 10 seconds each and the average energy per second is 60 decibels, resulting in 1 billion drops of rain dropping into the barrel, raising the level of water to less than 10% percent of the height of the barrel. The third event lasts for 50 seconds and averages 70 decibels, resulting in 500 million drops of water falling into the barrel and raising the level of water to over 15% of its capacity. The next three events all last 10 seconds and average 80 decibels, and one of those events is at night. The first two events add 2 billion drops of water to the barrel, and raises its water level to over 35% of the height of the barrel. The nighttime event adds as many drops as the capacity of the barrel and everything that is already in the barrel flows out. This example is designed to demonstrate the relative effect on cumulative average noise levels of operations of varying loudness and at different times of the day.

Each increase of decibel level by 10 dB equates to 10 times as much noise energy. Therefore it would take 10 events of the lower level to provide as much energy as one event of the higher level. Every event that occurs at night (10 p.m. to 7 a.m.) is considered to have 10 times the amount of energy as the same event that occurs during the daytime (7 a.m. to 10 p.m.) hours.

Thresholds of Significant Noise

A threshold of significance, in terms of aircraft noise, may be described as the noise level at which aircraft noise creates a significant impact on noise sensitive uses and persons exposed to it or higher levels. The FAA has selected 65 dBA of DNL to be the default threshold of significance for aircraft noise. Any such uses exposed to 65 DNL for the average annual condition are described to be significantly impacted. On federally funded aviation projects, any uses that are exposed to less than 65 DNL for the average annual condition are described as not being significantly impacted. With few exceptions, the FAA does not participate in funding actions to mitigate parcels of land exposed to less than 65 DNL.

In addition to the exceedance of 65 DNL, properties may be exposed to another threshold of significance when the noise level over them increases by 1.5 dBA of DNL or more from a no-action condition and the resultant with-project average annual DNL exceeds 65 dBA.

Other jurisdictions, including state and local governments, may define different thresholds of significance for their own communities. Such thresholds may be tools to control the loudness of aircraft using their airports, or may be used to control the development of noise-sensitive land uses in areas exposed to noise greater than the threshold. For example, at Naples, Florida, the

Table 6-1. Authorities and responsibilities of parties.

Noise Abatement Opportunity	United States Congress	FAA - All divisions except Air Traffic	FAA - Air Traffic Control	State Government
Authority to establish noise abatement actions through operational change	Establish environmental policy in accordance with national priorities. May legislate to specific goals for noise abatement	Must prepare environmental guidance, regulations and standards to meet Congressional policy. Prepares environmental reviews on federal development actions at airports	Must manage for the safe and expeditious flow of air traffic. Prepares environmental reviews on airspace and flight procedure modifications	May establish state requirements to monitor noise levels or evaluate a change of environmental noise associated with proposed action
Loudness of individual aircraft airframe and engine design	Set general policy for aircraft noise levels and compatibility	Sets standards by size and number of engines for landing and takeoff noise	None	None
Location of takeoff routes	None	Advise on environmental and operational consequences of route revisions	Establishes and manages routes in accordance with requirements for safety and efficiency of flow	Usually none. Some states may require assessment of environmental consequences of changes
Location of arrival routes	None	Advise on environmental and operational consequences of route revisions	Establishes and manages routes in accordance with requirements for safety and efficiency of flow	Usually none. Some states may require assessment of environmental consequences of changes
Steepness of climb or descent	None	Flight standards and certification may have a role in approval of procedures	Assure proper separation between climbing and descending traffic and with surface structures and topography	None
Reduction of power or thrust settings during takeoff or landing (including reverse thrust and cutbacks)	None	Flight standards and certification may have a role in approval of procedures	Assure proper separation between climbing and descending traffic and with surface structures and topography	None
Selection of runway	None	Advise on environmental and operational consequences of route revisions	Assign runways in accordance with wind and operating standards	None
Time of activity (curfew)	Establish criteria for implementation of access restrictions	Review and/or approve or deny restrictions on activity times	None	None
Limits on flight operations (number of flights or noise budget or aircraft type restrictions)	Establish criteria for implementation of access restrictions	Review and/or approve or deny restrictions on activity times proposed by airport	None	None
Ground run-up location and timing	None	None	Assign aircraft to preferred run-up location	None
Construction of new on-Airport facilities for noise mitigation	May provide funding authorizations through the AIP process or through line-item funding in legislation	Must review and approve modifications to Airport Layout Plan through the environmental review process prior to construction. May participate in funding effort if eligible under Airport Improvement Program	Review to assure the proposed action does not degrade safety. Modify operating plan to incorporate new facilities, if applicable	May participate in funding. May require completion of state environmental documentation prior to construction

(Column header spanning all party columns: Authorities and Responsibilities of Parties. Row group label: Noise Abatement Actions)

Authorities and Responsibilities of Parties				
Airport Owner or Operator	**Aircraft Operators**	**Aircraft Manufacturers**	**Local Government Jurisdictions**	**Airport Neighbors**
May request change of FAA Air Traffic management procedures, through Part 150 or other action. May control noise of aircraft not in flight or on runway	Operate aircraft safely and in accordance with federal flight standards.	Must manufacture aircraft to meet established guidelines for weight and number of engines	Communities may establish controls on ground activity, but are preempted from jurisdiction over aircraft in flight or during landing or takeoff	None
None	Maintain aircraft to continue to meet standards	Design and construct aircraft to achieve certification standards set by federal regulation	None	None
May advise and request modifications to routes for noise abatement	IFR – fly routes assigned by ATC. VFR – fly where desired assuring separation from other traffic	None	None	None
May advise and request modifications to routes for noise abatement. May add number of routes through improved instrumentation for landing	IFR – fly routes assigned by ATC. VFR – fly where desired assuring separation from other traffic	None	None	None
May request changes for noise abatement	Fly to procedures set by FAA and within capabilities of aircraft	None	None	None
May request changes for noise abatement	Develop and train on standardized procedures within capabilities published by manufacturers	Publish information about aircraft capability for use by operators	None	None
May request from FAA-ATCT a preferential runway use program for noise abatement.	Operate in accordance with assigned runway from FAA-ATCT. Pilot may request a different runway.	None	None	None
May propose limits on time (curfews) of operation to FAA	None	None	None	None
May propose limits on numbers of operations or restrictions on aircraft types to FAA for review and approval/denial	None	None	None	None
Authorized to establish run-up rules and criteria, to include times, bearings and thrust	Operate in accordance with established rules	None	Communities may establish "at the fence" noise standards for ground activity, but must apply the standards to non-aviation activity as well.	None
Propose, design, and construct as approved by FAA. Provide local funding required. Maintain on completion.	Use operational facilities as assigned by FAA ATCT upon completion.	None	Review and modify if appropriate land use policies in areas that may become impacted by newly introduced or increased aircraft noise levels	Review, comment on, and discuss proposed development plans during environmental review process. Consider resulting noise levels in home purchase deliberations

Table 6-1.   (Continued).

	Noise Abatement Opportunity	United States Congress	FAA - All divisions except Air Traffic	FAA - Air Traffic Control	State Government
			Authorities and Responsibilities of Parties		
Noise Metric Selection	Mitigation actions within various noise levels	Establish funding priorities to designated levels of Day-Night Average Sound Level (DNL)	Interpret Congressional action to prioritize proposed mitigation actions requiring funding. Reviews and denies or approves EIS, Part 150 and Part 161 program actions requiring federal participation	Review proposed actions requiring modification of flight procedures or runway use to assure safety and continued efficiency of operation	Within the state, establishes priorities for noise abatement activities and sets bounds for statewide standards of noise sensitivity
	Noise metric used	Authorized FAA to select suitable metric for the description of aircraft noise	Established DNL as the acceptable metric to describe aircraft noise, based on annoyance. Reviews on a case-by-case basis the acceptability of supplemental metrics for planning	Follows FAA policy on suitable metrics	Within the state, may select additional metrics that are required for airport assessments
Land Use Management Actions	Land use planning	None	Recommends appropriate land uses compatible with airport operations and noise based on DNL noise levels	None	Within the state, may establish goals for land use compatibility and require efforts to achieve mitigation through planning, acquisition or remedial treatment. May require periodic reporting of achievements or changes in noise exposure levels
	Land acquisition for noise abatement	None	May fund part of the acquisition cost if included in an approved Part 150 Noise Compatibility Program or as mitigation in an approved EIS	None	May require completion of state environmental documentation prior to acquisition
	Zoning for compatible land use	None	None	None	May provide statewide guidance for compatibility, and methodology for zoning coordination
	Residential density control through subdivision design	None	None	None	Typically, none
	Modify building codes to improve sound insulation on construction	None	None	None	Typically, none
	Sound insulation of existing structures	None	May fund part of the program cost if included in an approved Part 150 Noise Compatibility Program or as mitigation in an approved EIS	None	Typically, none
	Noise level disclosure	None	None	None	May require notifications within given noise levels or distances from airport

Authorities and Responsibilities of Parties				
Airport Owner or Operator	**Aircraft Operators**	**Aircraft Manufacturers**	**Local Government Jurisdictions**	**Airport Neighbors**
Develops program of noise abatement and land use management actions for review and approval by FAA or local jurisdictions. Manages mitigation and implementation actions for which it is the funding source or agent	None	None	Communities may determine compatibility standards within their own jurisdictions, but to obtain FAA concurrence, they must manage development to control the introduction of incompatible uses to those standards	Where applicable, comment on proposed program actions under Part 150, Part 161 or EIS mitigation actions as part of public involvement process
Selects supplemental metrics most useful to provide information to those interested in noise patterns at airport. Uses DNL for all required documentation	None	Provides certification data to FAA using EPNdB and EPNL metrics. Provides SEL data to FAA for application in Integrated Noise Model	None	None
Work with land use management to seek controls on the development of incompatible uses within noise exposure pattern, based on local determination of noise level target	None	None	Jurisdictions establish and enforce land use management policies, including usage and density of development.	Review and comment on proposed Noise Compatibility Program or EIS mitigation actions during public involvement process. Exercise due diligence in selection of residential property prior to acquisition
May acquire land for noise mitigation as deemed appropriate to airport need	None	None	May express preferences, but unless the jurisdiction is the airport owner, will not have an active authority in process	Unless the owner of the property under consideration, none. If the owner, active participation, usually voluntary is required
None, unless the airport has jurisdiction over land uses in the airport environs	None	None	Sets zoning policy and establishes code within jurisdiction. Hears zoning change cases. Approves or denies applications for change	May review and comment through any hearing process associated with zoning or building codes
None, unless the airport has jurisdiction over land uses in the airport environs	None	None	Sets subdivision design requirements through development code. Hears and approves or denies requests for new subdivision or modification	May review and comment through any hearing process associated with zoning or building codes
None, unless the airport has jurisdiction over land uses in the airport environs	None	None	Adopts a standard building code or modifies to local need. Hears applications for variances	May review and comment through any hearing process associated with zoning or building codes
May fund and manage sound insulation programs for mitigation of existing structures. If eligible, partial funding is required	None	None	May establish standards for sound insulation within noise impacted areas for new or rehabilitated structures	None, unless an affected property owner
None, unless the airport has jurisdiction over land uses in the airport environs	None	None	May require noise level disclosure in transfer or advertisements for sale of properties within noise impacted areas - usually based on noise level, but may be based on distance from airport	May be obligated to disclose noise levels in any property transfer

(continued on next page)

Table 6-1. **(Continued).**

		Authorities and Responsibilities of Parties			
	Noise Abatement Opportunity	**United States Congress**	**FAA - All divisions except Air Traffic**	**FAA - Air Traffic Control**	**State Government**
Land Use Management Actions	Acquire noise/overflight easements	None	May fund part of the easement cost if included in an approved Part 150 Noise Compatibility Program or as mitigation in an approved EIS	None	Typically, none
	Institute development rights transfer program	None	None	None	Typically, none
	Institute purchase assurance program	None	May fund part of the acquisition assurance cost if included in an approved Part 150 Noise Compatibility Program or as mitigation in an approved EIS, and ultimately purchased by the airport	None	Typically, none
	Review development proposals for noise compatibility	None	None	None	Typically, none

Airport Authority established a ban on Stage 2 business jets after fulfilling the requirements of a 14 CFR Part 161 process. The measure was twice challenged in court by the FAA and user groups, and ultimately won by the city after several years delay. Conversely, several airports have established thresholds of significance for land management that restrict the development of residential development and noise-sensitive uses within lesser noise contours than 65 DNL, thus providing a greater envelope of protection against the risks of future conflicts between the airport and neighbors, through increased operations or upgrades of service. The specific noise levels of local thresholds are best defined through a thorough evaluation of local need.

Difference Between Noise Impact and Noise Effect

In simple terms, noise impact is limited to an area within a defined threshold of significance. For example, persons residing within the 65 DNL contour typically are considered to be adversely impacted by aircraft noise, if the 65 DNL contour has been determined to be the threshold of significant noise exposure. Conversely, persons residing beyond the 65 DNL contour are not considered to be adversely impacted by noise to a significant degree, but rather may be affected by aircraft noise. Persons may be affected by aircraft noise at any level or under a variety of different measurement techniques, but are not considered to be impacted by aircraft noise unless they are exposed to noise greater than the threshold of significance. See also"Differences within the FAA Divisions Regarding Thresholds of Noise Level Evaluation (60/65 DNL in Airports vs. 45/60/65 DNL in Air Traffic)"on the next page for additional clarification.

Difference Between Compatible and Incompatible (Noise-Sensitive) Land Uses

In practice, compatible land uses are those activities which may coexist with aircraft noise without being adversely impacted by them. Incompatible land uses are more specifically described as

Authorities and Responsibilities of Parties				
Airport Owner or Operator	**Aircraft Operators**	**Aircraft Manufacturers**	**Local Government Jurisdictions**	**Airport Neighbors**
May fund and manage easement acquisition programs for mitigation of existing uses and lands that are at risk for incompatible development. If eligible, partial funding is required	None	None	May require easements as a condition of zoning change or subdivision approval in areas of elevated noise, or within a designated distance from the airport	None, unless an affected property owner
May be an active participant in a swap of development rights or facilitator of transfers among others	None	None	If a change of zoning is required, must hear and approve or deny proposed transfer of development rights from one parcel to another	None, unless an affected property owner. If an owner, may negotiate terms after being contacted by the initiating party
May fund and manage purchase assurance programs for mitigation of existing structures. If resold, the funds must be returned to the FAA or used for fundable programs. If eligible, partial funding is required	None	None	None	None, unless an affected property owner. If an owner, and unable to sell after a designated period of time, may contact airport to negotiate sale
May participate in review of proposals provided by development approval agencies	None	None	Collaborates with airport owner in review of development proposals or applications for modification of zoning to incompatible uses within a designated airport environs area	May review and comment through any hearing process associated with zoning or building codes

residences, schools, churches, nursing homes, hospitals, outdoor amphitheaters, etc. where aircraft fly over activity may substantially impact the conduct of normal activity within those uses. 14 CFR Part 150 provides a detailed matrix of land use compatibility descriptions (*147,* Appendix A, Table 1) used by the FAA to assess how various land uses are affected by aircraft noise. See Table 6-3.

Differences within the FAA Divisions Regarding Thresholds of Noise Level Evaluation (60/65 DNL in Airports vs. 45/60/65 DNL in Air Traffic)

The FAA, Office of Environment and Energy, has established specific thresholds that are considered acceptable and supported by a preponderance of available scientific evidence. The FAA's Office of Planning and Environment has advised that these levels must be reported in 14 CFR Part 150 and Part 161 reporting, as well as in Environmental Impact Statements. The thresholds state that, for there to be a significant noise impact, there must be noise-sensitive public uses or persons residing within the 65 DNL contour of the annual average condition. When a change in the noise pattern is being environmentally assessed, an increase of 1.5 dB of DNL with a resultant DNL of 65 decibels or more constitutes a significant change. Should this situation be present, any areas exposed to a change of 3.0 dB of DNL or more, resulting in an annual average DNL of 60 dB or more are disclosed as having slight to moderate impacts.

The FAA's Air Traffic Organization has accepted these levels and added another for evaluations of modifications to flight routes. Should the changes previously cited be present, then any areas exposed to a change of 5.0 dB of DNL, resulting in an average annual DNL of 45 dB or more also is disclosed as having slight to moderate impacts. This reporting criteria is not recognized for application to environmental statements disclosing the effects of changes imposed by airport facility development, but only to modifications of aircraft flight paths. (*141*)

Table 6-2.   Relative effect.

Decibel Level	Duration - Seconds	Energy Units – Day	Energy Units – Night
1	1	1	10
	10	10	100
	50	50	500
10	1	10	100
	10	100	1000
	50	500	5000
20	1	100	1000
	10	1000	10000
	50	5000	50000
30	1	1000	10000
	10	10000	100000
	50	50000	500000
40	1	10000	100000
	10	100000	1000000
	50	500000	5000000
50	1	100000	1×10^6
	10	1000000	1×10^7
	50	5000000	5×10^7
60	1	1×10^6	1×10^7
	10	1×10^7	1×10^8
	50	5×10^7	5×10^8
70	1	1×10^7	1×10^8
	10	1×10^8	1×10^9
	50	5×10^8	5×10^9
80	1	1×10^8	1×10^9
	10	1×10^9	1×10^{10}
	50	5×10^9	5×10^{10}
90	1	1×10^9	1×10^{10}
	10	1×10^{10}	1×10^{11}
	50	5×10^{10}	5×10^{11}
100	1	1×10^{10}	1×10^{11}
	10	1×10^{11}	1×10^{12}
	50	5×10^{11}	5×10^{12}
110	1	1×10^{11}	1×10^{12}

The standards used by the Office of Planning and Environment are used by all divisions of the FAA, with the exception of the additional criteria described by the Air Traffic Organization use earlier.

NO DIVISION OF THE FAA HAS ADOPTED SPECIFIC THRESHOLD CRITERIA TO DESCRIBE A SIGNIFICANT IMPACT FOR ANY SINGLE EVENT METRIC, WHETHER BY NOISE LEVEL, DURATION OR NUMBER OF OPERATIONS.

Precedence of Federal and State/Local Standards and When Applicable

The federal government and its aviation regulatory agency, the FAA, holds precedent over local or state regulation of aircraft noise conditions, or numbers or time of operations when the aircraft is in the air, on the runway, or actively taxiing to and from a terminal area (including general aviation, cargo, or maintenance parking aprons) from a runway or taxiway. Several lawsuits have established the precedence of federal regulation over local control – the most notable of these was the case of *City of Burbank vs. Lockheed Air Terminal,* in 1973. In that case, the United States Supreme Court found that local communities may not use their police powers to control noise at airports that are owned by others. (*145*)

Table 6-3.   Land use compatibility guidelines – 14 CFR PART 150 (Table 1, Appendix A).

LAND USE	YEARLY DAY-NIGHT AVERAGE SOUND LEVEL (DNL) IN DECIBELS					
	BELOW 65	65-70	70-75	75-80	80-85	OVER 85
RESIDENTIAL						
Residential, other than mobile homes and transient lodgings	Y	N[1]	N[1]	N	N	N
Mobile home parks	Y	N	N	N	N	N
Transient lodgings	Y	N[1]	N[1]	N[1]	N	N
PUBLIC USE						
Schools, hospitals, nursing homes	Y	25	30	N	N	N
Churches, auditoriums, and concert halls	Y	25	30	N	N	N
Governmental services	Y	Y	25	30	N	N
Transportation	Y	Y	Y[2]	Y[3]	Y[4]	N[4]
Parking	Y	Y	Y[2]	Y[3]	Y[4]	N
COMMERCIAL USE						
Offices, business and professional	Y	Y	25	30	N	N
Wholesale and retail -- building materials, hardware, and farm equipment	Y	Y	Y[2]	Y[3]	Y[S]	N
Retail trade, general	Y	Y	25	30	N	N
Utilities	Y	Y	Y[2]	Y[3]	Y[4]	N
Communication	Y	Y	25	30	N	N
MANUFACTURING AND PRODUCTION						
Manufacturing, general	Y	Y	Y[2]	Y[3]	Y[4]	N
Photographic and optical	Y	Y	25	30	N	N
Agriculture (except livestock) and forestry	Y	Y[6]	Y[7]	Y[8]	Y[8]	Y[8]
Livestock farming and breeding	Y	Y[6]	Y[7]	N	N	N
Mining and fishing, resource production and extraction	Y	Y	Y	Y	Y	Y
RECREATIONAL						
Outdoor sports arenas and spectator sports	Y	Y	Y[5]	N[5]	N	N
Outdoor music shells, amphitheaters	Y	N	N	N	N	N
Nature exhibits and zoos	Y	Y	N	N	N	N
Amusements, parks, resorts, and camps	Y	Y	Y	N	N	N
Golf courses, riding stables, and water recreation	Y	Y	25	30	N	N

The designations contained in this table do not constitute a federal determination that any use of land covered by the program is acceptable 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.

Key To Table 1, Appendix A, 14 CFR Part 150
Y (Yes)   Land use and related structures compatible without restrictions.
N (No)   Land use and related structures are not compatible and should be prohibited.
NLR   Noise Level Reduction (outdoor to indoor) to be achieved through incorporation of noise attenuation into the design and construction of the structure.
25, 30, 35   Land use and related structures generally compatible; measures to achieve a NLR of 25, 30, or 35 dB must be incorporated into design and construction of structure.

Notes for Table 1, Appendix A, 14 CFR Part 150
1. Where the community determines that residential or school uses must be allowed, measures to achieve outdoor-to-indoor Noise Level Reduction (NLR) of at least 25 dB and 30 dB should be incorporated into building codes and be considered in individual approvals. Normal residential construction can be expected to provide a NLR of 20 dB, thus, the reduction requirements are often stated as five, ten, or 15 dB over standard construction and normally assume mechanical ventilation and closed windows year round. However, the use of NLR criteria will not eliminate outdoor noise problems.
2. Measures to achieve NLR of 25 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
3. Measures to achieve NLR of 30 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
4. Measures to achieve NLR of 35 dB must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise-sensitive areas, or where the normal noise level is low.
5. Land use compatible provided special sound reinforcement systems are installed.
6. Residential buildings require a NLR of 25 dB.
7. Residential buildings require a NLR of 30 dB.
8. Residential buildings not permitted.
Source: FAR Part 150 Airport Noise Compatibility Planning, Appendix A, Table 1.

Local government may establish criteria for the regulation of aircraft noise when the aircraft is parked on an apron or ramp, or is under maintenance in an active run-up configuration. This finding was confirmed by the U.S. District Court in its finding in *National Aviation et al. vs. City of Hayward* (1976) which decided that local noise control restrictions may be implemented by a community as an airport owner or operator, but not through its police powers. (*148*)

The United States Congress passed the Airport Noise and Capacity Act (49 USC 47521) in 1990, which among other things included a National Aviation Noise Policy prohibiting locally based restrictions on Stage 3 aircraft without federal approval, while requiring phase out of Stage 2 aircraft weighing more than 75,000 pounds by 2000. It also authorized Passenger Facility Charge (PFC) funding for airport development.

Although the FAA has published guidance to the compatibility of various land uses with differing levels of aircraft noise (as described by DNL) through its 14 CFR Part 150 guidance, the agency does not have the authority to manage or control land uses on property beyond the boundaries of federal ownership off the airport. Further, the airport sponsor is responsible for the usage of land within the boundaries of the airport, but must comply with federal guidelines to assure the safe operation of any aircraft using the airport (i.e., to avoid the introduction of obstructions on the airport). Local communities or states may regulate the use of land in areas off the airport, including zoning and subdivision, review of development propositions, and the regulation of the heights of structures.

Frequently the federal and local agencies work together to develop plans for the compatible development of lands surrounding the aviation facility within the framework of community-wide planning needs and airport need.

Measured versus Computer-Modeled Noise Levels

The airport manager will frequently be asked to explain the difference between noise levels that have been measured in the field and noise levels for the same location that have been modeled by computer software. Frequently there will be differences of several decibels between two numbers for the same place.

Modeled Noise

At most airports, noise levels are described by either a series of contour lines representing points of equal noise exposure or by projected single event or cumulative noise levels at selected locations. Because it would require extensive sets of noise measurement equipment placed over a wide area for long periods of time to develop contours from measured data – at costs well beyond the means of all but the most affluent airports – computer models have been developed to simulate the noise patterns created by aircraft. Two models are accepted by the FAA's Office of Environment and Energy (AEE) for use on federally funded airport noise studies – these are the Integrated Noise Model (INM) and the Helicopter Noise Model (HNM). Under the provisions of FAA Order 1050.1E, Change 1, Appendix A, Section 14.4d, noise contours required for various environmental analyses conducted with federal funding assistance must be developed using the INM or HMH. In studies of flight track relocations above 3,000 feet above the ground level, the Noise In Route System (NIRS) model is also acceptable, but generally applied only to work sponsored by the Air Traffic Organization. Other models may be used if prior approval is sought from and certified by the AEE as having results equivalent to those produced by the INM or HNM.

For planning evaluations and assessments of environmental effect conducted under federal grant or for federally funded development, the modeling of noise levels is considered more acceptable than the use of measurements for several reasons. Measurements cannot reflect conditions that do not exist, i.e., they cannot provide projected noise levels for future years or for

alternative operating configurations. Furthermore, except for the most sophisticated systems, measurements do not reflect the complete annual condition usually required by planning documents. Modeled noise levels can capture hypothetical cases and alternative conditions that are impractical to measure over any length of time. Computer models can also interpolate the noise patterns across any area, based upon the input provided to the model. Consequently, great care must be taken to the preparation and verification of input data, including flight track locations, types and numbers of aircraft, their distribution through the day, their use of various runways, and the rates at which they climb or descend from the airport. Once these variables are coded and processed, the projected noise levels of individual aircraft may be compared to measured noise levels of similar aircraft flying comparable flight paths to verify the validity of the modeling effort. If not comparable, the input data may be adjusted to provide a better fit with the measured data for individual aircraft.

Measured Noise

Measurements of single aircraft events, collected with a properly calibrated scientific noise measurement instrument in the field, are nearly always more accurate than the computer-modeled noise level—for that same operation, and if the portion of the measured noise attributable to non-aircraft sources is filtered out. Further, Section 14.4f of FAA Order 1050.1E, Change 1, Appendix A, provides that noise measurements are not required in federally funded environmental documents, nor should they be used to calibrate the computer model.

To be fully acceptable for inclusion in federally sponsored environmental evaluations, measurements should be conducted in accordance with the programmatic guidelines presented in 14 CFR Part 150 guidelines (FAA Advisory Circular 150/5020-1, *Noise Control and Compatibility Planning for Airports,* FAA, 1983).

Notably, measured data is required by state law to be reported in some locations. For example, in California, measurements are required to be reported quarterly to the State Division of Aeronautics under the California Airport Noise Standards (*149*) Under Section 5032 of the Code; the measured data recorded by sets of permanent noise monitors serves as the basis for noise contour mapping at each airport designated as a "noise problem airport". Currently, nine large California air carrier airports and Van Nuys Airport are designated to be "noise problem airports".

Aircraft Noise-Based Vibration and Rattle

Persons who reside near airports will occasionally comment about vibration or rattle, which they associate with aircraft noise events. When related to aircraft, these phenomena are normally caused by low frequency noise generated during takeoff roll or the application of reverse thrust that is often limited in area to locations near the airport.

A recent assessment of the available literature regarding this relationship (*150*) indicated that there is no generally accepted relationship between low frequency and annoyance. Neither have any studies indicated a causal relationship between low-frequency noise generated by aircraft and structural damage to any buildings off of an airport, although the rattle generated by the low-frequency vibrations may be considered annoying by some persons. Low-frequency noise and rattle was the subject of a recent PARTNER project, the results of which may be found at

http://web.mit.edu/aeroastro/partner/projects/index.html. (*151*) 🖰 6-8

Sound Insulation Programs for Noise Abatement

Since early recorded history, the Egyptians and Romans have used cork as a renewable source of thermal insulation for pipes and roofs. What they didn't realize was that they were also the first

humans actually providing sound insulation to their homes. Even back in 1937, *The Washington Post* published an article stating how insulating materials were being used for thermal and sound insulation.

However, it really wasn't until the 1960s when large jet aircraft became common at commercial airports that aircraft noise began to be recognized as a real issue in residential areas around airports. LAX started one of the first airport-sponsored sound insulation programs in 1967. However it really was not until The Aviation Safety and Noise Abatement Act (ASNA) of 1979 that sound insulation programs really started to take off. ASNA permitted the FAA to provide funding noise mitigation projects at airports. One of the first projects in the early 1980s was the treatment of homes near Boston's Logan International Airport (BOS).

FAA funds are provided once an airport has an approved Noise Compatibility Program (NCP), but the FAA will also provide funds for buildings used for educational or medical purposes without an approved NCP.

A sound insulation program is comprised of several phases including the following:

- Startup activities;
- Design and implementation phase;
- Bid and award phase;
- Construction phase; and
- Program evaluation.

The startup activities include the review of existing program documents, development of a policy and procedures manual, determining the community outreach requirements, reviewing acoustical treatment options, and coordinating with the local jurisdictional agencies and the FAA.

The design and implementation phase includes undertaking homeowner outreach, scheduling and conducting initial assessment visits, performing pre-construction acoustical testing, evaluating the mechanical and electrical systems, performing a structural and hazardous materials evaluation, and preparing final bid documents. During the bid and award phase, a pre-bid conference is held, along with a pre-bid walk through, followed by a review of bids, and the contract award.

In the construction phase a pre-construction conference and walk through is held followed by pre-construction review. Construction begins and work includes construction administration and inspections, followed by contract closeout. The final program evaluation would include post-construction acoustical testing, undertaking homeowner satisfaction surveys, preparation of a final program report, and preparation of the documentation to close-out the FAA Grant.

One of the biggest issues facing airports today, with regards to their sound insulation program, is changing DNL/CNEL contours. Many airports have large ongoing programs with the limits defined as part of an approved NCP, some going back to the 1990s. Since that time the airline industry has changed dramatically. Overcapacity and the 9/11 attacks, among other reasons, have caused carriers to cutback and phase out the noisier hush-kitted aircraft. Quieter regional jets became more common and many carriers either went bankrupt or restructured and downsized due to financial considerations. More recently the high cost of fuel has resulted in schedule reductions, further airline bankruptcies, and mergers.

The result is that many contours around airports have shrunk dramatically. They are much smaller than the contours upon which the sound insulation program was based in the original NCP. In many cases the FAA is requiring airports to update the noise contours, resulting in smaller sound insulation programs. Where residents were initially in the program, they now fall outside the program limits and the airports have to deal with the public relations fallout as a result of these diminished contours.

Difference between Interior and Exterior Sound Levels and Methods to Abate Each

The abatement of noise inside a structure is largely based on structural modifications to the receiving building, while abatement of noise outside a structure is focused on its source. As a rule of thumb, aviation noise levels are reduced by approximately 15-20 decibels between exterior and interior measurements for well-constructed buildings in the middle latitudes. When windows remain closed year-round or the structure is in higher latitudes and well-insulated to retain heat, the difference between levels may average somewhat higher, while in the tropics or sub-tropics where windows remain open for much of the year, the difference between outdoor and indoor noise levels from an aircraft overflight may be less.

Interior Noise Abatement

The purpose of a sound insulation program is to reduce the adverse impacts of aircraft noise on residents near an airport. In general, sound insulation programs help to preserve neighborhoods and communities, improves homes and neighborhoods, and makes the interior of homes more inhabitable.

The major paths for noise transmission into a house in order of importance are: gaps and cracks, windows and doors, and walls and roof. Therefore, the generalized acoustical approach for treatment protocols would be to:

- eliminate all openings and flanking;
- improve all windows and doors;
- improve walls and ceilings;
- add mechanical ventilation or central air conditioning; and
- treat attic spaces and/or roof structures.

Windows treatments would include replacing existing windows with single- or double-pane acoustical windows that may include monolithic or laminated glass and also may include a storm window depending upon the noise reduction requirements. Specialty windows such as bay, bow, stained glass, or garden windows are evaluated on a case-by-case basis for treatment requirements. Windows in unfinished attics, attached garages, and unfinished basements are typically not treated, although the windows may be replaced with a nonacoustical window to maintain the similar look on the outside of the house.

Door treatments are likely to include replacing existing doors with acoustically rated or solid wood doors making sure the door and frame have good seals and gaskets. Storm doors are added depending upon noise reduction requirements. Specialty doors such as sliding patio doors and French doors also are treated. Doors to basement areas, attached garages and finished attic spaces are usually not treated, while a door to an unfinished attic may be treated.

Roof treatments are usually not required in homes with normal attic space although additional batting or blown-in insulation may be added. Hatches to attic spaces may be covered with batt insulation and the opening resealed and regasketed. For homes with vaulted or cathedral ceilings, acoustical treatment is evaluated on a case-by-case basis. Additional gypsum board may be added to the interior ceiling in some cases to build up the noise reduction capabilities of the ceiling.

Wall treatments are rarely required, except in extremely high noise areas. In those cases, additional gypsum board may be added to the interior walls to build up the noise reduction capabilities of the exterior walls.

The HVAC system of each home is also evaluated and treated. Installation may include either a central air conditioning or whole house ventilation system. For homes with a forced air system, a central air conditioning system will be installed as required. Existing furnaces may be upgraded

to accommodate the system if the cost is less than furnace replacement. For homes with a hot water system, the existing boiler system will not be replaced, but a separate condensing system would be installed. Electrical systems will be upgraded as necessary to accommodate the new systems.

Kitchen and bathroom vents will be treated as necessary. This may include replacing with a non-recirculating fan, baffling the fan exhaust, or rerouting the ductwork thru a ceiling or attic space.

In most cases, roof, gable, soffit, and ridge vents are baffled per standard details to reduce noise infiltration into the house.

Exterior Noise Abatement

The abatement of noise outside a structure may be accomplished through quieting the source or making it less frequent. These actions may be accomplished through modifications of flight tracks, runway usage programs, changes in aircraft run-up locations or hours, or changes in flight procedures. Of comparable value are noise mitigation actions that manage the development of noise-sensitive properties in areas exposed to significant levels of aircraft noise. The land itself may be designated for uses that are deemed compatible with aviation noise sources (industrial, commercial, agricultural, and open space uses are often selected as the most suitable to accomplish this end). Chapters 7 and 8 of this report discuss a number of opportunities for noise abatement through aircraft operation or land use management.

Contour and Impact Area Change Over Time and the Differences Between Federal and Local Response to Change

During the years since the introduction of noise contours, the area within the contours of significant noise exposure (65 DNL) have generally shrunk around airports where its mission and character of its operations have remained unchanged through time. In 2007 the FAA reported that the requirement of increasingly more restrictive 14 CFR Part 36 noise level requirements during the last quarter of the 20th century resulted in a reduction of the number of persons within the 65 DNL contour around the nation's airports by 90 percent between 1975 and 2000. When the last of the Stage 2 jets were retired from the United States continental fleet at the end of 1999, the population within the 65 DNL pattern at U.S. airports was estimated to have been reduced from over 7 million to less than 700,000. Subsequent information suggests an additional reduction of approximately 27 percent from year 2000 levels, or to less than 500,000 today. (More is available at: http://www.faa.gov/about/plans_reports/Performance/quarter_scorecard/media/Noise%20Exposure%20Detail.pdf)

Even though the number of large aircraft operating today is much greater than was present more than 30 years ago, the patterns of significant noise levels have been reduced through a combination of improvement in aircraft design, engine design, flying techniques, and air traffic actions. The reductions are being maintained through the management of land uses in areas exposed to high noise levels to assure that the risks to the continued operation of the nation's airports remains low.

Federal Response

With the gradual shrinking of the noise exposure patterns of 65 DNL or more has been the reduction of the area in which the FAA will fund land mitigation programs. The FAA has made it a practice to limit its funding of acquisition and sound insulation programs to areas within the 65 DNL contour, often prioritizing such programs to mitigate the most severely (loudest) affected areas first.

Consequently, some programs implemented in areas around large airports find that by the time the schedule of improvements has reached the outlying program areas, the noise levels are no longer sufficiently high to justify the mitigation action because the contours have shrunk.

More recently, the FAA has become more rigid in its evaluation of noise abatement procedures for the ability to mitigate noise impacts within the 65 DNL contour. For example, a measure may have the substantial benefit of removing low level overflights from a residential area just beyond the 65 DNL contour if the traffic that created those overflights were turned 15 degrees away from the runway heading. Although many might benefit at a level just below 65 DNL and experience many fewer direct overflights, the measure may not be justified if one additional person is exposed to 65 DNL or more as a result of the turn. This situation has been the crux of the evaluation arguments on a number of Part 161 study cases that have been presented to the FAA for review.

Local Response

The reduction of the size of the 65 DNL contour has led communities into a dilemma of land management and compatibility controls. Two principal ways this has occurred have been through 1) the modification of public expectations for sound insulation programs for those who were within the contour of definition at some time in the past and have come to believe they are entitled to sound insulation that will "fix up" their homes; and 2) the release of areas of vacant and undeveloped land from within the controlled contour area that becomes either eligible for development of, or much more difficult to justify the prevention of, noise-sensitive uses.

In the first case, and depending upon the number of units that remain to be sound insulated, airports may choose to continue a preexisting program at their own expense or abandon the program for those areas that no longer are eligible for federal reimbursement. When programs are abandoned, there is usually a public relations crisis and hard feelings develop that may continue for years. It is usually a better practice to publish only the programmatic boundaries of sound insulation programs that are actively underway and to emphasize in every news release about the program that additional areas may be added as federal funding becomes available. Should the airport sponsor choose to continue a program beyond the 65 DNL contour, only limited federal funding for immediately contiguous areas may be available and the bulk of the excess cost will fall on the sponsor.

In the second case, land that has been prevented from incompatible development, but is subsequently removed from within the 65 DNL contour by area shrinkage, will often become the focus of new opportunities for the development of noise-sensitive uses. Around many airports, residential developers build up to the contour line. When the contour line retracts, proposals often soon follow to develop additional new residential lands to the new contour line, and so forth. Then, if the character of the airport changes, or if only a couple of new nighttime operations by loud aircraft are introduced, the contour may expand and the new residential development is again within the contour and the airport often faces a public relations crisis of increasing noise over residential areas and public demand for abatement. Two widely used controls available to the airport to manage this situation are either outright ownership of all the land within the larger 65 DNL contour, or public land use jurisdictional control for non-noise sensitive uses within an area surrounding the 65 contour for the expected worst case condition.

Self Assessment Tools for Noise Management Programs

As airport managers face the question of whether or not to implement a noise management program, or if one is in place, what its status may be, it is helpful to have an organized way to think through the issues. The preceding sections have provided an overview of the rules, the roles, the responsibilities, and the issues involved in noise abatement and land use mitigation planning efforts, and have discussed the involvement of the public in those efforts. This section

provides two checklists that airport managers may use in 1) assessing the usefulness of establishing such a program if one does not exist, or 2) evaluating the status of an existing program.

Evaluation Checklist for Airports without Noise Programs

Those airport managers that have not previously had the need to engage with the public regarding aircraft or airport noise issues may not have a clear understanding of the issues. New noise management programs are often the result of pressure generated by the local political process at the urging of outspoken members of the public. Although their governance structures differ, both public and private airports must be sensitive to public pressure manifested through the political process. The tool included in this section provides an overview to the manager of an airport without a noise program in 1) is a program advisable; and 2) what information is needed to consider the approach to initiating a program? 🖱 6-9

Evaluation Checklist for Airports with Established Noise Programs

Airports with well-established noise programs are usually aware of their level of success in seeing its components implemented. Airports with permanent noise officers or staff address public inquiries on a daily basis, provide status reports on the success or failure of their programs, and act as a conduit between higher management and the surrounding community. However, the level of commitment to noise program management, its funding, and its responsibilities varies widely among those airports that have addressed aircraft noise issues. The checklist tool provided in this section allows the airport noise officer or airport manager to evaluate the status of the existing program and changes that may have occurred since the program was initiated to determine if modifications or updates are warranted. 🖱 6-10

Noise Metrics and Community Response

National aircraft noise policy and public perception are often different in the view of what conditions constitute an adverse noise impact. The EPA and FAA have adopted the DNL as the defining metric for the description of aircraft noise impacts. The Federal Interagency Committee on Urban Noise (FICUN) (*152*) found in 1980 that DNL is the best descriptor of community impact. The finding was reconfirmed by the subsequent Federal Interagency Committee on Noise (FICON) (*8*) in 1992. Several studies of public reaction to noise have found the metric to best correlate to the number of persons highly annoyed by transportation noise. Figure 7-1 (*150*) reproduces the Schultz and Fidell Curves, which relate the percentage of persons who consider themselves to be highly annoyed by noise to the DNL decibel level.

Although DNL takes into account every aircraft noise event experienced by the airport neighbor, it can be experienced only in cumulative terms. Many airports responding to the surveys and interviews conducted for this assessment, as well as the authors' experience on numerous 14 CFR Part 150 and EIS evaluations, have indicated that individuals respond more positively to single event noise levels that they directly experience. As airport managers communicate with neighbors and the general public on noise issues, it is appropriate that they be acquainted with the variety of noise measurements and metrics available to respond to public comment. In discussions with the public, it is essential to use graphic representations to demonstrate the concepts of noise. Several examples are provided for the more common of the metrics used in the United States. For complex situations, the reader also may consider various demonstration tools that have been developed to convey some of the complexities of noise and its associated metrics. Among these tools are the FAA's designated computational model for noise evaluations, the Integrated Noise Model (INM) (http://www.faa.gov/about/office_org/headquarters_offices/aep/models/inm_model/) (*153*), the Interactive Sound Information System (ISIS) (http://www.noisemanagement.com) (*120*) and the Noise Model Simulation (NMSIM) (http://www.wylelabs.com/products/acousticsoftwareproducts/nmsim.html) (*154*). A number of derivative graphical interfaces are commercially available from aviation and acoustic consultants to display the results of noise simulations.

There are three types of noise metrics: those that express noise cumulatively as a function of total energy experienced over a set period of time, those that express the noise levels experienced during a discreet aircraft operation, and those that are a hybrid of the other two. The following sections will address each and how they might be used in describing the patterns of current or changing aircraft noise levels to the public. The tools identified throughout this document provide illustrative examples of ways each metric is used, including several animations developed to aid public understanding. Table 7-1 provides a summarization of the utility of various metrics that are discussed in subsequent paragraphs for functions that are subject to public scrutiny.
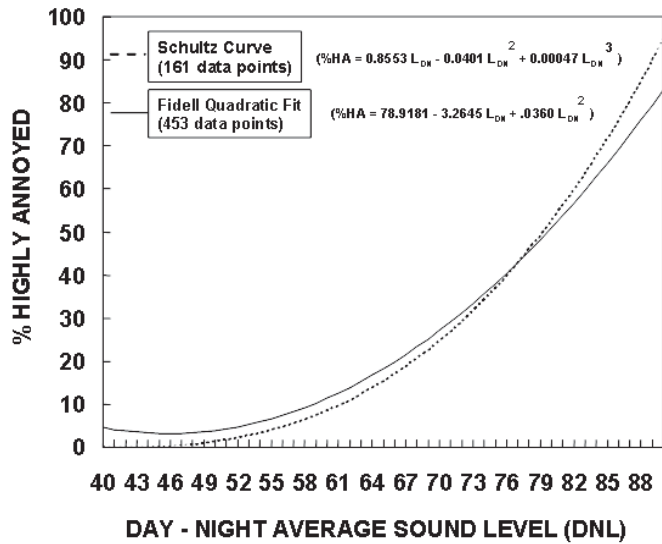
Figure 7-1.   Prediction curve from Fidell compared with original Schultz Curve (adapted from Fidell, Barber, 1991, as presented in ACRP Synthesis S02-01 Report, Effects of Aircraft Noise: Research Update on Selected Topics (145)).

Cumulative Noise Metrics

All cumulative noise metrics are expressions of the total amount of acoustic energy that is present. Most express a 1-second average of the noise energy that occurs during a selected period of time. Based on the needs of the governmental jurisdiction where each is used, they often are adjusted to weigh more heavily periods of the day that are considered to be more noise-sensitive. Those that the airport manager in the United States should become most familiar are the DNL

Table 7-1.   Utility of available noise metrics for public communication programs.

Application	Applicable Noise Metric Type in United States		
	Cummulative	Single Event	Hybrid
EIS/EA/Part 150 evaluations	DNL, CNEL		
Comprehensive land use planning	DNL, CNEL	L_{max}, SEL, Altitude	
Noise abatement planning	DNL, CNEL	L_{max}, SEL, Slant range distance, altitude	NA, TA
Sound insulation	DNL, CNEL, L_{eq}	L_{max}	
Section 303(c) or 4(f) evaluations	DNL, CNEL		
National Parks evaluations	DNL		TA ambient, TAUD
Vibration assessments		C-weighted SEL	
Sleep disturbance		SEL	
Speech disturbance		L_{max}	
Public involvement and clarification programs	DNL, CNEL	L_{max}, SEL, Slant range distance, altitude	NA, TA

DNL – Day-Night Average Sound Level
CNEL – Community Noise Equivalent Level
L_{eq} – Equivalent Sound Level
L_{max} – Maximum Noise Level
SEL – Sound Exposure Level
NA – Number of Events Above (a user defined threshold)
TA – Time Above (a user defined threshold)
TAUD – Time Audible

or CNEL in California and L$_{eq}$, as described in the following sections. Other cumulative metrics such as the Day-Evening-Night Level (Lden) used in Europe, the Australian Noise Exposure Forecast (ANEF), the Weighted Equivalent Continuous Perceived Noise Level (WECPNL) used predominantly in Asia, and the Noise Exposure Forecast (NEF) used in Canada, will occasionally be raised by the public in discussions of noise issues, but are not accepted as primary metrics in the United States. Occasionally these metrics may be used in complex studies for supplemental analyses. They are described in the toolkit. ⟨🖱 7-1⟩

FAA evaluations of the environmental effect of airport development or air traffic modifications require an assessment of the change of noise level that will occur. Consequently, the best examples of metric usage often are maps displaying areas of expected change. Throughout this chapter, examples of the key metrics and ways that change may be graphically illustrated for public consumption will be provided.

Day-Night Average Sound Level (DNL or Ldn)

DNL considers all the noise energy that occurs during an average day of operation. The sum of the noise energy present between the hours of 10 p.m. and 7 a.m. is multiplied by 10 then added to the sum of the noise energy present between 7 a.m. and 10 p.m. (this equates logarithmically to multiplying each nighttime operation by 10 before the energy of each noise event is summed). This penalty is applied in recognition of the increased sensitivity of people to operations during the nighttime hours. The total is divided by the number of seconds in a 24-hour day (86,400) to obtain a 1-second average energy level. The logarithm of the average is multiplied by 10 to obtain the DNL level (see the glossary for formulae) ⟨🖱 7-2⟩ . The metric is complex, the mathematics are obscure to the general public, and the measure cannot be directly heard by neighbors. Many members of the public complain because the DNL averages energy across every second of the day, rather than only those seconds when aircraft noise occurs.

The FAA has adopted the DNL as the only noise metric required for consideration in airport projects, although it may be supplemented by other metrics to better explain characteristics of the noise exposure pattern. As the metric of choice, the 14 CFR Part 150 land use compatibility guidelines are based on thresholds of DNL. A DNL of 65 dBA has been identified as the threshold of significant noise impact above which efforts should be taken to mitigate noise levels. Computer-generated contours connecting locations of equal noise exposure are typically used in the selection of land use development criteria and plans in airport environs.

Example of Metric Display for Public Information:

- Change in Day-Night Average Sound Level (DNL) Combined Alternatives (Boston Overflight Noise Study, Phase 1) (*155*) ⟨🖱 7-3⟩

- Comparative DNL Contours for Baseline and Alternative Conditions at Boston Logan International Airport (Boston Overflight Noise Study, Phase 1) (*156*) ⟨🖱 7-4⟩

- Example of DNL computation Video: (prepared for ACRP 02-05 project) ⟨🖱 7-5⟩

Community Noise Equivalent Level (CNEL)

CNEL is similar to DNL and used for essentially the same purposes. Required by state law in California, the FAA has approved CNEL as an acceptable substitute for DNL in federally funded airport noise analyses there. In addition to the penalty applied to nighttime operations by DNL, CNEL also applies a penalty to operations that occur during the evening hours between 7 p.m.

and 10 p.m. The evening penalty multiplies the sum of the evening energy by 4.77 before adding it to the sums of the daytime and nighttime energy levels. The evening penalty is equivalent to considering each evening operation to have three times the effect of an equivalent daytime operation.

The State of California mandates that CNEL noise exposure contours be made available for public land use planning in the same way that DNL contours are used at airports outside the state. Further, at several large airports, the contour patterns are regularly monitored to strive to meet a state requirement that no residences be located within the 65 CNEL contour. Where such incompatible uses remain, the airports must allow variances to the rule and demonstrate their attempts to reduce the overall impact of noise in neighboring communities through noise abatement or mitigation.

Equivalent Sound Level (L$_{eq}$)

The L$_{eq}$ is the simplest and most flexible of the cumulative metrics. It does not apply penalty factors based on time of day, nor does it require consideration over a 24-hour period. The metric may be used by planners to assess the comparative noise effects of any number of events on people. For example, the L$_{eq}$ may be computed for 1-hour periods, for the nighttime hours, for school hours, for a peak period of operations, or any other duration desired. It may be used to compare the cumulative contribution of specific aircraft types, users or user groups to the total noise energy. It also may be used to reflect the combination of discrete aircraft events having different noise characteristics.

The analytical use of the L$_{eq}$ metric may be widely varied in considering various noise abatement operational techniques. L$_{eq}$ levels allow a more in-depth assessment of the specific costs or benefits of flight actions by comparing, for example, the noise energy from aircraft flying along one departure track as compared to another. When mapped, the two resulting patterns may guide noise management programs to maximize the reduction of impacts on underlying populations.

Single Event Noise Metrics

Cumulative aircraft noise contours often are challenged by airport neighbors as not representing what can be heard and measured every time an aircraft flies over their home. Long duration measurements and computer technology may indicate the contour patterns are accurate for the community, but they fail to capture the discrete nature of the single events that people actually identify and complain about.

As louder Stage 2 aircraft were removed from the commercial operating fleet during the 1990s, cumulative noise contours shrank significantly from earlier sizes. Although the contour reduction could be attributed largely to the reduction of noise from individual aircraft, the number of actual operations has generally increased. As a consequence of this change, the public has become more vocal in demanding that the number and noise levels of single events be assessed in environmental evaluations. Several metrics are available to respond to this demand.

Sound Exposure Level (SEL)

The SEL is a mathematical expression of the noise energy present during an event or a period of time, normalized to a single second. Consequently it is always larger than any cumulative noise measurement of the same event that lasts longer than one second. It provides the noise analyst the ability to directly compare the acoustic energy generated by two separate events,
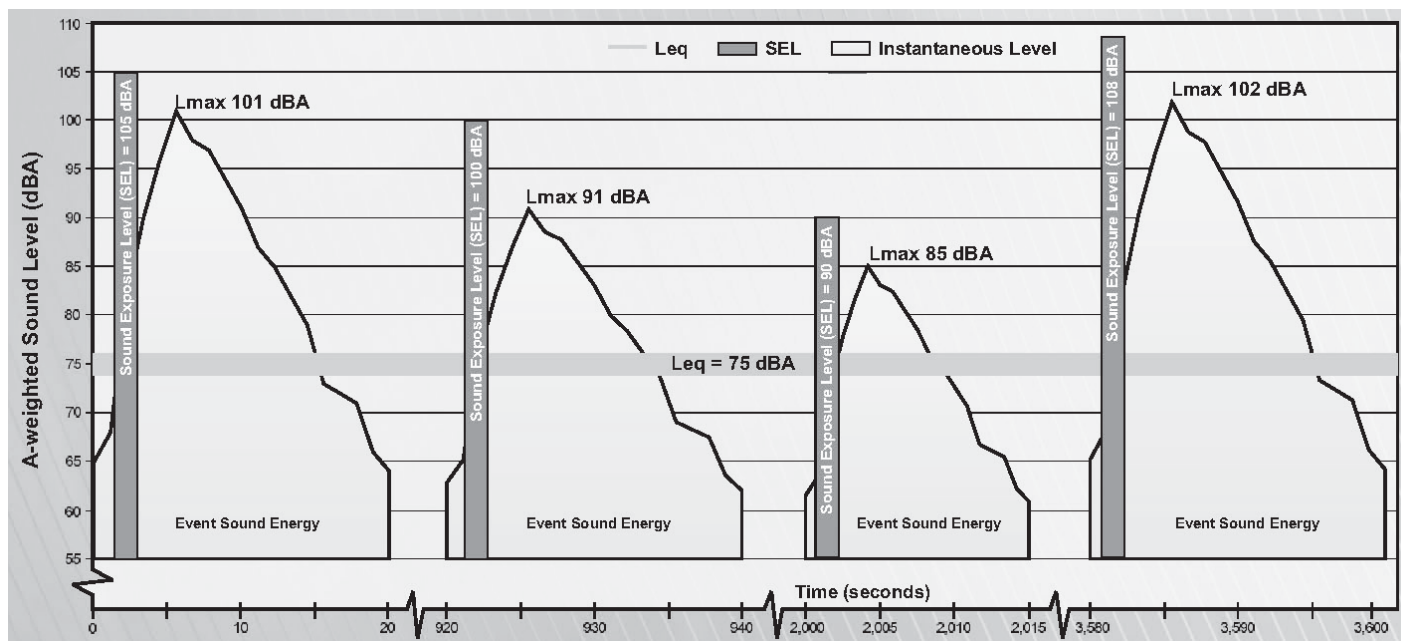
Figure 7-2.   Comparative single event noise metrics compared to equivalent noise level.

while clearly accounting for both their peak noise levels and durations. For example, the same operation may be considered along an existing and proposed flight track. The SEL of each operation would be compared to provide insight into the prospective effects of changing location on the underlying population. Further, the SEL is the preferred metric for the evaluation of sleep disturbance, making it critical to the evaluation of noise abatement measures that are directed at night operations. Typically, the SEL is approximately 8-10 decibels louder than the peak noise level that occurs during a single event. The SEL is represented by a series of dark bars and compared to the measured noise levels, including L_{max}, through the course of several single events in Figure 7-2.

Example of Metric Display for Public Information:

- Example of SEL computation Video: (prepared for ACRP 02-05 project) 🖰 7-6

Maximum A-Weighted Sound Level (L_{max})

The L_{max} of an event represents the loudest decibel level achieved during that event. It also can be expressed over a period of time (hour, day, year, etc.). Similar to SEL, the metric is useful to compare operational alternatives for noise abatement. Unlike SEL, it is not subject to the compression of all noise energy during an event into a single second, but rather provides the instantaneous peak noise level achieved. Consequently, it is the loudest aircraft noise level the public experiences, and often the one most cited in public comment and complaint.

Example of metric display for public information:

- Comparison of Sound – Outdoor and Indoor sound levels (*157*) 🖰 7-7

- ORD Aircraft Noise Comparison (single event footprints) (*158*) 🖰 7-8

- Loudest Aircraft Noise Events Site Report (Chicago O'Hare) (*159*) 🖰 7-9

- Example of L_{max} computation Video (prepared for ACRP 02-05 project) 🖰 7-10

Slant Range Distance/Altitude

Another factor frequently cited by the public as a noise issue is the distance from the aircraft in flight to the listener on the ground (the slant/range distance) or the aircraft's altitude. The slant/range distance represents the hypotenuse of a triangle formed by the aircraft altitude and the lateral distance from the ground location to the point of closest approach along an aircraft's path of flight. Noise complaints recorded by those airports surveyed for this evaluation cited "too low" as a common source of public concern.

Similarly, the public will often be aware of preferred flight patterns and complain that the aircraft was "right over my house" and frequently point to a location halfway above the horizon instead of straight up. The perception of location, coupled with distance, is often difficult to answer without the use of triangulation. An aircraft 45 degrees above the horizon is as far away horizontally as it is vertically and farther than either when measured in a straight line distance.

Members of the public often are interested in the number of events that overfly an area at different altitudes and may request that altitudes be raised to abate noise. As the distance between the noise source and the receiver is increased, the noise level will decrease by six decibels with every doubling of distance. Consequently, a noise event of 80 dBA of SEL at 3,000 feet overhead will be decreased to 74 dBA of SEL if the altitude of the aircraft is increased to 6,000 feet. It is often very difficult to increase aircraft altitudes by significant amounts at any course along a flight track without adding substantial length to the track prior to passing over, or in some cases, without significantly increasing the power setting used in flight (and the resulting noise level). However, if the same flight track were relocated laterally by one mile, the noise reduction would be the same because the distance between the source and the receiver would be increased to 6,000 feet. It is often much easier to relocate a flight track than to increase altitude enough to achieve a meaningful reduction in single event noise levels.

Hybrid Metrics

As information has become more available for individual aircraft types, as noise prediction tools have been improved, and as the public has become more sophisticated in their understanding of the effects and consequences of aircraft development actions, new applications of available metrics have evolved to be more responsive to public interests. Several supplemental metrics have evolved in recent years that allow the noise analyst to develop information that may be more meaningful to members of the public in their understanding of aviation noise. While such supplemental metrics are not required for inclusion in any environmental evaluation, their availability is well known and often advisable at locations where noise is a contentious issue. These metrics are typically formed from combinations of simpler single event metrics. Because they are developed from more detailed computer modeling and post-processing requirements than the more standard metrics described in earlier sections, they are more costly to produce. They include Number of Events Above, Time Above, and Audibility.
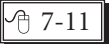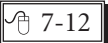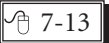
Number of Events Above (NA)

In recent years, the Number of Events Above metric has become popular as a means of comparing the number of operations above various thresholds of loudness associated with operational alternatives. The INM is capable of computing the SEL or L_{max} of every operation that is included in its input data, at any location selected by the program's user. The availability of this information will allow the noise analyst to sort output data to provide the numbers of daily operations that exceed selected noise thresholds. For example, the number of flights exceed-

ing 75 dbA of SEL may be computed for a single location for two separate alternative flight routes, and the results compared to identify which alternative provides more noise abatement. Because output information is available in detail, the number of operations may be determined for any combination of noise level, type of operation, and if desired, aircraft type or group.

The information provides the public with a level of detail that it often has demanded to assist in understanding of the potential effects of proposed airport development actions. It provides the planner the ability to design noise abatement and land management actions that more precisely address the impacts perceived as meaningful by the public to those identified as significant by regulation. Traditionally, the alternatives are compared through mapping of change in the Numbers of Events Above, a threshold from a baseline condition.

Example of Metric Display for Public Information:

- Examples of Number of Events Above illustrations (*160*) 🖰 7-11
- Change in Number-of-Events Above SEL 60 (Annual Average Day) Combined Alternatives (*161*) 🖰 7-12
- Example of Number of Events Above Video (prepared for ACRP 02-05 project) 🖰 7-13

Time Above

The Time Above metric has been available for many years, but has rarely been used as a planning tool for noise abatement or land use mitigation. Output information is computed by the noise model to indicate the amount of time noise exceeds a user-selected threshold. This information is helpful in evaluations of sleep or speech disturbance when the thresholds are set at levels that correlate to the significant effect levels of those activities. One substantial drawback to use of Time Above information is that simultaneous events heard within the same time span are added to the total independently, resulting in overestimates of the total Time Above. This is particularly problematic at threshold levels below 80 dBA near an airport, and at levels below 70 dBA along departure paths. At very low thresholds, the total TA for a day may exceed the number of minutes in a day – a result that does not further the analysis of the noise conditions. Time Above results may be presented as either the minutes per day or the percentage of the day that the threshold of interest is exceeded.

Example of Metric Display for Public Information:

- Example of Time Above Video (prepared for ACRP 02-05 project) 🖰 7-14

A metric of interest in the evaluation of national parks and other similar properties of significant national interest (monuments, wilderness areas, etc.) is the Time Above Ambient (TAA) noise levels. The calculation of this metric requires knowledge of ambient noise levels at specific locations on the surface, or a digital map of the distribution of non-aircraft ambient noise across the area of interest. The metric is typically applied in areas of very low ambient levels where natural quiet is an essential component of the environment. Consequently, the TAA levels tend to be greatly overestimated by the INM because simultaneous events at low noise levels will be added independently, rather than considered together.

Audibility is a metric developed for the National Park Service that is applied in national parks and other park areas where natural quiet is an important part of the visitor experience. The metric is similar to Time Above in that it considers the amount of time each aircraft event is audible. However, audibility considers such exceedances within each of the twenty-four 1/3 octave bands of the frequency spectrum associated with aircraft noise. This measure also is subject to overestimation through the addition of simultaneous events to a single total.

Example of Metric Display for Public Information:

- Cumulative Aviation Noise Percent of Time Above Natural Ambient with Existing Airport (St. George UT EIS) (*162*) 7-15

- Relative Change in Project Noise – 2020 Airport Only – Percent Time Audible %TAnatural (St. George UT EIS) (*163*) 7-16

Best Applications

Based upon the results of surveys and interviews conducted for this analysis, as well as literature available in the field and author experience, several noise metrics may be identified as best practices in communicating the complexities of aircraft noise to the public. Measures that provide greater understanding of the effects a proposed change may have on the level of exposure are useful in focusing attention on reality rather than feared unknown consequences. The most effective measures identified by this evaluation to achieve this purpose include:

Day-Night Average Sound Level (DNL). Although DNL is not well-understood by the general public, it has been found to be the best indicator of a high degree of annoyance by several different evaluations over a long period of time. Further, the FAA has adopted DNL as its required metric in all noise evaluations for which the agency provides funding assistance. It is the only metric for which widely accepted guidance is available for land use compatibility determinations. Consequently, DNL is the essential metric for evaluation during noise abatement and environmental planning processes involving aircraft noise exposure assessments.

Sound Exposure Level (SEL). Comparisons of SELs between existing and proposed alternative conditions are able to provide the public with greater insight into what changes may occur in the future, without actually experiencing that change. The greater the array of information available to assist the public in understanding the potential changes, the better able the airport is to communicate fact rather than public fear of the unknown. Comparison of single event sound levels is one of the better tools to communicate the extremes of anticipated noise events.

Number of Events Above (NA). While this metric is relatively expensive to develop, it is flexible enough to allow the analyst to distinguish the effects of specific noise abatement actions on specific categories of aircraft. Hence, evaluations of cost and benefit may be enhanced through greater detail. Its use to project the anticipated number of events above a threshold of public interest has been widely used to assist communities to relate the effects of alternatives using what they hear (single events), rather than relying on analysts to tell them that the DNL doesn't indicate they will be adversely effected. This is the single metric that responds to differences in numbers of overflights in a way every individual can understand. Every community is unique, yet every community is interested in the same thing – its quality of life. The use of the NA metric allows the individual to better relate to how any proposed development action or change of operational characteristic may impact that quality.

Time Above (TA). The TA metric is best applied to evaluations of proposed changes to facilities or operational characteristics on schools during the school hours. When combined with an L_{max} threshold equivalent to the exterior to interior attenuation plus the threshold of interest, the data may be useful in identifying those schools that should be considered for additional noise mitigation. The public's interest in the measure is usually restricted to the secondary interest in the effect of aircraft noise on the quality of life. Therefore, it may be developed to provide additional understanding of existing and potential aircraft noise patterns.

Noise Abatement (Airside) Techniques

The results of the airport noise officer survey conducted early during the data collection stage of this study sought information regarding the activity or offender most frequently complained about by the public during their conversations with airport staff about noise issues. These findings were verified through follow-up discussions with nearly 30 airports, users, and community advocates representing airports with a wide range of missions appropriate to the United States.

Note that all results of the survey may be found in the accompanying Toolkit as 🖰 8-1

Noise Complaint Characteristics

The frequency of the occurrence of eight distinctly different aircraft activity effects, as cited by the survey airports, is reflected in Figure 8-1. The number of responses within each of six frequency categories was weighted to provide a measure of the relative incidence of each type of aircraft activity as a complaint or concern, as cited by the respondents. The frequencies were: "never" (0 points), "rarely" (1 point), "occasionally" (2 points), "commonly" (3 points), "frequently" (4 points), and "very frequently" (5 points). The same categories also apply to the subsequent two figures. Respondents were allowed to self-regulate their selection based on their perception of the importance of each category to the conditions at the local airport facility and its environs.

- The combination of too low, too loud, and too many combined to dominate the frequency of noise complaints received by airports and were the principal source of concern within communities as expressed by non-airport interviewees. Noise complaints citing one of these three activities occurred more than "commonly" for the group.
- Of more limited frequency ("occasionally" to "commonly") were complaints about nighttime operations, loud landings and aircraft off expected courses.
- Activity on the ground (run-ups, taxiing, reverse thrust, and ramp noise) were seldom mentioned. This may reflect the fact that the loudest noise from these activities generally remains much closer to the airport and over more compatible land uses than the noise of aircraft in flight.

Responses to questions about the types of annoyance persons cite in their noise complaints indicated a less specific focus on what activity was disrupted than the identification of the aircraft activity that disrupted it. On average, no individual category of effect was cited more frequently than "commonly". Figure 8-2 indicates the subject of complaint most cited as annoying to the public.

- Awakening (sleep disturbance) was the most frequently cited public activity disrupted by aircraft noise, averaging only slightly less frequency than complaints about nighttime operations (see Figure 8-1).
- The disruption of outdoor activity, speech and classroom activities are cited "occasionally" or less. This appears to be an inconsistency with the frequent citation of too low and too loud aircraft, the principal sources of L_{max} noise levels that cause these disruptions.

119

Weighted Frequency
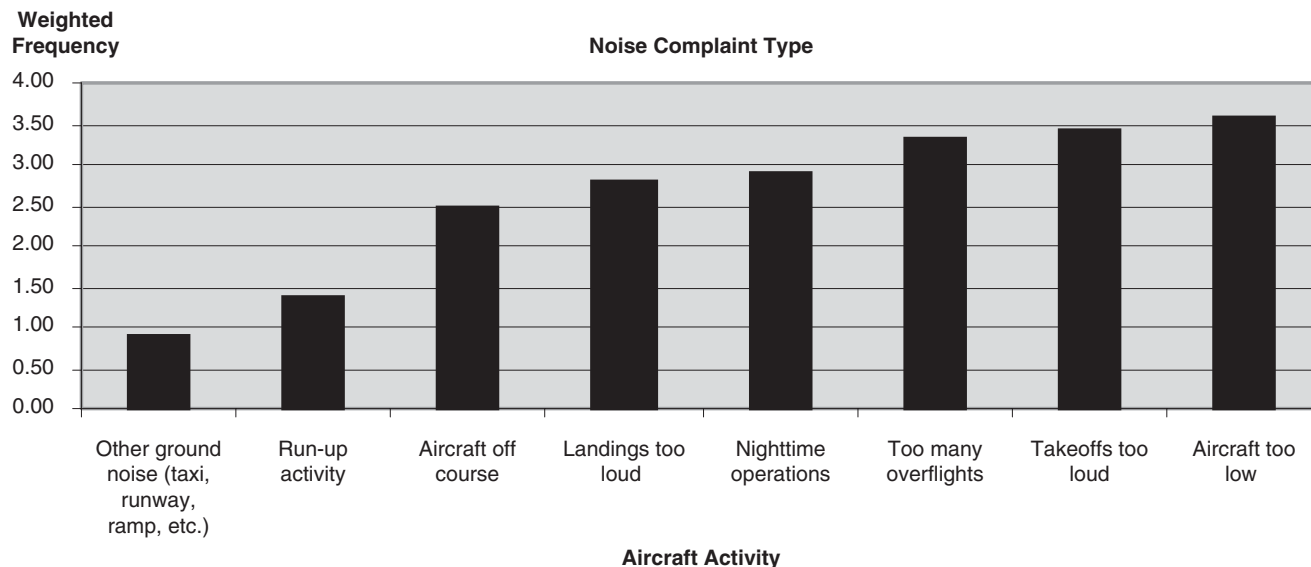
Noise Complaint Type

Aircraft Activity

Figure 8-1.   Aircraft activity generators of noise complaints.

- Concerns about vibration correlate well with the complaints about run-up activity and other ground operations. This is not unexpected because more low frequency noise – the source of most vibration and rattle effects – occurs during ground based activity.

The recently published document "*Aircraft Noise Effects*" (*145*) describes in some detail the volume of literature and current understanding associated with the disruption of several different types of activity associated with aircraft noise events.

As most airports canvassed for the survey were air carrier facilities with additional uses by cargo and general aviation operators, it is not surprising that commercial passenger jet activity was cited most frequently as the source of the noise about which complaints were received. Figure 8-3 shows the frequency with which complaints in which each of five user groups are identified as the source of the complaint.
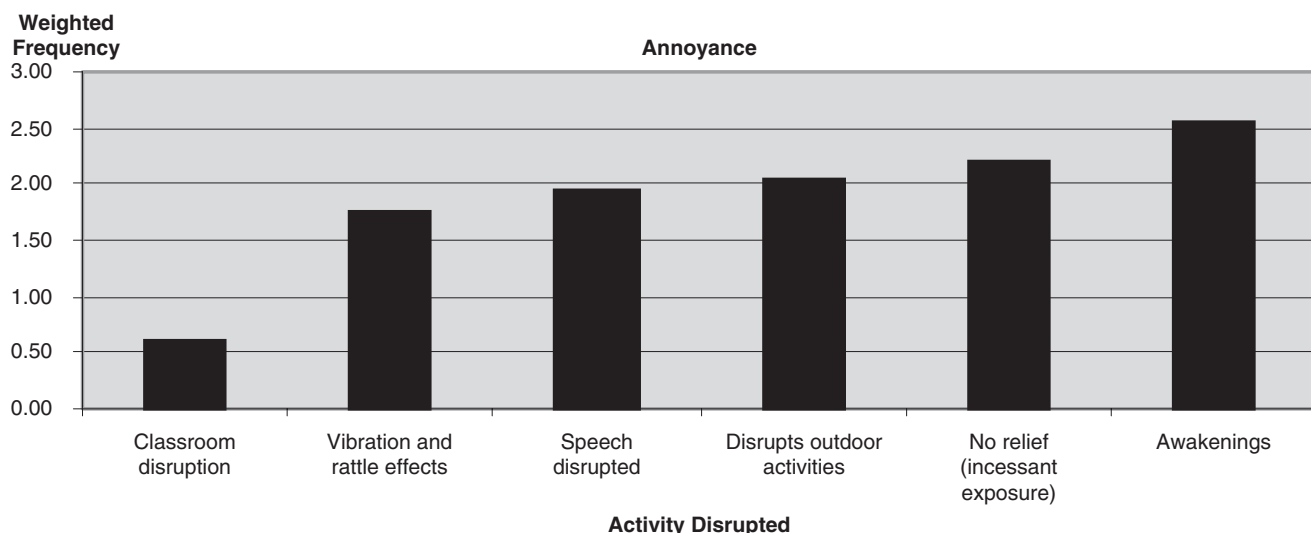
Weighted Frequency

Annoyance

Activity Disrupted

Figure 8-2.   Activities most frequently cited as disrupted by aircraft noise.

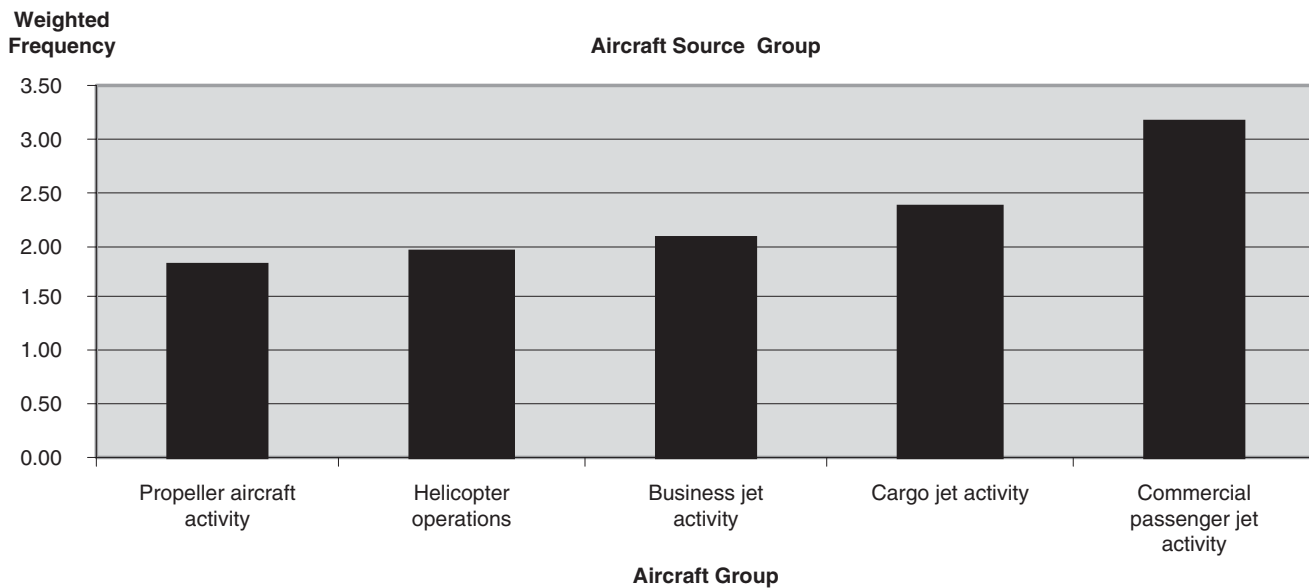**Weighted Frequency**

Aircraft Source Group

Figure 8-3.   Aircraft groups most frequently cited in noise complaints.

While noise complaints are not considered by the FAA to be a measure of compatibility in noise abatement planning, their analysis provides insights into the issues that are most important to the individuals who reside in areas exposed to aircraft noise. This chapter will review a series of opportunities that the airport manager may choose to investigate with airport users and the FAA in seeking to moderate any adverse impacts aircraft noise may have on the airport's neighbors. While conducting these investigations, many airports have found it helpful to involve the neighbors in seeking out various approaches to mitigate noise. By doing so, the neighbors become better aware of the constraints faced by all parties to the management of aviation conditions, and better understand that any improvements or resolutions to the situations they perceive to be of significant impact must be the result of a give-and-take process accepted by all parties.

The remainder of this chapter provides a description of various noise abatement techniques currently in use to mitigate aircraft noise levels. These include airside measures, which are actions that the airport, air traffic control, or the aircraft operators may take to reduce the impacts of aircraft noise on populations under the routes of flight. The goal of a noise abatement action is the reduction of the number of persons exposed to environmentally significant levels. The FAA currently defines that level as being 65 decibels of DNL. However, many communities around the United States are establishing additional noise level criteria for land use management that extend to areas beyond the 65 DNL level to reduce or control the introduction of newly impacted persons.

The benefit or disbenefit of every noise abatement action is a function of the residential population and number of nonresidential noise-sensitive uses that fall within the noise patterns resulting from implementation of the measure. If the population is not distributed evenly across the area affected, certain specific opportunities may be present to design noise abatement actions. When the population is broadly spread, other actions may be capable of producing the most effective results. The distribution of the noise pattern over the distributed population is the key to finding the mix of various tools for aircraft noise abatement and land use control to maximize the reduction of noise impacts while taking into account the continuing utility of the airport's role as a transportation center. The application of noise abatement actions, particularly if restrictive in nature, may generate a substantial effect on airport delay and flight time, and may potentially hinder airport expansion. The next chapter will review land use management techniques that may be used for airport noise compatibility planning.

The subsequent paragraphs provide a short definition of the purpose of each measure, the limitations to its implementation, the parties responsible for its implementation and management, the general public reaction to its use and the sources of additional information about its application. Examples of how the action may be displayed to explain its effects to a public audience is provided for the most effective of these techniques.

Flight Management Techniques

To abate the noise of aircraft in flight, the following techniques have been used at airports across the United States in efforts to seek relief for those affected.

Continuous Descent Approach (CDA)

Purpose: An automated arrival procedure designed to reduce noise impacts on communities located under the approach path to a runway. The procedure is designed for aircraft to utilize a continuous descent of aircraft on a gradual slope while idling without the deployment of flaps and landing gear to reduce airframe noise. Procedure provides benefit to communities located 7-15 miles from airport and reduces fuel burn where approaching aircraft will typically fly level segments of their arrivals to sequence into the air traffic flows. These level flights may result in higher noise levels as aircraft use more thrust to remain level and have gear and/or flaps extended to maintain slow speeds. The CDA technology is new and has been implemented only at Louisville, KY, and London Heathrow Airports. CDAs are in development at several other airports, including Atlanta Hartsfield, Mather Field, and Los Angeles International.

Limitations: CDA requires extensive research and coordination in the development of the descent profile. Procedures are designed for one or more runway ends, but usually both. It has not yet been shown to work well in environments exposed to conflicts between arriving and departing traffic, nor during peak operating periods. Procedure works very well in single operation, off-peak periods when properly designed.

Implemented by: Airlines/operators with guidance from the FAA Air Traffic and Flight Standards. Airports may seek their approval if believed to be a desirable noise abatement action.

Public reaction: Public experiences lesser noise levels along the full course of the approach through the absence of thrust adjustments required to maintain episodes of periodic level flight. Reaction to date on this relatively new procedure has been generally positive.

The investigation of CDAs is one of the PARTNER projects undertaken by the FAA/NASA/Transport Canada sponsored Center of Excellence. Additional information about CDAs may be found at: http://web.mit.edu/aeroastro/partner/projects/project4.html (*164*).

Preferential Runway Use Program

Purpose: This is an airport-initiated program that delineates selection procedures for the use of each runway at an airport. The runway use program can be either informal (voluntary) or formal (mandatory). These programs attempt to manage the number of aircraft that fly over areas along the approach and departure routes leading to or from each runway end. By doing so, the programs manage the overall noise energy present, over time, in those areas. To be effective for noise abatement, they should always be indexed to the population overflown or incorporate techniques to provide relief and respite to those persons under the preferential routes of flight.

Limitations: Preferential runway use programs are driven by wind availability. When wind conditions are favorable (up to a five knot tail wind component) and runway length is adequate

for the weight of aircraft, a preferential program may result in the preferred runway's acceptance. Virtually all preferential use programs in the United States are voluntary and require the concurrence of the pilot in charge of the aircraft to be fully implemented. In some cases the pilot may wish to use another runway for safety purposes. When that happens, air traffic controllers will attempt to find gaps in the traffic flow that will allow the off-preference operation to take place, but the pilot may have to delay the operation to use the desired runway. Further, the most preferential runway use pattern for noise abatement may not be the most efficient pattern for operation of the airport. Consequently, preferential runway use programs may be limited to off-peak or nighttime hours to achieve their greatest application.

Implemented by: FAA air traffic and airlines/operators. Airports may request the adoption of specific program measures to achieve management goals.

Public reaction: When preferential runway use schemes are used to abate aircraft noise, they must take into consideration the number of persons exposed to varying levels of noise under the routes of flight. As in any case, those who are overflown will react negatively while those benefited by the program by not being overflown will react positively. Consequently, the correlation of noise exposure to population densities is an important consideration in the design of these programs. Public education as to the conditions and benefits of the program are also critical to their success.

Example of Technique for Public Information:

- Comparison of 2020 No Action and Alternative B1b Noise Exposure Pattern (*165*) 🖱 8-2

Flight Track Modifications to Fly Over Compatible Uses

Purpose: To reduce the population within noise-sensitive areas, development of specific arrival/departure procedures may be utilized to direct aircraft while in flight. On approach or departure, use of specific departure headings, waypoints, and FMS/GPS procedures can be very helpful in keeping aircraft over the designated flight path. Flight track modification has been used to define preferred departure routes and approach courses, to separate large and small aircraft for noise abatement and to increase operational efficiency, and to specify courses for general aviation propeller aircraft and helicopters to assure that they do not conflict with faster jet aircraft.

Limitations: Requires FAA approval in the United States of procedures, a process which can be time consuming. Some aircraft may not be properly equipped with the correct navigational instruments if the procedure uses FMS/GPS procedures. Aircraft using standard departure headings ("Fly heading 090 for 2 NM") may be expected to deviate from the nominal flight path due to wind and weather conditions. When tracks are preferred or advisory (as are some helicopter routes), their use is not required.

Implemented by: FAA Air Traffic is responsible for the development and management of aircraft track procedures within a controlled airspace environment. Operators are responsible within uncontrolled airspace. Airports may recommend modifications to improve noise exposure conditions.

Public reaction: When flight tracks are moved to overfly compatibly used lands such as farmland, industrial/commercial areas, transportation corridors or water, the public reaction is generally positive if the traffic has been moved from over residential areas. However, if the traffic is moved from areas of dense residential population to areas of less dense residential population to achieve fewer population impacts, or if new areas of residential use are exposed to overflights beyond the compatibly used property, controversy generally will be an outcome, particularly if those newly impacted persons have not been a part of the creative process to define the courses of flight. This action has been the nexus of most airport noise litigation in the United States during

the last decade. The action may also require preparation of environmental documentation if the changes result in new or increased impacts within a 65 DNL contour.

Example of Technique for Public Information:

- Comparative Noise Exposure of a Single Straight-out Departure Against Three Divergent Departure Routes (*166*) ⎰ 8-3

- Example of Alternative Flight Tracks Video (prepared for ACRP 02-05 project) ⎰ 8-4

Take Off Thrust and Flap Management Procedures

Purpose: This strategy utilizes specifically designed departure climb procedures to minimize noise impacts over communities. The FAA has issued Advisory Circular 91-53A, *Noise Abatement Departure Profile,* which specifically outlines power setting and flap management techniques for aircraft to minimize noise for communities located either "close-in" to, or "distant" from, the airport. The National Business Aircraft Association has also designed a set of procedures to be used by general aviation jet aircraft. Close-in procedures are designed to reduce the noise levels over land uses close to the takeoff end of the runway by providing thrust cutbacks during climb between 1000 and 3000 feet altitude. Distant procedures provide for a thrust cutback at a greater distance from the airport with consequent reduction of noise levels beyond 18,000 feet from the runway end. ICAO has established similar procedures.

Limitations: Airlines have adopted different definitions of these procedures for their own use. Any measure that varies from the airlines standard "close-in" or "distant" procedures requires special approval from the FAA. Airlines may request carriers to use the measure that is most appropriate to the need at the airport, but it is the pilot and carrier who actually implement the measure in flight.

Implemented by: Airlines/operators with guidance from airports and FAA.

Public reaction: The selection of a "close-in" or "distant" departure procedure is typically transparent to the person on the ground. The noise levels generated by Stage 3 aircraft do not vary by many decibels and the location of the variance differs by aircraft type and procedure. Consequently, it is virtually impossible for a layman on the ground to identify what aircraft is using what procedure.

Example of Technique for Public Information:

- Comparative Noise Footprint of the MD-83 Using Close-in or Distant Departure Climb Profiles (*167*) ⎰ 8-5

- FAA Advisory Circular 91-53A, Noise Abatement Departure Profile (*168*) ⎰ 8-6

- NBAA material on its noise abatement program, including quiet climb and descent procedures at http://web.nbaa.org/public/ops/quietflying/ (*169*)

Approach Thrust and Flap Management Procedures

Purpose: This strategy utilizes specifically designed profiles to minimize noise impacts over communities. These may take the form of flap and thrust management during descent, the development of intercept altitudes that assure that aircraft turn onto final approach courses at points farther away and at higher altitudes that have been previously used, or the use of Vertical Navigation courses that set descent and level segments to minimize the noise produced over populated areas. The NBAA has included information on quiet flying during approach proce-

dures as part of its noise abatement tools available on-line at the address provided in the preceding section.

Limitations: If published as a standard procedure, the measure requires design by FAA Flight Standards and Air Traffic Organizations, with input from airlines/operators and must be developed to the standards of the least capable aircraft in the poorest operating conditions to be generally applied.

Implemented by: Airlines/operators with guidance from the FAA Air Traffic and Flight Standards. Airports may seek their approval if believed to be a desirable noise abatement action.

Public reaction: For those residing under the areas of lesser thrust or higher overflight, the reaction will be positive. Otherwise, the action is essentially transparent to area residents.

Ground Operations Techniques

Limit the Use of Reverse Thrust on Arrival

Purpose: Jet aircraft utilize thrust reversers to help slow down just after touchdown, reducing wear on the brakes and enabling shorter landing distances. The output from the aircraft engines are directed forward instead of behind the aircraft, increasing noise levels in the direction of the landing. Some airports seek voluntary restriction of the use of thrust reversers and ask operators to utilize the entire runway for arrival to minimize noise impacts, particularly on areas parallel to the runway.

Limitations: This is typically a voluntary program that airport operators rely on pilots to utilize when conditions are favorable. The measure is rarely used in poor weather or poor runway surface conditions, nor can it be used on relatively short runways when the aircraft requires a long landing distance.

Implemented by: Airlines/operators, at the request of the airport with concurrence by the FAA's Air Traffic Control management.

Public reaction: In general, reverse thrust limitations are supported by those persons who live lateral to the runway and are most exposed to the increased noise levels during its use. Those who live near the far end of the runway are exposed to more taxi noise as the aircraft uses the full length of the runway to land. In a harmoniously distributed population, the use of reverse thrust is inconsequential to total noise abatement, but as with almost every noise abatement measure, the distribution of the incompatible uses around the airport drives the ability of the measure to be effective for noise reduction.

Restrict Ground Run-up Activity

Purpose: The airport could restrict the airlines and FBO's to conducting ground run-up activities during specified time periods and/or to a certain location on the airfield. This measure may be included in the lease agreements, and published in NOTAMs or the airport's rules and regulations. The focus of these restrictions has historically been on aircraft undergoing engine maintenance.

Limitations: On occasion, an engine that has undergone an overnight repair must be tested prior to being flown. This may result in a late night or early morning engine test run-up before an early morning flight. Restrictions on ground run-up activity frequently exempt these activities or require permission from Airport Operations management prior to occurring.

Implemented by: This is one of the few actions an airport may take to limit aircraft noise without prior approval or cooperation by the FAA.

Public reaction: For those who live in the airport vicinity, run-ups may be irritating because they may be long lasting and the power settings may vary from high to low. When they occur at night they become even more intrusive because the ambient levels are typically lower and they may disrupt sleep. Any limitation on the presence, time, duration, power settings, or location of run-up activity that reduces their effects on residential populations is generally seen as positive by airport neighbors.

Limit Taxiing Power

Purpose: An airport may request the use of single engines or idle taxi power for taxiing to and from runway ends to reduce noise along taxiway routes.

Limitations: Issues have been raised about overuse of one engine for taxi operations. At busy airports, air traffic controllers may object to the potential for additional conflicts between taxiing and landing or departing aircraft at taxiway/runway crossings.

Implemented by: Aircraft operators/pilots, at the request of the Airport with concurrence by the FAA.

Public reaction: Generally positive, but may not be noticeable beyond the immediate environs of the airport.

Example of technique for public information:

- Ground Concept G-B (*170*) 🖰 8-7

Facility Development Actions

Runway or Taxiway Addition or Relocation

Purpose: While enhancement of capacity is the primary goal of additional runways and taxiways, an airport may take advantage of the process by assuring that the anticipated effects of that facility are minimized by its location and alignment. The availability of a new facility may lead to additional opportunities to use preferential runway use programs that rely on a more compatible relationship between post-construction noise patterns and underlying land uses, or allow the focusing of traffic during the most sensitive periods onto the most compatible landing and departure routes. Taxiways near population concentrations may be constructed or relocated to more remote areas to abate sideline noise effects.

Limitations: Runway projects are long-term solutions that must be fully assessed under NEPA and may require years of planning, design, and construction, all at high cost, prior to being commissioned. It is critical that once a commitment is made to pursue the new runway solution, the land uses under the approach and departure paths to that runway must be dedicated to compatible use.

Implemented by: Airport, with concurrence of the FAA. Review by users and the public through the NEPA process.

Public reaction: Public reaction may be mixed. As with flight track modifications, the degree of public controversy will be dependent upon the severity of adverse impacts associated with the project's specific conditions.

Displaced Threshold - Landings

Purpose: A landing threshold may be located farther from the overflight end of the runway than the normal touchdown zone to seek noise abatement. This action may be implemented

to raise altitude of aircraft as they pass over areas on final approach. When arrival noise is the issue, the full runway length may be used for departures. Arriving aircraft would land at or after passing the displaced landing threshold. Displaced thresholds are more often used for obstacle clearance than noise abatement because their effectiveness in reducing noise is so small. Under a typical approach, the displacement of a runway by 1,000 feet will reduce the altitude of a landing aircraft by only about 50 feet and its accompanying noise levels by less than 1-2 decibels just beyond the clear zone, with decreasing benefits at greater distances from the runway end. On arrival only runways, that effect may reduce overall DNL by a similar amount.

Limitations: Different aircraft require different runway lengths for safe operation. If the runway is displaced too far, some larger aircraft may no longer be capable of using it. The measure also may move post-landing ground noise farther to the departure end of the runway.

Implemented by: Airports, with FAA approval of any changes to the airport layout plan.

Public reaction: The public is rarely aware of the use of a displaced threshold unless the displacement is long and the runway is almost exclusively used for landings.

Relocated Runway End - Takeoffs

Purpose: A relocated runway end for takeoffs is the establishment of a location for the beginning of takeoff that is offset from the landing end of the runway. Not used nearly as often as a landing threshold displacement, this technique allows takeoffs to be initiated at greater distance from noise-sensitive uses near the landing end of the runway. The benefit that might be gained by the relocation must be balanced against the decreased safety imposed by shorter takeoff length available and lower altitudes during climb out. With a takeoff end relocated 1000 feet down the runway, a typical aircraft will be about 280 feet lower than without it.

Limitations: Different aircraft require different runway lengths for safe operation. If the runway end is relocated too far, some larger aircraft may no longer be capable of using it. The measure may also noticeably increase noise levels near the overflight end of the runway.

Implemented by: Airports, with FAA approval of any changes to the airport layout plan.

Public Reaction: The public is rarely aware of the use of a displaced threshold unless the displacement is long or residences are near the runway ends.

High Speed Exit Taxiways

Purpose: A high speed exit is a specially designed, angled taxiway that allows arriving aircraft to leave the runway prior to coming to a full stop. Use of high-speed taxiways may diminish the noise generated on arrival at neighborhoods adjacent to the airport by allowing aircraft to exit taxiways earlier and reduce their taxi time to their parking positions at the gate or on the apron.

Limitations: May be cost prohibitive for some airports to implement.

Implemented by: Airport, subject to ALP approval by the FAA.

Public reaction: Generally positive reactions from the public evolve from the removal of taxiing aircraft from the runway when the runway is adjacent to populated areas. Conversely, aircraft may apply greater levels of reverse thrust to slow enough to use a high speed exit taxiway. As the aircraft moves away from the populated areas into the core of the airport, the noise associated with the landing aircraft becomes less obtrusive.

Noise Barriers/Berms/Shielding

Purpose: The noise impact of an aircraft on the ground is usually confined to nearby areas where the line of sight between the source and the receiver is interrupted by the barrier. An effective method to mitigate this type of noise impact is through the use of sound barriers or berms. Hush houses (Ground Run-up Enclosures, GRE) are a special type of barrier that may be appropriate in engine maintenance areas where noise events are long and often conducted at night. Strategic placement of airfield buildings has been used to interrupt the flow of noise from the source to sensitive receivers nearby. A barrier of any type does not stop the transmission of noise, but rather reflects, absorbs, or redirects parts of the noise energy.

Limitations: Construction of a barrier or GRE can be cost prohibitive. Any such facility requires a considerable land footprint on the airfield to construct.

Implemented by: Airport.

Public reaction: The public reaction is usually positive to the noise level reduction produced by a GRE (there are documented cases where the noise level reduction at the airport boundary from a GRE is as much as 20 decibels). Lesser benefits are achieved through the provision of sound walls or earthen berms between aircraft noise sources and noise-sensitive uses. These too generally yield positive public reaction, although there may be some complaints about their structural design being unaesthetic.

Example of technique for public information:

- Single Event Run-up Contour – Proposed GRE Location – 727 Stage 3 (*171*) [📎 8-8]

Restrict Apron/Gate Power

Purpose: The airport may limit the airlines and other users from utilizing aircraft engines to power aircraft at the gate or at parking positions on the apron. Airports may encourage ground power units, auxiliary power units, or the installation of power and air conditioning at the gate to minimize the noise effects associated with idling aircraft.

Limitations: Requires investment in auxiliary power units, ground power units, or gate electrical power by airport or airlines.

Implemented by: Airport and aircraft operators.

Public reaction: Generally positive, but may not be noticeable beyond the immediate environs of the airport.

Enhanced Navigational Aids

Purpose: The improvement of navigation aids may lead to better defined or predictable routes of flight, as well as enhanced safety at the airport. The introduction of point-to-point navigation systems on aircraft, coupled with ground transmitting equipment has led to the development of radar navigation system approaches and departure routes that may be crafted to more consistently overfly noise-compatible areas than previously used headings or vector routes. A wide array of equipment is available that may be used to allow the airport to be used in poorer weather conditions, as well as to safely navigate through the area along specific flight paths.

Limitations: Requires investment in equipment. Often subject to long delays in rising on FAA priority lists for installation. Relatively long evaluation periods are required for more complex procedures.

Implemented by: FAA with the assistance of the Airport and participation of the users.

Public reaction: As with measures that modify flight track locations, the results may be positive or negative, dependent on the distribution of noise-sensitive uses under the resulting flight paths.

Airport Access Restrictions

For completeness, this section is included among the potential actions available to airports to abate aircraft noise. The airport manager in the United States is often faced with public demands to "just close the airport at night" or "make that airplane go somewhere else". To respond to such demands, the manager must do so within the context of compliance with federal laws and regulations, as well as the many grant assurances that the airport sponsor has committed to fulfill on every airport grant from the FAA. Since the passage of ANCA in 1990, no airport has received FAA approval for the implementation of a restriction on the operation of Stage 3 aircraft. Only Naples (Florida) Municipal Airport has been allowed to implement a restriction on operations by Stage 2 aircraft, and then only after successfully arguing its case in U.S. District Court. A small number of airports have actively conducted the analyses required to implement an access restriction under 14 CFR Part 161, but to the date of this document, no access restriction has been approved under its provisions.

Prior to 1990, a number of access restrictions were implemented at airports located in environments highly sensitive to aircraft noise. At that time, these restrictions were a matter of local option. Outside the United States, restrictions on airport access remain a feasible option to abate aircraft noise. Nevertheless, the public traditionally focuses on restrictive measures in demanding that airports "do something" about noise levels. The following paragraphs provide an overview of the various types of access restrictions, but their implementation is subject to all Part 161 requirements. Conversely, if the measures are taken through voluntary agreement of all the existing and probable users of the airport, the actions may be implemented outside the requirements of the regulation.

Purpose: This strategy restricts, voluntarily or involuntarily, the access to the airport by prohibiting all or portions of its aircraft operations. In the past these restrictions have been based on cumulative impact (slot controls, noise quotas, and noise budgets), certificated noise levels (Stage 2 ban), single event noise levels, and/or time of day (curfew). They also may include the restriction of certain areas of the airfield, including runways, to specific classes or weights of aircraft. Among the access restrictions are the following types. Often they are considered in combination when implemented, e.g., a curfew on any aircraft exceeding a given noise level are denied access, while any that produce lesser noise levels are allowed to operate freely.

- Aircraft type or class – A ban on operations by a given group of aircraft such as those classified as Stage 1 or Stage 2 under the categories of 14 CFR Part 36. While 14 CFR Part 161 exempts restrictions on Stage 1 aircraft from its requirements, any ban on Stage 2 aircraft must be fully evaluated and the FAA must conclude that the evaluation is adequate prior to its implementation. Any restrictive action on Stage 3 or Stage 4 aircraft that affects their ability to operate at the airport must be approved by the FAA prior to implementation. Any measure that restricts access by a user group such as general aviation jet aircraft, cargo operators, helicopters, etc., may also be categorized as a type or class restriction.
- Time of day – The curfew (or restriction of access by time of day) is the most recognized access restriction by the public. Prior to 1990, several were implemented and remain in force under the "grandfathering" allowances of 14 CFR Part 161. As currently implemented, curfews limit operations by type (arrivals vs. departures), by aircraft class (Stage 3 only allowed), and by noise level (prohibitions above a specific decibel level). The times of the curfew also vary – some are 10 p.m. to 7 a.m., some are 11 p.m. to 6 a.m., and some have other hourly constraints.

- Weight and size of aircraft – Some airports have restricted their access to those aircraft that weigh less than a fixed amount, e.g., 12,500 pounds, thereby prohibiting operations by the larger louder jet aircraft. If the airport runway is constructed to handle heavier weights, then such restrictions may be considered arbitrary and be disallowed under Part 161 provisions.
- Noise level – As a surrogate to an access restriction on a class of aircraft, some measures that have been implemented cite a specific noise level that may not be exceeded. In some cases, the limitation may be on certificated noise levels for aircraft, as drawn from 14 CFR Part 36, and in other cases, the noise level may be based on measured single events, with penalties assessed against those who exceed the established levels.
- Noise budget – A noise budget allocates the total noise energy present at the airport among its users, with a given amount of noise assumed for an operation by each aircraft type. Those operations that take place during night and evening hours may be assigned higher values to more strictly limit such operations. Each operator is provided a "budget" and allowed to distribute that budget across its operations in any manner, so long as the total is not exceeded. The concept provides incentive for the use of the quietest aircraft during daytime periods to maximize the total flights allowed. A portion of a budget is reserved for non-signatories to the budget agreement.
- Operations cap – An operations cap is similar to a budget in that a limit is placed on the number of flights that may occur during a given period of time, much as the budget limits the amount of noise energy. Signatories to the operations agreement pledge to limit their operations to given levels; some agreements provide exceptions from the cap for aircraft that are exceptionally quiet.
- Noise Level Based Operating Fee – This strategy bases all or a portion of the landing fee upon the noisiness of the individual aircraft, thus apportioning the fees to the relative noise "cost" of the operation to the airport's proprietor. The strategy encourages the use of quieter aircraft while producing additional revenue to offset noise induced expenses. For maximum benefit, noise fees should be used in concert with other noise abatement techniques. Instead of assessing a fee, an airport operator could reward air carriers who go to extra lengths to reduce noise generated by their aircraft by providing a discount or a reduction in land fees. (*135,* p. 31) 🖰 8-9
- Restricted Runway Use - For noise abatement purposes, aircraft are prohibited from utilizing a specific runway for one or more types of operations. The restriction can be based on time of day or type of aircraft. For example, a runway may be maintained for propeller aircraft or arrival use only, or its use may be limited to specific wind conditions. This action has occasionally been enacted as part of an environmental mitigation program for new runways.

Limitations: Among U.S. airports, with the singular exception of Naples (Florida) Municipal Airport, only those mandatory restrictions that were in place and grandfathered into law prior to the passage of ANCA remain in effect. At Naples, there is a prohibition of operations by Stage 2 business jets that was ultimately approved by the courts over the objections of the FAA under both 14 CFR Part 161 and federal grant assurance stipulations for the use of airport trust fund monies. Institution of any mandatory measure to restrict the access to an airport by Stage 3 aircraft will require the airport operator to undertake a Part 161 Study and have the measure approved by the FAA before implementation. Additionally, FAA has determined that restricting use of public airports is a violation of the grant assurances an airport operator agrees to when receiving federal funds for airport development.

Restrictive actions voluntarily entered into to restrict access to given conditions do not require a Part 161 action.

Implemented by: Airport, with review and/or approval by the FAA. Voluntary measures require agreement by the Airport and the users.

Public reaction: Any action to restrict the number of operations at an airport is generally viewed favorably by those affected by aircraft noise. Conversely, restrictive actions are normally opposed by aircraft operators and the business community.
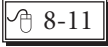
Pilot Awareness Programs

Purpose: These programs are designed to provide pilots with specifics about an airport's noise abatement program and other information, as deemed desirable. Airports often publish a handout describing the noise abatement procedures for pilots to carry in their flight manuals, hold pilot training meetings, and develop information posters for placement in flight planning rooms.

Limitations: A voluntary program that requires constant updating and pilot outreach to ensure success.

Implemented by: Airport.

Public reaction: Awareness programs are typically transparent to the public at large, but may result in general benefits of noise reduction across a community that is positively received. Similarly, pilots are frequently supportive of pilot education and awareness programs that assist them in becoming better neighbors to noise-sensitive communities.

Example of Technique for Public Information:

- Phoenix Deer Valley Airport Pilot Guide (*172*) 🖰 8-10

- Phoenix Goodyear Airport Pilot Guide (*173*) 🖰 8-11

- Hillsborough (Oregon) Airport Pilot's Guide (*174*) 🖰 8-12

- Truckee Tahoe Airport Fly Quiet Pilot's Guide (*175*) 🖰 8-13

- Naples Municipal Airport - Recommended Fixed-Wing Arrival and Departure Procedures (*56*) 🖰 8-14

- Naples Municipal Airport - Recommended Helicopter Arrival and Departure Procedures (*57*) 🖰 8-15

- Naples Municipal Airport - Recommended Jet Arrival and Departure Procedures (*59*) 🖰 8-16

- Chicago O'Hare Fly Quiet Program Aviator's Manual online site at http://www.chicagoairports.com/cnrc/ohare/o_noise_flyquiet.shtm (*176*) 🖰 8-17

Best Practices

Based upon the effectiveness and ease of implementation associated with the various noise abatement measures, as well as the results of surveys and interviews conducted for this analysis, several techniques may be identified as best practices for achieving the greatest reduction of noise for the least cost and effort. These are:

Flight Track Modification

In areas of varied land use, the development of preferred flight paths over areas of compatibly used (generally non-residential) land, particularly within three miles of the overflight end of a runway, usually provides substantial benefits to the reduction of noise impacts. The airport must assure the relocation of noise of significant levels (in FAA evaluations, above 65 DNL) from one area of population at the expense of another. This measure may be initiated by the airport, but requires concurrence and implementation by the FAA.

Voluntary Preferential Runway Use Programs

Where capable of being implemented, voluntary runway use programs offer the potential for wholesale mitigation of noise impacts by changing the total number and types of overflights from areas of noise-sensitive use to other areas of compatible use. Care must be given to assure that program preferences are in line with the operating capabilities of all aircraft at the airport, as well as being carefully designed to assure that the transfer of noise exposure patterns does not adversely impact noise-sensitive uses at significant noise levels. This measure may be initiated by the airport, but requires concurrence and implementation by the FAA and users.

Ground Run-Up Restrictions

Where ground noise is a significant issue, the airport may implement restrictions on the time, location, and power settings used during maintenance run-up activity at an airport. It is unreasonable to exclude any capability to fully conduct required maintenance checks, but those that most impact surrounding land uses may be restricted to daytime hours or given locations on the airfield.

Pilot Awareness Programs

In light of the findings illustrated throughout this document, good communication between the airport and its stakeholders regarding the issues of noise are critical. Pilot awareness programs that convey the concerns of neighboring communities, the constraints on the airport, and the options available to its users contribute to the success of noise abatement. Many airports that have strong user awareness programs have experienced improving relationships between their pilot groups and the communities over time. Many airports that do not communicate regularly with the user group regarding conflict issues with neighbors do not overcome airport opposition.

Land Use Management Techniques for Noise Abatement

The reduction of adverse aircraft noise impacts on noise-sensitive land uses is dependent not only on the abatement of aircraft noise at the source or through operational techniques, but also through the management of the use of land that remains exposed to high noise levels after abatement measures are implemented. There would be little logic in modifying flight activity to focus or disperse noise over compatibly used land if that land were to be built up in noise-sensitive uses by future development action. This chapter will discuss a series of land use management opportunities available to airports and communities to seek a balance between airside and landside responsibilities for maintaining compatibility between the airport and its neighbors.

Since the retirement of louder, older aircraft from the operating mix began in the mid-1980s, aircraft manufacturers and operators have contributed substantially to the reduction of the size of the areas deemed incompatible around airports. Their conversion to new aircraft types and/or quieter engines has resulted in the removal of millions of persons from within the 65 DNL footprints around the nation's airports. As the contours have shrunk, lands that had previously been deemed incompatible for the development of noise-sensitive uses no longer fell within the 65 DNL contour and hence became eligible for compatible development. Throughout the history of the conflict between aircraft noise and noise-sensitive uses, land developers have applied pressure to reduce the contour and open the land to development.

Communities with land use jurisdiction face conflicting pressures from developers who wish to bring vacant lands to their highest and best use, and from airport advocates who wish to maintain unimpeded abilities to use the airport. Until the mid-1990s actions were possible on the aviation side of the conflict that would allow tweaking of flight paths, runway use, and operating procedures to make increasingly smaller adjustments to noise contours. However, as the overall contour size shrank from reduced noise emissions at the aircraft source, the costs to make meaningful flight management changes to enhance compatibility began to exceed the benefits. With the passage of Lott Amendment to the Vision 100 Century of Aviation Reauthorization Act of 2003 (*140*), Congress formally banned the use of federal funding to mitigate noise beyond the 65 DNL contour. Although that provision expired on December 31, 2007, FAA policies are now in place that discourage the expenditure of funds to not only mitigate noise-sensitive land uses beyond the 65 DNL contour, but also to modify flight paths that effect noise conditions there.

The position now taken by the FAA, as well as nearly all other aviation groups, is a call for balance between the airside and the landside management efforts to control the incompatibilities between aircraft noise and noise-sensitive land uses. User advocates have taken a stand for more control at the local level to prohibit the introduction of potential new incompatible land uses into areas where aircraft noise remains above 65 DNL, and where possible, within an envelope around the contour to assure that future growth at the airport will not reintroduce noise impacts into areas that are allowed to newly develop adjacent to the current contour of significant exposure. In March

1998, the FAA published its final policy on the approval of Part 150 measures for noise mitigation projects, and in it, prohibited the use of federal funding to mitigate dwellings constructed within a published 65 DNL contour after October 1998 (*177*) 🖱 9-1

Several state governments also have provided guidance to communities regarding the planning for compatibility between airports and their surrounding uses. Two substantial examples of this guidance include:

- State of Washington – Airports and Compatible Land Use, Volume 1 (*178*) 🖱 9-2

- State of California – California Land Use Planning Handbook (*179*) 🖱 9-3 and at http://www.dot.ca.gov/hq/planning/aeronaut/documents/ALUPHComplete-7-02rev.pdf

The following provides an overview of the opportunities available to communities and airports to seek and maintain compatible land uses within the areas affected by noise levels that are determined to be locally significant. For more information, the reader is directed to the ACRP Project 03-03, Enhancing Airport Land Use Compatibility website at www.trb.org.

Land Management Actions an Airport May Implement

The airport may undertake several land use management actions on its own initiative. Other actions rely upon the powers of other local agencies to control the presence or introduction of incompatible uses within the areas exposed to significant levels of aircraft noise. Each airport-only action involves the acquisition of land or some portion of the various land rights held by a property owner.

Purchase of Non-Compatible Land

Purpose: The purpose of this strategy is to acquire property and relocate any occupants who reside within contours of significant noise. Once the land is owned by the airport, it can be re-allocated to a compatible land use for that noise level. Although expensive, it is the most effective tool for the airport to eliminate incompatible uses and control future development risks.

Limitations: Federal funding is available for acquisition of properties identified as part of an approved Noise Compatibility Program or as mitigation for an Environmental Impact document. It can be a costly and time consuming process to undertake for airports with limited funding. There may be objection by local communities for removal of property from tax rolls or from parties to a use agreement who disagree with the proposal.

Implemented by: The airport, usually with funding assistance by the FAA.

Public reaction: The public may view this strategy as an excuse for the airport to "land grab." Local jurisdictions typically are concerned about developable property being removed from the local tax rolls.

Example of Technique for Public Information:

- Land Acquisition for Public Airports (*180*) 🖱 9-4

- Voluntary Land Acquisition & Relocation Program (Harrisburg, PA) (*181*) 🖱 9-5

- Voluntary Acquisition/Relocation Assistance Program (Providence, RI) (*182*) 🖱 9-6

- FAA Order 5100.37B Land Acquisition and Relocation Assistance for Airport Projects (*183*)

   🖱 9-7

## Acquisition of Noise and Overflight Easements

Purpose: A noise or overflight (avigation) easement may be purchased by the airport on properties that are noise-impacted, but will not be mitigated through other means. It grants permission to the airport for aircraft to fly over the property while using the airport, and in most cases to make noise of a given level or less. A noise easement transfers with any change of property ownership. Easement purchase programs may be designed for homeowners who are either not eligible for other mitigation programs or choose to not participate. Purchase of easements allows current land use to remain in effect and maintains local tax rolls.

Limitations: The value of easements is often nominal unless individual appraisals are undertaken, which can be costly. The purchase of an aviation easement without a sound insulation program does not 'mitigate' the property; it only 'mitigates' the existing property owner for existing impacts and often does not change public attitudes to the airport, particularly in regard to growth or airport expansion issues. Theoretically, the value of the easement contributes to a discounted future value of the property on its sale.

Implemented by: Airports, with or without funding assistance by the FAA.

Public reaction: The public generally perceives the purchase of an aviation easement as a justifiable reward for accepting the nuisance of continuous aircraft noise effects.

Example of technique for public information:

- Sample Avigation Easement (Raleigh, NC) (*184*) 🖱 9-8

- Deed of Easement and Declaration of Protective Covenants (Columbus, OH) (*185*) 🖱 9-9

- Deed of Easement (Sound Insulation Program) (Cincinnati, OH) (*186*) 🖱 9-10

- Noise and Avigation Easement and Covenant Not to Sue (Scottsdale, AZ) (*187*) 🖱 9-11

Waiver of Claim

Purpose: A waiver of claim is similar to an easement in that the property owner forfeits the right to any claims that may be made as the result of nuisance imposed by aircraft noise. Also known as "non-suit covenants" or "hold harmless agreements", they are legal instruments usually incorporated into an avigation or noise easement. They document that the owner has agreed not to sue the airport over noise issues, in exchange for monetary compensation or some other benefit. They are normally carried on the deed of property as a restrictive covenant accompanying an avigation easement.

Limitations: As with easements, the value of a waiver of claim is difficult to determine and may be settled as a percentage of the assessed or appraised value of the property. Further, a waiver of claim does not 'mitigate' the property, but rather 'mitigates' the property owner through compensation or a discounted sale price on the property when transferred. It generally mitigates for existing or forecast impacts and often does not change public attitudes to the airport, particularly in regard to growth or airport expansion issues.

Implemented by: Airports, with or without funding assistance by the FAA, when established through a Noise Compatibility Program or environmental mitigation program.

Public reaction: The action is generally transparent to the general public.

Development Rights Transactions

Purpose: Where acquisition is not an option and a vacant property is located within an area of significant noise exposure, the purchase of the rights to develop that property in incompatible uses may be a viable approach to land use management. Development rights may be acquired or transferred. Purchase of development rights (PDR) transfers all rights to develop a property in incompatible uses from the property owner to the acquiring party—in these cases the airport. The value of the transfer is appraised comparably to that of an easement. The transfer of development rights (TDR) allows the owner of the sending property to develop property in another location that would not normally be approved for the proposed development. For example, potential for a high density development proposed in an area of significant noise exposure may be transferred to an area that local plans indicate should be developed in a lower density.

Limitations: There must be state enabling legislation to permit such transactions.

Implemented by: Airports, with support of local planning and zoning authorities.

Public reaction: Typically, the property owners adjacent to the parcel where the rights are being transferred 'from' are in favor; the property owners adjacent to the parcel where the rights are being transferred 'to' are generally opposed. This is because such a transfer of development rights typically means the rights being transferred will permit a higher density of development.

Purchase Assurance/Sales Assistance

Purpose: Purchase assurance and sales assistance programs are intended to provide homeowners in noise-impacted areas an assurance they will be able to sell their property for fair market value. Under purchase assurance the airport proprietor agrees to acquire the property as a purchaser of last resort if the homeowner was unable to sell on the open market. The airport may place limitations on the guarantee amount relative to the appraised value of the property (e.g., 90 percent of appraised market value) to assure that the owner has made an adequate effort to sell the property prior to applying for purchase assurance. The airport then sells the home and retains an aviation easement after making sound insulation or other property improvements. Under sales assistance programs, the airport may support the homeowner in the independent sale of the property in exchange for easement or other deed considerations by paying closing costs, or subsidizing a portion of the difference between the appraised value of the property and the final sales price.

Limitations: Purchase assurance and sales assistance programs can be fairly complex and time-consuming to administer. They also open up the risk that the airport will become a property manager or landlord if market conditions make it difficult to sell homes. The program should be carefully staged to prevent more applicants than can be dealt with effectively at any one time. Otherwise, an adverse reaction in the larger real estate market could be caused.

Implemented by: Airport with potential funding assistance from FAA.

Public reaction: Generally purchase assurance and sales assistance programs are well-received by the public. This program allows the existing property owner an opportunity to leave the area

impacted by 65+ DNL noise levels and fully discloses the existing (and potential future) noise environment to a new, willing, and informed buyer.

Sound Insulation of Noise-Sensitive Noncompatible Structures

Purpose: This technique provides for the addition of insulation, noise attenuation baffles, solid core doors, double paned windows, and possibly air conditioning units to noncompatible buildings located within the 65 DNL and higher noise contour at airports with an approved Part 150 Noise Compatibility Program. Participation in a sound insulation program generally requires that the homeowner provide an avigation easement and non-suit covenant attached to the deed of property, as well as an agreement to noise level disclosure upon sale.

Limitations: Sound Insulation programs can be time consuming and complex. They involve construction and a great deal of homeowner outreach.

Implemented by: Airports, with FAA funding support.

Public reaction: In general, the public response to implementing a sound insulation program is favorable. A community welcomes sound insulation programs because it brings with it an assumed improvement in the quality of life to areas impacted by a 65+ DNL noise contour. One negative comment typically made about such programs is that sound insulation does not mitigate the aircraft noise effects for outdoor activities.

Example of Technique for Public Information:

- Homeowner Handbook – Bradley International Airport Residential Sound Insulation Program (Hartford, CT) (*188*) 9-12
- Homeowner Handbook – Philadelphia International Airport Residential Sound Insulation Program (*189*) 9-13
- Residential Sound Insulation Program Brochure (Lambert-St. Louis International Airport) (*190*) 9-14
- San Antonio International Airport Residential Acoustical Treatment Program – Homeowner Brochure (*191*) 9-15

Land Use Actions Requiring Implementation by Others

There are actions available for land use management that the airport cannot enact, but may encourage through implementation by local planning or regulatory agencies. Each involves the control and development of future uses of property.

Comprehensive Community Planning

Purpose: The comprehensive planning process provides guidelines to the development of infrastructure and land use patterns within communities. When the effects of aircraft noise on community compatibility are used to guide the planning process, development that avoids the introduction of noise-sensitive uses into areas of significant noise exposure may be recommended. For example, the designation of undeveloped off-airport areas within the 65 DNL (or other) contour for industrial, commercial or open space uses will contribute to the prevention of future impacts. In contrast, the planning of water or sewer service to residential standards

within the same area will make the ultimate development of incompatible uses in the air much more likely and will lead to future conflicts with the airport.

Limitations: Requires the willingness of the local planning authority to develop comprehensive plans that place a high priority on compatibility and on elected authority to adopt them as policy decisions.

Implemented by: Local jurisdictions based on airport recommendations.

Public reaction: Public acceptance of the recommendations of the comprehensive planning process is typically dependent upon the community's general acceptance of land use planning, policies, and zoning, as well as political interests and influences of those effected.

Compatible Land Use Zoning

Purpose: The formal adoption of development regulations that discourage or prohibit the placement of incompatible uses, as outlined in 14 CFR Part 150, Appendix A, Table 1, in areas within contours of significant noise exposure adjacent to an airport. Comparable state or local criteria may be similarly applied.

Limitations: Requires the local zoning authority to implement.

Implemented by: Local jurisdictions based on airport recommendations.

Public reaction: Public acceptance of compatible land use zoning is typically dependent upon the community's acceptance of comprehensive land use planning, policies, and zoning (in general) and political interests and influences.

Noise Impact Overlay Zoning

Purpose: The purpose of a Noise Impact Overlay Zone is to alert existing and future property owners of the possible noise impacts from a nearby airport. These zones also prevent or discourage noncompatible development of property within the zone from occurring without the proper notice and documentation. Most overlay zones also address issues of structural height and seek to eliminate obstructions to aviation, require noise level disclosure on all properties, and may require avigation easements for new development approvals within their boundaries.

Limitations: Requires the local jurisdiction to adopt and implement as part of its Comprehensive Plan or zoning ordinance. Often is subject to variance requests from developers.

Implemented by: Local jurisdictions.

Public reaction: General public acceptance of noise impact overlay zoning is typically dependent upon the community's acceptance of comprehensive land use planning, policies, and zoning (in general) and political interests and influences

Example of Technique for Public Information:

- Airport Environs Overlay (*192*) 🖱 9-16
- Airport Land Use Management District (ALUMD) (*193*) 🖱 9-17
- Environmental Impact Districts Section 4-1400 AI-Airport Impact Overlay District (*194*) 🖱 9-18
- Aircraft Noise Overlay District (*195*) 🖱 9-19
- Noise Overlay District (Plainfield, IN) (*196*) 🖱 9-20

Subdivision Code Modifications

Purpose: The purpose of a subdivision code is to establish consistent design criteria for the development of infrastructure and lot sizes to allow for the development of complementary uses within a subdivided area. To manage the compatibility between aircraft noise and noise-sensitive uses, the code may seek the limitation of the number of lots within higher noise levels, restrict the density of development on those lots, or direct that lots exposed to the highest noise levels be dedicated to compatible uses such as open space or nonresidential development. Subdivision plats are frequently used as the mechanism for attaching avigation easements and waivers of claim to the deed, as well as disclosure requirements on sale and transfer of property within any subdivided property as a condition of its approval. Samples of these tools are provided under other sections of this chapter.

Limitations: Requires the local jurisdiction to adopt and implement as part of their regulatory documents, and requires local planning agencies having review authority to assure the attachment of any necessary covenants that apply within various noise areas. It is incumbent on the airport to assure that noise exposure contours are kept current with the planning agency to assure that their reviews are up to date.

Implemented by: Local jurisdictions and planning agencies.

Public reaction: Public acceptance of subdivision regulations is typically transparent. These provisions are normally in place prior to the transfer of property and come with covenants already in place. The development community may see all such subdivisions as detrimental to their ability to maximize the return on investment in the development of property.

Dedication of Noise and Overflight Easements

Purpose: A noise or overflight (avigation) easement may be acquired in one of several ways other than direct purchase. It may be attached and dedicated as a requirement for approval of a development plat or subdivision; it may be required to be dedicated as a condition of a zoning change; or required as a condition of another benefits program. In each case, it grants permission for aircraft to fly over the property, and in most cases to make noise of a given level. It often includes a waiver of claim and requirement for noise level disclosure that runs with the deed. An avigation easement transfers with property ownership. Requirement of easements will increase the flexibility of developer options, but do not prevent the introduction of noise-sensitive uses into areas of significant noise exposure.

Limitations: An easement does not mitigate the noise effects on a property, but rather on the property owner for existing or predicted noise levels. The action often does not change public attitudes to the airport, particularly in regard to growth or airport expansion issues.

Implemented by: Local jurisdictions and planning authorities, on behalf of the airport.

Public reaction: Property owners often object to the requirements for easements as an effort by local government to place limitations on the desirability of the subject property. An aviation easement required as precondition for approval in another benefit may be perceived as signing away property rights to the airport in exchange for those benefits, which the property owner may feel is owed to them with no strings attached.

Example of Technique for Public Information:

- Sample Avigation Easement (Raleigh, NC) (*184*) 9-21

- Deed of Easement and Declaration of Protective Covenants (Columbus, OH) (*185*) 9-22

- Deed of Easement (Sound Insulation Program) (Cincinnati, OH) (*186*) 9-23

- Noise and Avigation Easement and Covenant Not to Sue (Scottsdale, AZ) (*187*) 9-24

Noise Level/Nuisance Disclosure Statement

Purpose: A disclosure policy requires formal disclosure of noise levels of residential property located within the noise impacted areas surrounding an airport, typically the 65 DNL and higher, or within the local flight pattern. The policy is supplemented by information on aircraft noise levels distributed by airport staff to citizens, neighborhood associations, developers, real estate agencies, and lenders. The policy provides actual, or constructive, disclosure to potential residents in the vicinity of the airport of the likelihood that the property will be subjected to loud aircraft overflights. Such disclosure is intended to advise a prospective buyer where the property is located in relation to current noise exposure contours, allowing them to make an informed purchase decision. This policy may be implemented by ordinance or through voluntary participation.
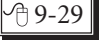
In the State of Indiana, a public use airport is defined by state law as a public nuisance that is allowed to continue operation without threat of nuisance litigation if the airport is operated in accordance with state aeronautics rules and does not significantly change its hours of operation. Effectively, the State has determined that it is appropriate to exempt airports "in order to reduce the potential for the state to lose the benefits to the state's air transportation system that are provided by airports" (*197*). 9-25

Limitations: Noise Level/Nuisance Disclosure Statements typically are adopted by the local jurisdiction and implemented by real estate agents through listing information or by airport staff through periodic publication of noise exposure maps. Occasionally, an airport will take upon itself the responsibility for direct notification through mailings or signage. Similar to required easements, the required noise level and disclosure statements often do not change public attitudes to the airport, particularly in regard to growth or airport expansion issues.

Implemented by: Local jurisdictions and/or the airport.

Public reaction: The public generally views these types of statements as a 'taking' of property because they believe it classifies their property as adversely affected by aircraft noise levels. The legal basis of this argument is, at the time of writing, unresolved. Realtors frequently object because the requirement is seen as a property detriment, impeding sale.

Example of Technique for Public Information:

- California Real Estate Transfer Disclosure Statement (*198*) 9-26

- Public Airport Disclosure Map – Phoenix Deer Valley Airport (*199*) 9-27

- Public Airport Disclosure Map – Phoenix Goodyear Airport (*200*) 9-28

- Public Airport Disclosure Map – Phoenix Sky Harbor International Airport (*201*) 9-29

- Indianapolis Executive Airport Basic Information (*202*) 9-30

- Indiana Notice of Designation of Noise Sensitive Area (*203*) requirements of developers for real estate sales disclosure 9-31

Development Density Restrictions in High Noise Areas

Purpose: In areas of high noise levels, local jurisdictions may prohibit or limit residential land use to minimize noise impacts. Restrictions may include the prohibition of new residential devel-

opment and specified timeframe for rebuilding if the structure is destroyed from natural causes. Such restrictions may also limit the number of noise-sensitive uses that may be developed within areas of elevated noise through applying a unit per acre factor or a percentage of open use set aside in larger property platting. These measures are usually a provision of a Noise Overlay Zone, but may be applied independently by local government through the platting or subdivision approval process.

Limitations: The measure places a restriction on the unrestrained development of property. Although the number of potentially impacted persons is reduced, impacts may still occur within the areas of significant noise exposure.

Implemented by: Local jurisdictions.

Public reaction: Typically the restriction of development densities is transparent to the ultimate resident and land is used for estate lot or agricultural purposes. However, the original developer may be impacted by the limitation the measure places on his ability to fully develop the property.

Plat Modifications to Move Open Space into Noisiest Areas

Purpose: When development of noncompatible uses is proposed within the areas exposed to significant aircraft noise levels (generally greater than 65 DNL) the plat design may be modified or managed to assure that the areas exposed to the highest noise levels are reserved for open space or buffer zones and the areas exposed to the lower noise levels are used for the most incompatible development.

Limitations: Such modifications to plats typically require the support or participation of local developers. The acceptance of such a design strategy may be in the hands of those whose potential market and profitably may be adversely affected by such design standards.

Implemented by: Local jurisdictions.

Public reaction: It is likely that such plat modifications would be transparent to the general home-buying public.

Building Code Modifications

Purpose: Building codes may be modified to incorporate structural characteristics into a building that will provide additional sound insulation to mitigate the interior noise levels imposed by aircraft activity. In addition to the requirements established for new construction, buildings that are substantially modified or upgraded may be required to be brought "up to code" through the local permitting process.

Limitations: Generally, building codes are established at the state level and, depending upon the language contained in the state code, the use of the state building code is either mandated or permissive. "Mandatory" codes are applicable to all construction whether or not they are locally enforced. "Permissive" codes are only applicable if a local government chooses to adopt and enforce the code.

Implemented by: Local jurisdictions.

Public reaction: Building codes are often unknown to the general public and typically proposed changes are challenged by the home building industry. In general, the public attitude toward building code changes/amendments and enforcement is indifference unless there would be a direct impact on their cost.

Review of Development Proposals

Purpose: Airports can participate with local planning agencies in their review of permit zoning and subdivision applications to discourage development of noncompatible land uses. Local planning agencies are encouraged to include airport staff review and airport impact assessment as part of the permitting process. If appropriate land use controls are in place through zoning regulations, airports can deny or recommend changes to a development proposal to ensure compatibility with airport operations.

Limitations: Requires local permitting authority or developers to pro-actively engage airport in the development process.

Implemented by: Airports and local jurisdictions.

Public reaction: Typically, such administrative actions are unknown to the public.

Example of Technique for Public Information:

- Phoenix Development Services Department Preliminary Review Checklist – Preliminary Site Plan (*204*) used by the planning agency to evaluate development proposals ⟦🖰 9-32⟧

- Phoenix Aviation Department development review flowchart for review of land use proposals in airport environs (*205*) ⟦🖰 9-33⟧

Best Practices in Land Use Management for Noise Compatibility

Based upon their effectiveness in managing the use of incompatible lands in the airport environs, as well as the results of surveys and interviews conducted for this analysis, several techniques may be identified as best practices. The best practices of land use management are those that preclude incompatible uses before they develop. To assure the best application of each, it is essential that airport staff communicate and collaborate closely with local planning officials that have jurisdiction over the preparation and regulation of each technique. If the incompatible land uses are already present within the areas of significant noise exposure, mitigation actions are warranted. The best practices to manage land use include:

Acquisition of Noncompatible Property. The acquisition of lands developed in noise-sensitive uses is the surest method to reduce incompatibilities within the areas of significant noise exposure, but it is also the most expensive. Property within the 65 DNL contour that has not been developed, but is at high risk to do so, is also a prime target for a comprehensive acquisition program. In both cases, the purchaser is usually eligible to participate in the federal grant program.

Sound Insulation Programs. Sound insulation programs may be best practices in areas where the noise levels are high, the noise-sensitive uses (residences or public-use buildings) are well established, and all available abatement opportunities have been implemented. These programs are expensive and complex to administer, and do not mitigate exterior noise levels, but they do make the interiors of the treated structures compatible with high levels of aircraft noise.

Comprehensive Community Planning. The incorporation of considerations of aircraft noise levels into the comprehensive planning process may allow the community to prevent the development of incompatible uses before they occur. It discourages the provision of infrastructure designed to support residential development in areas where significant potential impacts are now or may become present with development. It also may designate significantly noise impacted areas for future compatible land uses. Comprehensive planning can provide management of the risk to the utility of the airport by stopping incompatibilities before they happen.

Noise impact overlay zoning. The zoning of land that is exposed to significant levels of aircraft noise, whether through conventional zoning or through an impact zone, provides a measure of control over its future development. The greater benefit of the overlay zone is its ability to set density controls, subdivision design requirements, and to require easements, disclosure, and waivers of claim on any property developed within a large area, rather than on each individual zoning request. One drawback to the use of zoning is that it is always subject to changes or variances based on current development considerations and economic need of the community.

Subdivision code modification. Because they are transparent, subdivision codes are useful to establish a variety of noise mitigating tools. They may control the density of noise-sensitive development, impose avigation easements, and require disclosure covenants as conditions of approval.

Development review. The collaborative review by airport staff and planning or zoning officials of proposed development projects allows the airport to comment early on about the potential for adverse impacts created by incompatible development on noise-sensitive properties. Organized review may place both the developer and the community on notice that if the incompatible land use is allowed to take place in areas exposed to high noise levels, conflicts between the airport and the public are likely to arise.

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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
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
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