DIA Leadership

A Metro Denver EDC Committee

Homebuyers' Guide to the Denver International Airport Region

Homebuyers' Guide to the DIA Region

Introduction

The purpose of this guide is to provide potential homebuyers with information about planned airport growth and the impact of aircraft operations in the area near Denver International Airport (DIA) – now and in the future.

The DIA region in northeast Denver is the fastest-growing area in metro Denver. The DIA Region has become a desirable place to live, with quality education, transportation, and parks and open space, and continues to attract residents and businesses alike. Commercial and residential development is actively occurring and there is room for much more.

Denver's airport also has room to grow, and that is what makes it unique among U.S. airports. It has ample room to expand as needed – the airfield can hold as many as 12 runways without requiring more land. As a major hub for the nation's air transportation system, DIA must be able to respond to increasing demand for air passenger and air cargo service. DIA's ability to grow is critical to Colorado's economic vitality.

Over the years, airport planners worked with local governments to develop compatible land uses around the airport. Now, more than 300,000 people live within 15 miles of DIA, and a projected half million people will live there by 2030. Many people who travel frequently may appreciate a home close to an airport, but other people may react to aircraft overflights, noise and other airport impacts.

DIA Homebuyers' Guide Task Force

The Homebuyers' Guide Task Force – a coalition of real estate developers, business leaders and airport officials – was convened by the DIA Leadership Committee, an organization of local business leaders dedicated to enhancing economic opportunity and quality of life in the DIA area. The task force created this guide to provide factual information to prospective homebuyers when considering a home purchase in the DIA area.

More detailed information can be found through resources listed at the end of the guide. Readers are encouraged to do their own research to verify or supplement the information provided here.

The DIA Homebuyers' Guide Task Force encourages prospective homebuyers to consider all of the information within the guide when making their home-buying decisions. Some key questions homebuyers should ask are:

1. Where is the home located in relationship to DIA, especially in view of its expansion plans?
2. If I purchase the home, will I be aware of aircraft overflights?
3. Do any aviation-related conditions, easements or disclosure requirements apply?

Economic Impact

The economic activity associated with the airport goes beyond the more than 30,000 workers at DIA and the businesses that are directly related to airport operations (parking, ground transportation, cargo shipping, etc.). The airport supports the state's essential tourism industry as well as businesses that are dependent on air transportation for just-in-time shipping or frequent corporate travel.

A Colorado Aeronautical Board and Colorado Department of Transportation study determined that DIA's total economic impact in 2003 was $16.7 billion, including 193,229 jobs, $6.9 billion in wages, and 3.7 billion tourist dollars for lodging, food, entertainment, and retail sales. Because passenger volume is growing and additional air carriers have started service at DIA, the current impact is even more significant.

DIA anchors what is now metro Denver's fastest-growing region. With an annual economic impact of $15 billion to metro Denver – increasing to $85 billion by 2025 – the DIA region will account for 30 percent of all metro area employment growth. More than 184,000 people currently work in the region and 317,700 live there.

DIA – Today and Tomorrow

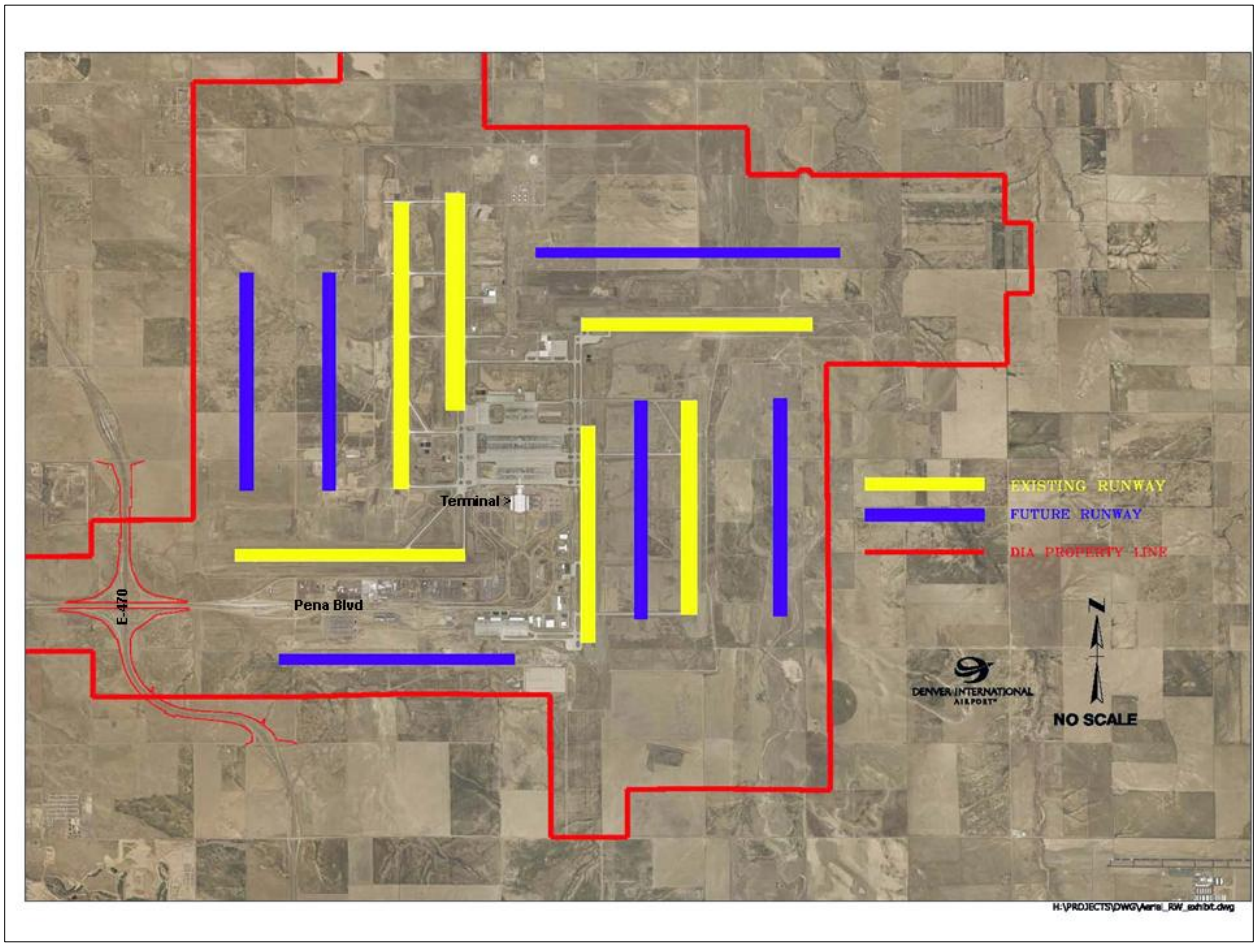
Denver International Airport is the collective vision of the communities and governments of the Denver metro area. Every feature of the airport is designed to make it the most efficient, attractive and customer-friendly airport in the world. Its airfield, with its "flow-through" operation and multiple runways, provides high capacity and few delays, ranking Denver at the top for on-time performance. Runways do not intersect, and they are far enough apart to support simultaneous arrivals and departures. Air traffic flow can be easily switched from one runway to another, depending on wind direction or traffic volume.

The airport's current layout has six runways, but DIA is designed to accommodate six more runways – 12 totals – as demand grows.

Over time, the terminal complex will expand, as will facilities for air cargo, general aviation, aircraft maintenance, and mass transit, with the completion of the FasTracks transit system.

The illustration that follows shows current runway configurations and the proposed locations of future runways. The precise location and order of construction for the new runways will be determined by future studies (see Exhibit 1).

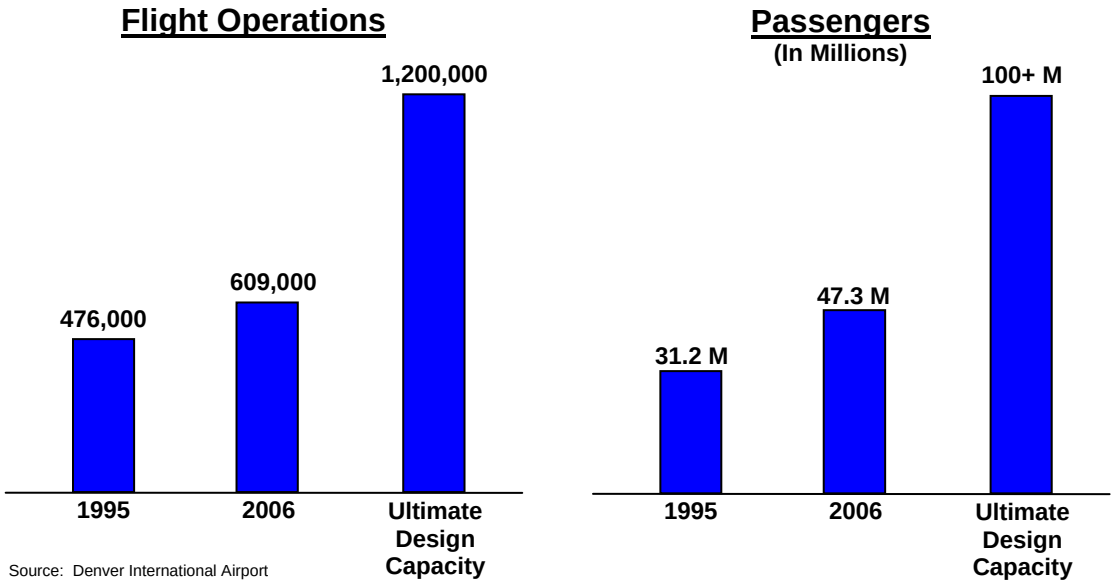
Exhibit 1



Ultimately, DIA is planned to handle 1.2 million aircraft takeoffs and landings and more than 100 million passengers per year. In 2006, DIA operated at about half of its ultimate capacity on six runways, with 609,500 aircraft takeoffs and landings and 47.3 million passengers. Current projections show the airport exceeding 650,000 takeoffs and landings and 50 million passengers before 2010 (see Exhibit 2).

Exhibit 2

DIA – Future Growth



At these rates of growth, one or more additional runways will be needed sometime between 2015 and 2020, and other runways could be added at approximately five-year intervals beyond 2020.

Land Use Planning Around DIA

Aircraft noise is the single largest generator of airport-related public complaints and concerns. The public's opposition to aircraft noise is one of the major obstacles to expanding and increasing capacity at our nation's airports. One of the primary reasons for relocating air operations from Stapleton International Airport to the new Denver International Airport site was the significant noise impact on residential neighborhoods located close to the former airport.

Denver International Airport was located in a largely rural area, so development of residential land uses could be planned and not restrict airport operations. Land use planning around DIA began when the airport was first conceived. To preclude aircraft noise from affecting future residential development, the airport and its neighboring cities and counties worked together to plan compatible land uses.

To build DIA, Denver needed to annex a large parcel of land located within Adams County. Both Denver and Adams County voters were asked to approve a ballot measure regarding the annexation of future airport lands. After the voter approval, Denver and Adams County adopted an intergovernmental agreement (IGA) with the goal of minimizing DIA noise impacts by restricting residential development in the immediate airport area.

Noise Contours

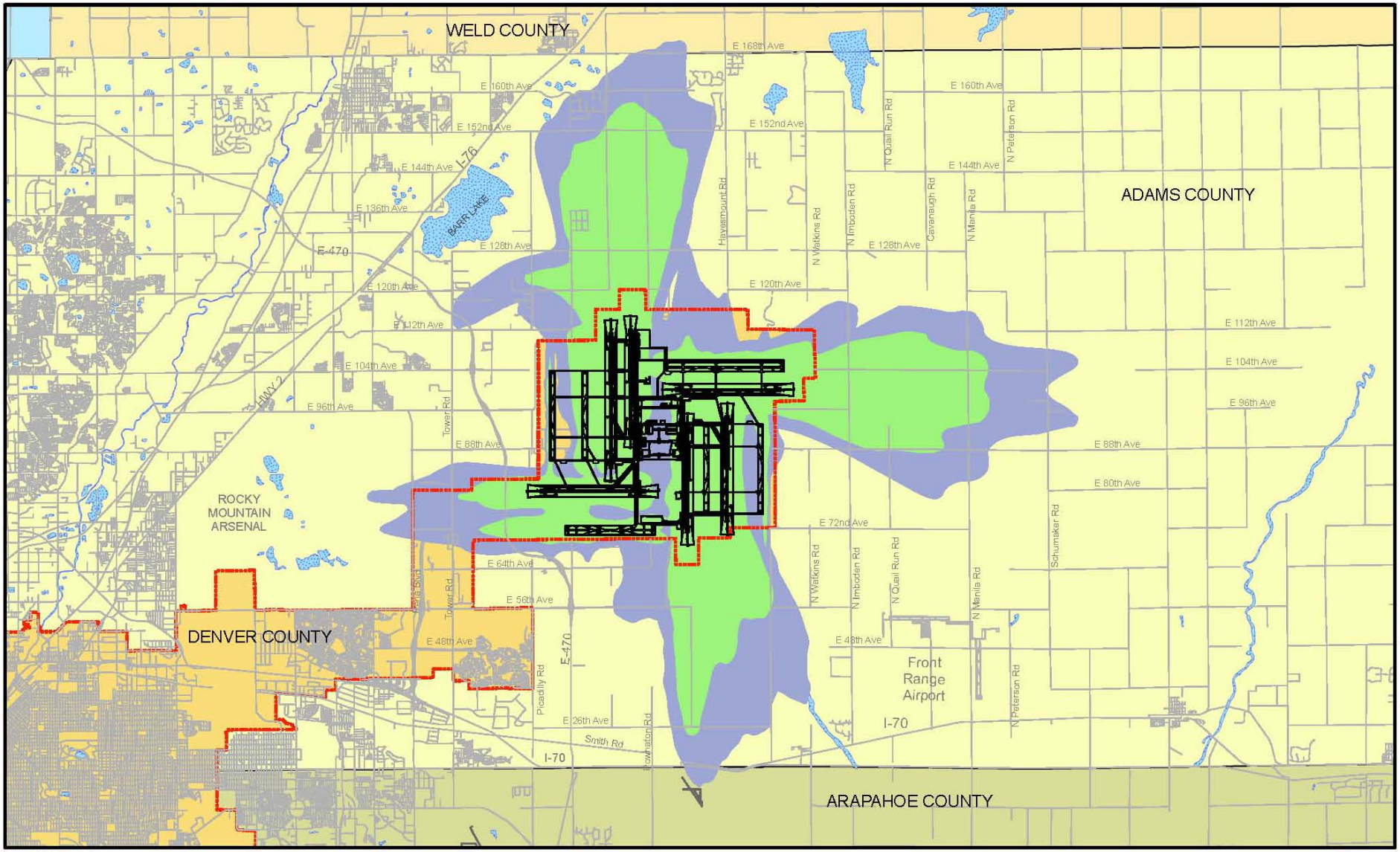
The significant noise-related provisions of the IGA provide that new residential areas are prohibited within the airport's 60 decibel (dB) Day-Night Level (DNL) noise contour for the 12-runway build-out scenario. Noise contour refers to a "line" surrounding an airport that encloses a geographic region exposed to a particular DNL level. A noise contour map depicts the annual average aircraft noise level that can be expected within the contour line. (See the Glossary of Terms at the back of this guide for an explanation of decibels and DNL.)

The Denver-Adams County IGA set a standard for using the 60 dB DNL noise level for compatible land use planning in the new Denver airport area. This level was also later adopted by the Denver Regional Council of Governments' airport compatibility land use guidelines for restricting noise-sensitive land uses around all airports in the Denver metro area. Outside and below the 65 dB DNL noise contour, no residences are eligible for Federal Aviation Administration (FAA) funded noise mitigation measures. Because there are no residence located in the 65+ dB DNL contour, DIA meets and exceeds FAA requirements.

Exhibit 3 shows the recommended long-term DIA noise contours for land use planning.

Exhibits 4 and 5 are air traffic intensity plots – for both arrivals and departures. (See Glossary for a more detailed definition of air traffic intensity plots). The plots are color-coded and show a range of air traffic intensities from low to high in the DIA region. Superimposed on today's air traffic intensities are arrows that show anticipated aircraft arrival and departure flows at the airport's full build-out of 12 runways. These plots do not necessarily depict the level of noise, only the anticipated number of over-flights.

Exhibit 3



Denver International Airport Recommended Noise Contours for Land Use Planning

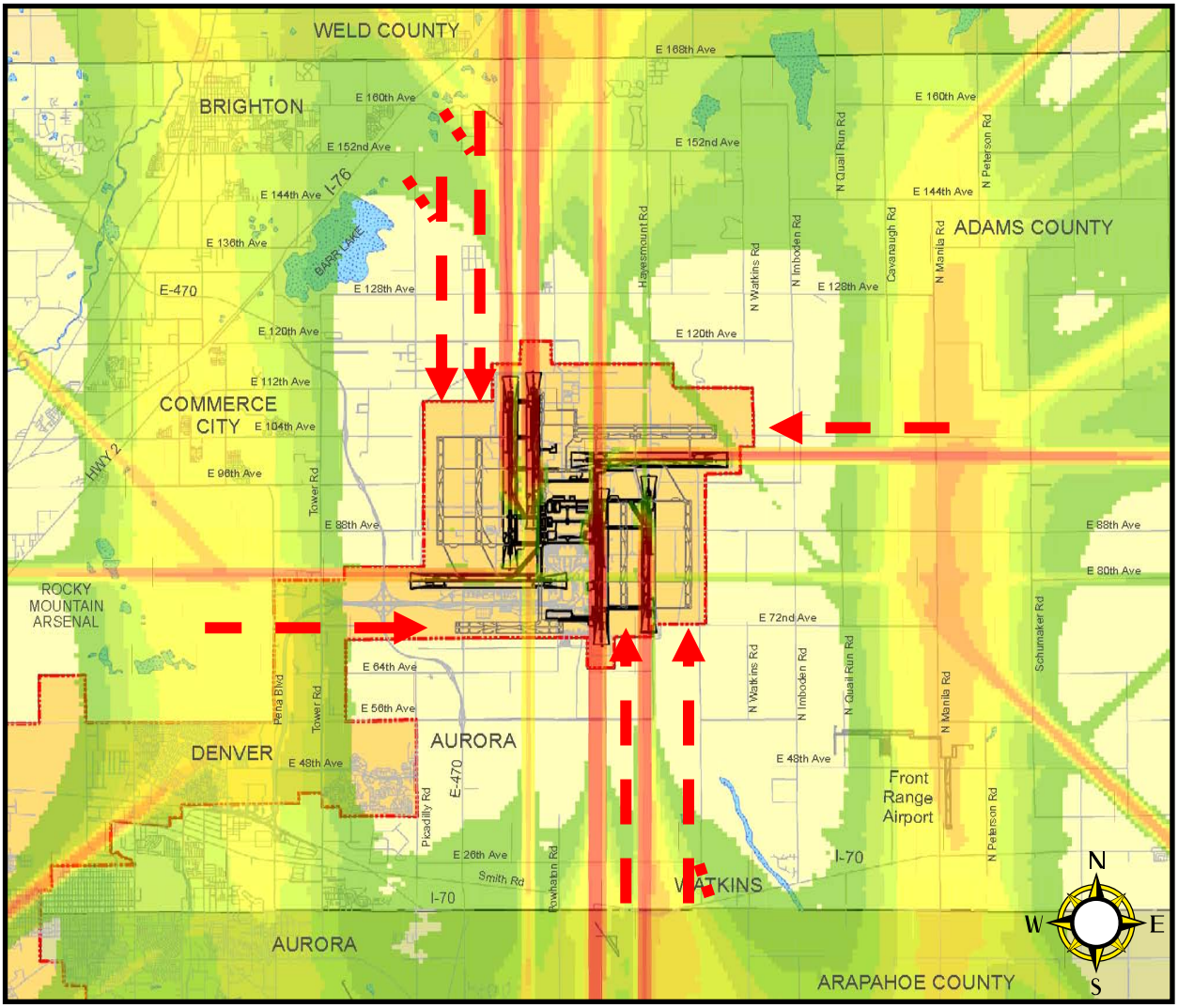
NOTE: These contours reflect the noise impacts that may be expected from full development of Denver International Airport (12 runways). They are based on current modeling and differ slightly from the IGA Composite Contours.

60 LDN Contour
65 LDN Contour

N 0 0.5 1 2 3 4 Miles

Prepared By Annie Christensen, DEN Noise Officer 7/2007

Exhibit 4

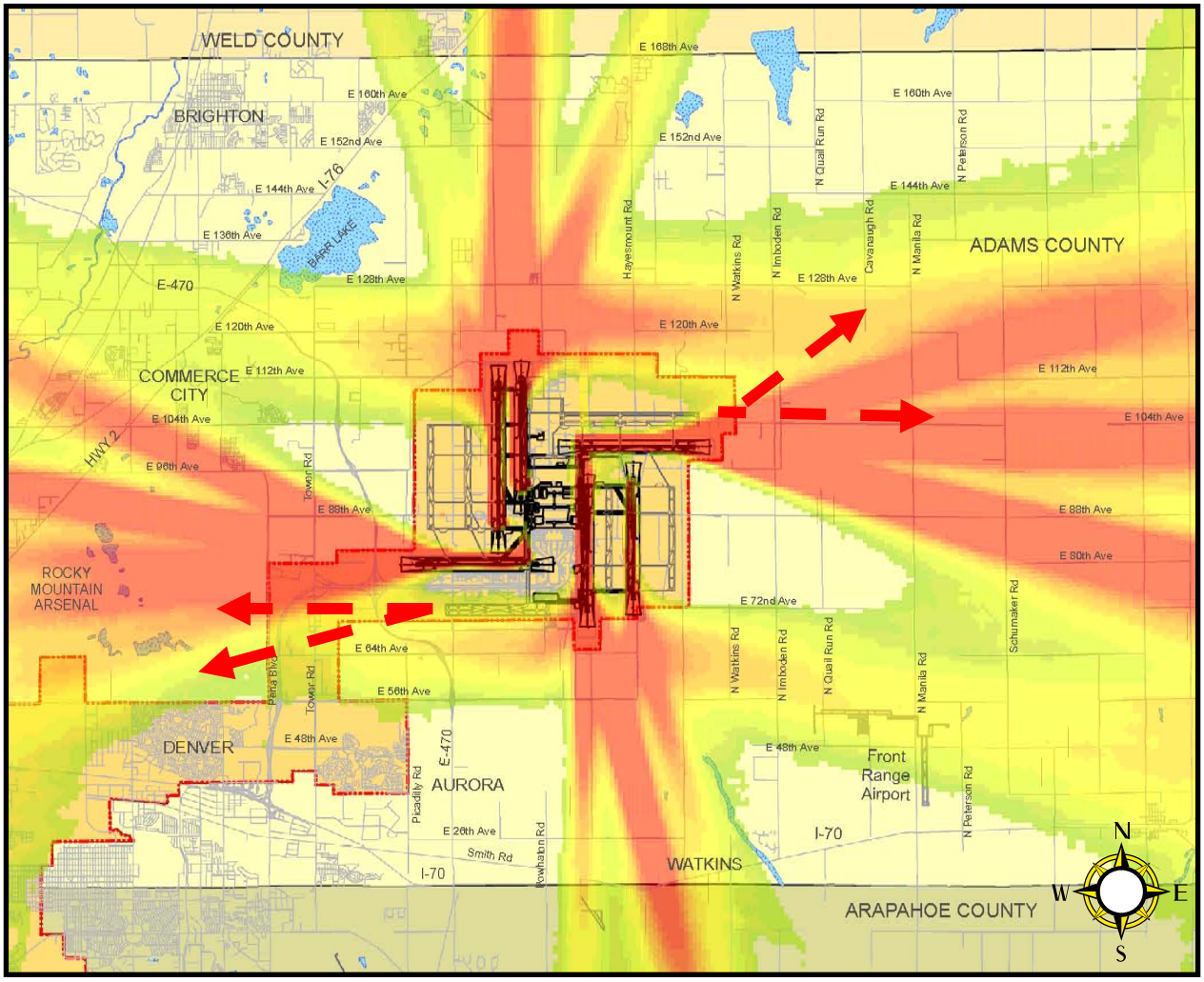


Denver International Airport Air Traffic Intensity
Arrivals Only - Current Arrival Flows Shown

Additional Anticipated Future Aircraft Arrival Flows at

Low
Medium
High

Exhibit 5



Denver International Airport Air Traffic Intensity
<u>Departures Only</u> - Current Departure Flows Shown

Additional Anticipated Future Aircraft Departure Flows at

Light
Medium
Heavy

Sample Disclosure Statements

Prospective homebuyers MAY receive a disclosure notice or statement relating to airport impacts from current landowners, sales agents or government jurisdictions. Disclosure statements inform prospective homebuyers that the site is subject to aircraft noise exposure, overflights, and impacts from current and future expansion of the airport. Disclosure statements allow prospective homebuyers to make informed decisions about the suitability of the home site for their individual needs. Disclosure statements may also identify if a home site is encumbered by an "avigation" easement (i.e., a grant of a property interest in land that has a right of unobstructed flight in the airspace above the property or a right to make aircraft noise). A sample disclosure statement is provided in Exhibit 6.

Property owners and their agents may be required to include a disclosure statement with the property sales documents, contracts, or homeowners' association documents. Statements could also be included in subdivision plats and site plans, and within the *Deed of Conveyance* for those properties located within an airport influence area or overlay zone district.

Some government jurisdictions may require additional noise mitigation measures including construction mitigation.

Exhibit 6

SAMPLE PLAIN LANGUAGE NOTICE – PROXIMITY TO AIRPORT

This shall serve as notice of the following to any owner of the property against which this notice is recorded.

This property is located in proximity to the Denver International Airport (DIA). As such, the property lies within the Airport Overlay Zone District established by (government jurisdiction) and is within one mile of the projected 60 dB DNL noise contour for the full build-out of Denver International Airport.

As a result, the property could be overflown on a regular basis by aircraft arriving and departing from the Airport, at altitudes as low as 1,000 ft. above the ground, possibly less depending on the actual location of the property. This property may also be subject to height restrictions per Federal Aviation Regulation (FAR) Part 77.21-77.29 (as may be amended from time to time).

The use and the enjoyment of the property may be affected by aircraft noise, vibrations, fumes, smoke, dust, or fuel particulates from aircraft operation from the current DIA airfield configuration, or any future additions to DIA, including a planned full airport build-out of twelve runways.

The layout of current and planned future runways, current noise level and aircraft flight track information, and height restrictions due to FAR Part 77 are available for public review from DIA.

This notice shall be provided to all future property owners.

Executed this _____day of _____, 20____. By:_____.
(Name of Property Owner)

Noise Mitigation

Aircraft noise can be mitigated (reduced or minimized) through several methods. The first is mitigating noise at the source through technological improvements to an aircraft's engines, airframe, or both. There are physical limits, however, to how much noise reduction can be achieved with technology.

The second method for reducing noise impact is to develop aircraft operating procedures that minimize noise over nearby residential areas. These procedures generally involve altering aircraft direction of flight, altitudes, or runway use. The goal is to move aircraft farther away from residences, either horizontally or vertically, or to reduce the frequency of flyovers.

Noise abatement procedures can be useful in reducing noise impact on residences, but several factors limit their applicability and effectiveness. The first is safety. In any phase of operating an aircraft, safety is paramount. The best noise abatement procedures may at times be overridden by the need to maintain safe flight.

For example, reducing the use of a noise-sensitive runway cannot be an option when winds and weather require aircraft to use such a runway. Also, FAA air traffic control procedures, which are designed to ensure safe and efficient use of the airspace, can often conflict with desired noise abatement procedures. When this conflict occurs, air traffic controllers will place priority on safe flight and usually on efficient flight.

Controllers also ensure that airport capacity is not unnecessarily compromised in the process of mitigating noise. DIA, although a tremendous regional asset, is also a critical component of a much larger National Airspace System. It is, therefore, important that Denver International Airport remains efficient to avoid compromising the operation of the national system.

The third method for mitigating aircraft noise is to prevent residences from being constructed in noise-impacted areas. This requires coordination between various jurisdictions. Denver International Airport has – as do many other airports – jurisdiction over its own land, but not over most of the adjoining land. Land use planning around airports generally establishes the most-compatible (i.e., least noise-sensitive) uses closest to the airport and the least-compatible uses (such as residences) farther away.

Weather and Other Factors Affect Noise and Flight Operations

In addition to being major determinants of which runways are used, wind, air temperature, humidity, cloud cover, and temperature inversions all affect the transmission of noise and the noise volume heard on the ground.

These meteorological factors vary from day to day, and so will the noise level heard on the ground. Wind, for example, moves the air and the noise it transmits. As a result, noise from a particular location may be heard loudly at a home on one day, but not be heard at all at the same home on another day. On humid days, the air is denser, and it transmits sound better. So noise, particularly in certain frequencies, will be heard farther away from the source. A temperature inversion or cloud layer may reflect noise back to earth.

Federal standards specify the weather conditions under which the DNL noise contours are calculated. Weather, however, is not fixed, so unlike altitude contours, which define a fixed condition on a map, noise contours merely provide a calculated planning guide for noise (which in reality fluctuates all the time). As a result, the equivalent of 60 DNL could be heard under certain weather or operating conditions, even outside the Land Use Planning Contour (see Exhibit 3).

Aircraft Size and "Visual Intrusion"

Small aircraft are obviously less visually intrusive than large ones. At an altitude of 600 feet, a small 19-passenger aircraft may pass almost unnoticed, while a 400-passenger airliner would be very noticeable, even if it was totally silent.

Much of the past growth in flight operations at Denver International Airport has been with small, relatively quiet regional jets. However, the long-term trend in aviation is toward larger aircraft. As flight operations grow at Denver International over the coming years, flights likely will become more, rather than less, visually intrusive.

Noise Standards

Federal regulations require that commercial aircraft meet noise standards that are "technically feasible and economically reasonable." As engineering knowledge has advanced, aircraft have been required to become quieter, but we are now at the point where aerodynamic noise is nearly as large a factor as engine noise for some new aircraft. Aerodynamic noise heard on the ground comes from air flowing over the aircraft's undercarriage, flaps, and control surfaces during takeoff and landing. While research is under way to try to reduce aerodynamic noise, the simple fact that this "wind" noise is now a factor alongside engine noise means that the aircraft designer's ability to further reduce aircraft noise solely by reducing engine noise is diminishing.

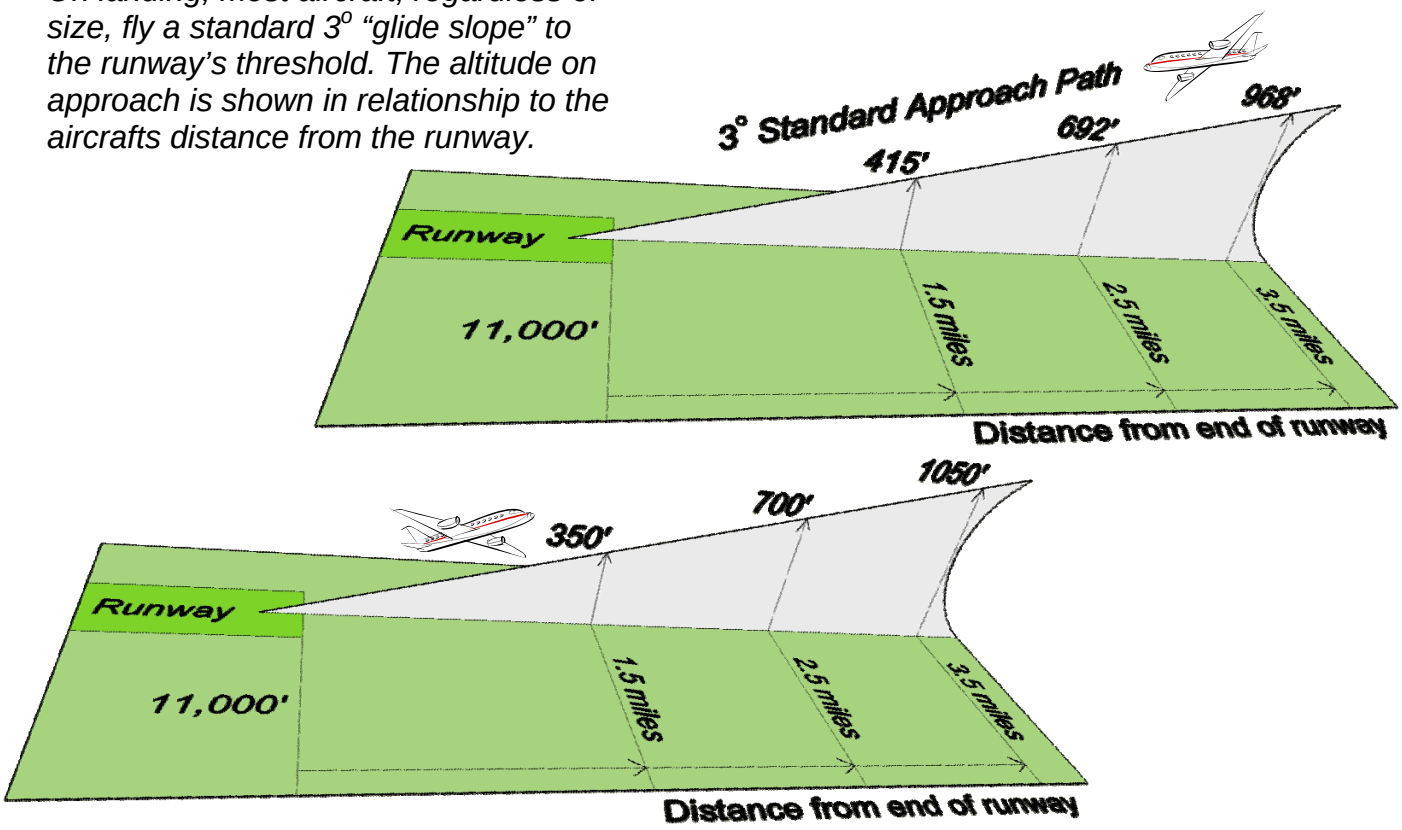
Flight Operations Vary

At most airports, including Denver International, aircraft do not follow fixed flight paths away from the airport. Although there is some consistency to most aircraft flight tracks, there is also a substantial degree of variation because the air traffic control environment is by its nature fluid and dynamic. Changing winds, changing weather, differences in pilot technique, differences in aircraft performance, differences in aircraft weight, and numerous other factors all combine to create an environment that is constantly changing. Air traffic controllers issue commands to move aircraft around the sky both horizontally and vertically in response to variable conditions. The primary objective is to avoid potential conflicts between aircraft.

Aircraft may also pass over a given point on the ground at varying altitudes. Differences in aircraft design, weight, or outside air temperature will result in varying altitudes on departure. Altitudes of arriving aircraft are generally more consistent, at least within a few miles of the airport, as they follow a stabilized three-degree glide slope as they approach the runway.

Exhibit 7

On landing, most aircraft, regardless of size, fly a standard 3^{o} "glide slope" to the runway's threshold. The altitude on approach is shown in relationship to the aircrafts distance from the runway.



Climb out on a hot summer's day - 100^{o} F- for a fully laden 747; altitude is expressed in feet.

The presence of an aircraft near a home, as much as the noise itself, tends to concern a homeowner. Denver International Airport generally discourages new housing proposals where new homeowners would likely find aircraft passing nearby at altitudes of 1,500 feet or less.

Local Government (City and County) Policies

Most local government jurisdictions bordering DIA have recommended land use compatibility guidelines or have adopted zoning regulations to avoid incompatible land uses near the airport, but their policies and ordinances may differ. Depending on where your home is located, jurisdictional regulations or disclosures may apply. Additional information on the following jurisdictions may be found as listed below.

Arapahoe County

- *Arapahoe County Airport Influence Areas map*, which depicts the airport influence area boundaries and airport noise contours/land use restrictions, is not available on the county Web site, but copies may be obtained by contacting the Arapahoe County Planning Division, (720) 874-6650, or the Mapping Section, (720) 874-6500.

- *Arapahoe County Land Development Code, Part I: Zoning Regulations, Overlay District, Section 3400 – "Airport Influence Area"*
  http://www.co.arapahoe.co.us/Departments/PW/documents/1-3400.pdf

- Building and Zoning Code of Aurora policies regarding development in the vicinity of the airport are found in *Code Sections 146-800 to 146-822, (Airport Districts zoning codes) Article 8. Overlay Districts, Division 4. "Residential Uses within the Commercial Aircraft Noise Impact District of Denver International Airport")*
  http://www.municode.com/resources/gateway.asp?pid=13725&sid=6

City of Brighton

- City of Brighton Community Development Department
  http://brightonco.gov/department/index.asp?fDD=7-0

City of Commerce City

- City of Commerce City Community Planning and Development Department
  http://www.ci.commerce-city.co.us/pages/government/planning/index_planning.html

City and County of Denver

- *Recommended Noise Contours for Land Use Planning Map* established by Denver International Airport
  http://www.flydenver.com/diabiz/community/noise/reports/landuse_contours.pdf

Denver Regional Council of Governments

- The Denver Regional Council of Governments (DRCOG) is a voluntary regional association of the counties and municipalities in the Denver metro area. This organization works collaboratively to resolve regional issues. *DRCOG's Airport Compatible Land Use Design Handbook* describes recommended land use guidelines for development near airports.

  http://www.drcog.org/documents/Airport_Compatible_Land_Use_Design_Handbook_5-15-98.pdf

  Table 1, Noise Compatibility Guidelines, on page 9 of DRCOG's handbook, considers noise-sensitive land uses, such as single-family residential, schools, hospitals, and churches, to be only marginally acceptable within the 55 to 60 dB DNL contour interval. Such development is normally unacceptable within the 60 dB DNL, and clearly unacceptable within the 65 dB DNL. Commercial, industrial and transportation-related development within the 55 to 60 dB DNL contour is acceptable.

Frequently Asked Questions

Q. ***Why can't the airport mandate that aircraft not fly over residential areas?***

A: Aside from the practical reasons that aircraft cannot avoid all residential areas, Denver does not have jurisdiction or control over aircraft in flight. Air traffic control is a federal responsibility, administered through the FAA. The City and County of Denver is the proprietor of Denver International Airport, and controls only the physical facilities on the ground. The city can and does work cooperatively with the airlines, FAA, and local political jurisdictions to encourage the FAA and aircraft operators to fly in a manner that minimizes noise impact on surrounding areas.

Q: ***I am looking at property that appears to be outside the flight corridors depicted in this document, yet I have noticed aircraft flying over the property. Why is this?***

A: It is important to remember that while there are certain areas that experience more intense arrival or departure activity than others, virtually all areas surrounding a major hub airport, such as DIA, will experience some overflights. Air traffic over a particular location will vary according to winds, weather, and hourly demand. Aircraft flight tracks will vary due to air traffic control (ATC) actions necessary to maintain safe separation between aircraft. Additionally, even when aircraft are repeatedly assigned the same heading by ATC, their actual tracks over the ground will vary. This is because aircraft are generally assigned compass headings to fly, rather than a particular track over the ground. Varying winds will cause aircraft to drift over different ground tracks even when they are assigned the same compass heading. This is normal and cannot be avoided.

Q: ***I have visited my potential new home site and it appears to be very quiet. Can I expect this to continue in the future?***

A: This is a difficult question to answer in general terms, as it very much depends on the specific location. You should refer to the noise contour and flight track maps on the airport's Web site to get a general idea of which areas are likely to be more or less affected than others. These maps take into account existing conditions, as well as future expansion of the airport and the corresponding expected increase in air traffic. Some areas that currently experience little noise can expect increased flight activity in the future. Just because a location is quiet today does not mean that it will necessarily remain so. If you want more information, it is recommended that you contact the Denver International Airport Noise Abatement Office by email at: noise.office@diadenver.net .

Q: ***I have reviewed the enclosed maps and my home is not located within the noise contour nor is it under one of the flight tracks. Does this mean that I will have no aircraft noise impact?***

A: Not necessarily. The noise contour map depicts the *annual average* aircraft noise level that can be expected within the contour line. In this case, it depicts what is known as "60 DNL." This simply means that within this contour, the annual average noise level due to aircraft alone will be at least 60 decibels (this measurement also includes a 10-decibel weighting factor for nighttime activity to account for sleep disturbance). While this level is 5 decibels quieter than federal standards recommend, being located outside this line is no guarantee of quiet. Noise does not stop at the contour line. As an example, one property located just inside the line, with a DNL of 60.5 decibels, and one located outside, with a DNL of 59.5, would exhibit no perceptible difference in noise level to a listener. Most people require about a 3-decibel difference between different sound levels to notice a difference. Additionally, predicting whether a particular person will find a certain noise level acceptable is very difficult, as sensitivity to noise is subjective, and varies greatly from person to person.

Q: How can I find out if my property requires an avigation easement or may be eligible for soundproofing?

A: Contact the governmental jurisdiction in which your property is located to learn more about specific requirements.

Glossary of Terms

Aircraft Flight Tracks: The flight path of an aircraft above the ground. Generally depicted as lines on a map that show where aircraft have actually flown. Flight tracks will fluctuate considerably due to variation in winds, weather, aircraft performance, air traffic control procedures, etc.

Air Traffic Intensity Plots: These plots indicate relative differences in the intensity of air traffic that may be experienced over various areas, based upon how frequently aircraft tend to fly over a particular point on the ground. The plots are derived from current air traffic activity; the additional arrows superimposed over the maps show anticipated aircraft arrival and departure flows at DIA's full build-out of 12 runways. Areas indicated as having a "high" intensity will be more directly over-flown by aircraft more often than areas with a "light" designation. However, even areas designated "light" should expect to experience some direct over-flights. These plots do not depict the level of noise, only the anticipated number of over-flights.

Avigation Easement: The right of passage of aircraft over the property, and of any incidental effects.

Day Night Level (DNL): A measurement of the average sound (in decibels) experienced over at least a 24-hour time span averaged over a year. Noise that occurs at night (defined as 10:00 p.m. to 7:00 a.m.) is given greater weight because of the public's increased sensitivity to noise during these hours.

Decibel (dB): Sound is measured by its pressure or energy in terms of decibels. The decibel scale is logarithmic; when the decibel level increases by 6 dB, the measured sound is twice as loud. For the average person, a change in sound level of 3 dB is about the smallest change that is noticeable.

Deed of Conveyance: A legal instrument that transfers property ownership.

Land Use Planning Contour: A 60 DNL contour that was developed by Denver International Airport using current modeling (2006) as a recommended guideline for determining compatibility between residential land use and aircraft noise. DIA strongly discourages construction of homes within this contour.

Noise Abatement: A measure or action that minimizes the amount or impact of noise on the environs of an airport. Noise abatement measures include aircraft operating procedures and use or disuse of certain runways or flight tracks. These operating procedures are controlled by the FAA.

Noise Contour: A "line" surrounding an airport that encloses a geographic region that is exposed to a particular DNL level. These contour lines are nested in such a way that contours closer to the airport generally surround areas that experience higher noise levels than contours farther out. Annual DNL contours are used to determine whether certain types of zoning or land uses are compatible with particular annual DNL noise levels. 65 dB DNL is considered by many federal agencies to be the level at which residential land use becomes incompatible. Denver and Adams counties recognize the quieter 60 dB DNL contour as the limit for residential use.

Contact Information

To obtain information about DIA and noise impacts, contact the Denver International Airport Noise Office at (303) 342-2360; or visit the DIA Web site at www.flydenver.com .

For information on regional development in the airport area, contact the DIA Leadership Committee office at 1445 Market St, Denver, CO 80202; 303-620-8092; or go to www.metrodenver.org/DIAL .