



**The Homebuyer's/Broker's Guide to  
Compatible Land Use  
Around  
Washington Dulles International Airport**

**Introduction**

The following information is provided by the Washington Airports Task Force (WATF) to assist potential homebuyers and the real estate community to assess the effect of aircraft noise and flight operations on homes in areas close to Washington Dulles.

If household members fly frequently, a home conveniently close to the airport may be a major asset. However, a home near a major airport is not a good solution for everyone. If the family members rarely travel by air and/or are sensitive to the daily “rainfall” of noise from repeated flight operations, the following information should be taken into careful consideration before purchasing a home near Washington Dulles or any other airport.

Loudoun and Fairfax Counties, the jurisdictions bordering Washington Dulles, have been extremely careful over the decades to try and ensure compatible land use. Surveys undertaken by the WATF show that the counties have largely succeeded in this goal. Because different people react differently to aircraft noise and flight operations, defining appropriate land uses is not as clear-cut as the reader might expect. Consequently, the counties have adopted policies to help guide people with respect to residential decisions close to Washington Dulles.

The potential buyer of a home near an airport should ask the following questions:

1. Where is the home in relationship to the airport?
2. If I purchase the home, will I be conscious of flight operations?
3. Do any aviation-related conditions, easements or disclosure requirements apply?

## County Policies

Both jurisdictions bordering Washington Dulles have created Airport Noise Impact Overlay Districts in an effort to avoid incompatible land uses. While the intent of the two counties is similar, their policies and ordinances differ.

### Loudoun County:

In order to ensure a "high-quality aural environment for both existing and future residents", and to sustain the economic viability of Washington Dulles and Leesburg Executive Airport, Airport Noise Impact Overlay Districts were established to impose development restrictions within specified areas surrounding both airports.

Loudoun County's policy related to aircraft and overflight covers three areas:

1. For areas outside but within one mile of the Ldn<sup>1</sup> 60 contour, the County requires a full disclosure statement to all prospective buyers located within that area. County policy requires this disclosure in all showrooms, exhibition exhibits, maps, advertisements, leaflets and other promotional material. **If you don't see this disclosure, please check. While most sellers conscientiously provide this information, some were granted exemptions from the policy in 1992 and others sometimes forget.** This disclosure requirement stays with the property and should be made by the seller to prospective buyers each time the property is sold.
2. For areas between the Ldn 60-65 aircraft noise contours, the County requires a full disclosure statement to all prospective buyers, acoustical treatment to ensure that interior noise levels within living spaces do not exceed a sound level of 45 db(A), and an aviation easement. An "aviation easement" is like a utility, trail or other easement, only it's in the sky above the property. The easement provides the legal right for aircraft to fly directly over your property without restrictions. Again, like other easements (and the disclosure requirement), it is a right that transfers with the property whenever it is sold.
3. For areas exposed to aircraft noise greater than Ldn 65, the County prohibits the construction of new residential or other noise sensitive uses within those areas.

The full content of the Loudoun Airport Noise Impact Overlay District policies can be obtained by going to page 452-454 of the following link:

<http://www.loudoun.gov/controls/speerio/resources/RenderContent.aspx?data=7870fce709be4259876f8325a711e55d&tabid=310&fmpath=%2f1993+Zoning+Ordinance+Revised>

### Fairfax County:

The Fairfax County Airport Noise Impact Overlay District has been established for the general purpose of controlling conflicts between land uses and noise generated by aircraft and to protect the public health, safety and welfare from the adverse impacts associated with excessive noise. Fairfax County regulate land uses within existing or projected airport noise impact areas by requiring acoustical performance standards.

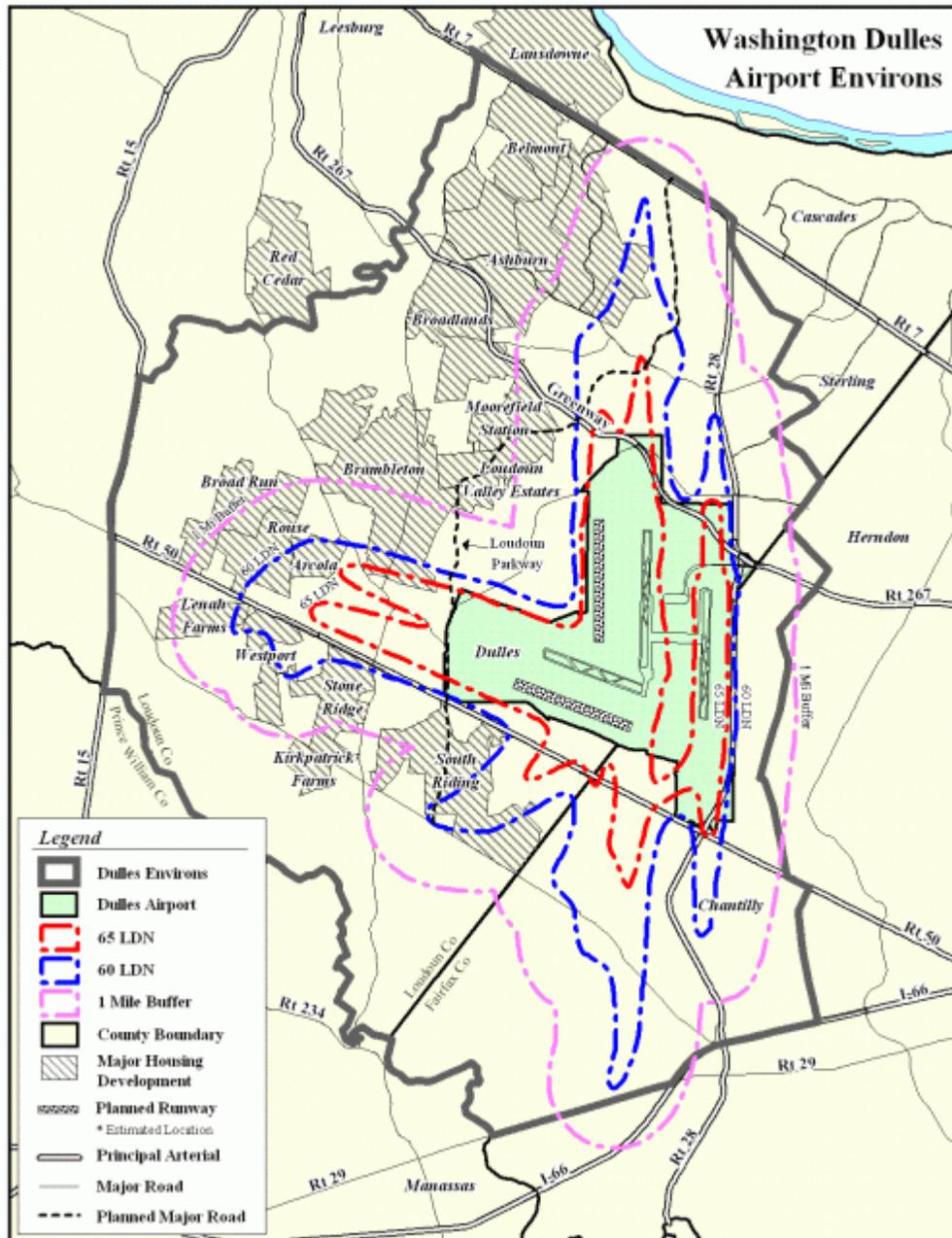
The full content of the Fairfax County regulations governing these acoustical performance standards can be obtained by visiting pages 24 through 28 of the following link: <http://www.fairfaxcounty.gov/dpz/zoningordinance/articles/art07.pdf>.

---

<sup>1</sup> Ldn – Loudness Day Night – also is sometimes referred to as DNL – Day Night Loudness.

## Maps

The following map provides an approximate guide to help the prospective homebuyer locate a particular property with respect to the planning guidelines. Please refer to county maps or your real estate specialist for precise location information.



Map courtesy of Patton Harris Rust & Associates, pc

## Survey

The presence of Dulles is favorable to most current residents, but not everyone feels this way. In a survey of households close to Washington Dulles conducted for the WATF in May 2005, the following results were reported:

- Most of Dulles' neighborhood travel by air, use Dulles as their primary airport and 89% have an overwhelmingly favorable opinion of the airport in general.
- 87% of area residents consider Dulles to be an asset to their neighborhood.

- 93% of neighbors were aware of the proximity of Dulles to their homes when they made their decision to move in.
- 3 out of 4 report they are aware of aircraft noise from Dulles.
- Of the 78% aware of aircraft noise, 88% describe the level as acceptable to them.
- 39% said the noise level was less than expected and 48% said it was about what was expected. 19% said noise levels have a greater impact than expected

### **Growth of Dulles**

Flight operations at Washington Dulles are growing. In the 12 months ending December 31, 2008, 23.8 million travelers used Washington Dulles, and 333,845 tonnes of freight and 360,292 flights passed through Washington Dulles. To support the region's economy and prosperity, the airport has the ability to handle up to 55 million passengers and 750,000 flight operations when all planned facilities are built.

The Metropolitan Washington Airports Authority is currently undertaking a capital improvement program, called  $d^2$ , to provide new facilities and to replace or modernize existing facilities at the airport. For details of the Airports Authority's  $d^2$  capital development program, you may access the following link:

<http://www.mwaa.com/dulles/751.htm>.

As can be seen from the illustration below, additional runways have been planned for Washington Dulles since 1985. County land use plans and policies are based on the construction and operational use of these additional runways.



*Photo courtesy of Air Survey Corporation*

This artist impression shows Dulles with five runways.

### **Weather and Other Factors Affect Noise and Flight Operations**

Wind, air temperature, humidity, cloud cover, and temperature inversions all affect the transmission of noise and the loudness heard on the ground. These 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 at all on another. On humid days, the air has more density and noise, and particularly, certain noise frequencies will be heard further away from their source. A temperature inversion or cloud layer may reflect noise back to earth.

Federal standards specify the weather conditions under which the Ldn contours are calculated. But weather is not fixed, so unlike altitude contours on maps which define a fixed condition, the noise contours provide a calculated planning guide. As a result, the equivalent of 65 Ldn could be heard under certain weather conditions, even outside the Aircraft Noise Impact Overlay District.

### **Aircraft Size & "Visual Intrusion"**

Small aircraft are obviously less visually intrusive than large ones. At an altitude of 600 ft. 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 growth in flight operations at Washington Dulles today is with small, relatively quiet regional jets. However, the long-term trend in aviation is toward larger aircraft. As flight operations grow at Washington Dulles over the years, flights likely will become more, rather than less visually intrusive.

### **Noise Standards**

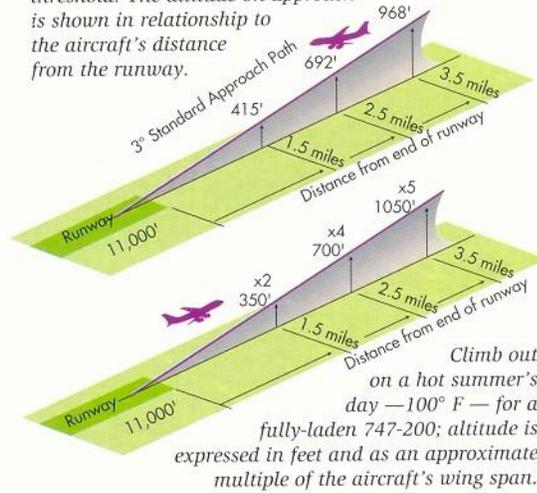
Federal regulations require that commercial aircraft meet noise standards which are "technically feasible and economically reasonable." As engineering knowledge has advanced, aircraft have been required to become steadily quieter, but we are now at the point where aerodynamic noise is nearly as large 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 underway to try and reduce aerodynamic noise, the simple fact that this "wind" noise is now a factor alongside engine noise means that the engineer's ability to further reduce aircraft noise is meeting the rule of diminishing returns.

What is technically feasible and economically reasonable is a function of the aircraft's purpose. For example, the laws of physics suggest that supersonic airliners are always likely to be noisier than a subsonic aircraft of equivalent carrying capacity. Military aircraft, incidentally, which are regular visitors to Washington Dulles, are designed for a different purpose and do not have to comply with civilian noise regulations.

### **Flight Operations Vary**

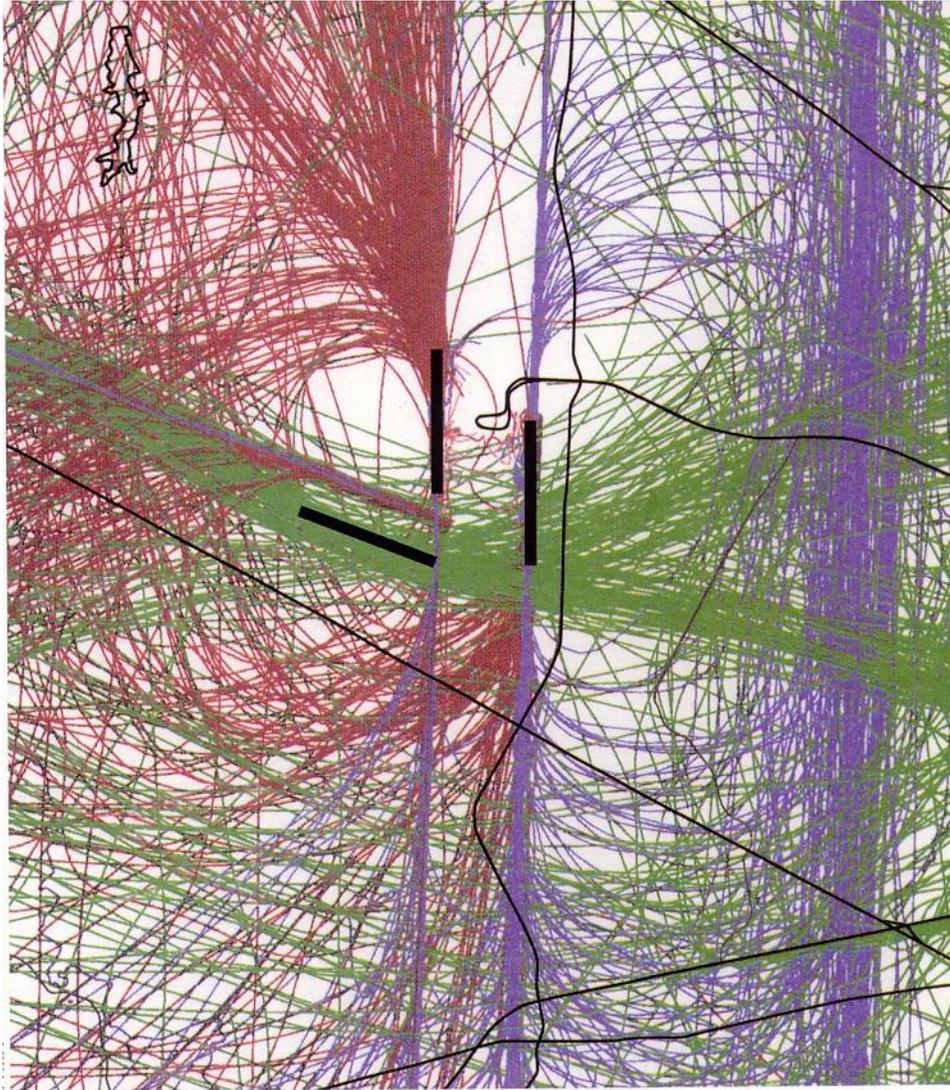
At most airports, including Washington Dulles, aircraft do not follow fixed flight paths away from the airport. Once airborne with sufficient altitude, pilots are free to take up the heading that will carry them to their next navigation point with minimum fuel burn and time loss. Very large four-engine aircraft will climb more slowly than small twin-engine aircraft, which may thus turn onto their course sooner. Arriving airliners regardless of size all follow a stabilized three-degree glide slope as they approach the runway.

On landing, most aircraft, regardless of size, fly a standardized 3° "glide slope" to the runway's threshold. The altitude on approach is shown in relationship to the aircraft's distance from the runway.



The presence of an aircraft in close proximity to a home, as much as the noise itself, generally arouses the homeowner's concern. An altitude of 1,000 feet is only five times the wing span of today's largest aircraft in passenger service. The Task Force has opposed housing proposals when new homeowners would likely find aircraft passing nearby at altitudes of 1,000 feet, and in some cases much lower.

The above illustrations show aircraft altitude at various distances from the airport on approach for all aircraft and on departure for a four-engined 747-200, assuming a straight out departure. Two- and three-engined aircraft will climb faster.



The picture above represents the radar paths of all aircraft within 10 miles of Dulles on a given day. Please note that many of the aircraft that could be heard and seen within that 10-mile square relate to other airports. Only the blue and red paths relate to aircraft arriving and departing Washington Dulles.

### Safety

Even with the horrors of terrorism, air transportation is way and above the safest means of transportation. However, aircraft accidents do occur.

Statistically, nearly 70% of all aircraft accidents occur on takeoff and landing, with the majority being in close proximity to the airport.

### WATF Recommendation

A homebuyer who is considering the purchase of a home in or near the Aircraft Noise Impact Overlay District should ask the appropriate questions and do the necessary research to ensure that the decision to buy a property with exposure to aircraft noise and flight operations is one with which they can be satisfied. What is tolerable to some people is unacceptable to others, and it is up to the purchaser to determine their threshold for such flight activities before making the purchase.

Convenient access to the airport may be just what a particular homebuyer desires, but even if no aircraft are seen or heard when the home or home site is inspected, they should consider whether or not they would be affected by flight operations under different weather conditions and operating patterns.

### **Frequently Asked Questions**

1. *Is aircraft noise a major problem in the Washington area?* Out of the total Washington population only a few people complain in a given year about the noise of flight operations from Washington Dulles International or Washington Reagan National Airports (about 300 complaints were received in 2005). A number of those complaints came from citizens living well away from the airports. Cooperation between the Airports Authority and its neighbors and wise land use planning by Fairfax and Loudoun Counties have so far avoided a noise problem. Our goal, and their goal as well, is to sustain that situation.
2. *Is there a phone number I can call to notify someone if I feel that an airplane has flown abnormally close to my home?* You can call Washington Dulles International Airport Operations at 703-572-8215. The Operations office will ask you a series of questions in an attempt to identify the flight operation to which you are referring. The person speaking with you may be able to explain the circumstance for the unusual noise or intrusion during that call, or it may very well require further research. The record of your inquiry is sent to the Airports Authority's Noise Abatement Office where they can determine the precise relationship of an individual flight to your home and offer you guidance. As part of its efforts to reduce airport noise and to provide information to help guide the public policy of local governments, the Airports Authority maintains a system of sound monitors strategically located throughout the region. They also obtain radar plots of the precise flight path of every aircraft using Dulles and National. By putting the two sets of information together, they can determine whether the noise you heard was made by an aircraft (and if so, which one) or by some other source.
3. *If there is nothing in the sales literature to indicate the presence of Dulles airport, does that mean the home would not be affected by aircraft flight operations?* No, if the home is close to Dulles it may well mean that the development was given an exclusion from Loudoun County's disclosure policy, or the developer was unaware of the requirement. For most of us, a home is our biggest financial commitment, so it is best to play it safe and check.
4. *How can I tell if the house I'm considering buying is in a noise impact overlay district?* The maps on this guide will give you a rough indication. A visit to the county planning office would enable you to review precise maps. Also, if you're buying a new home, there should be maps in the showroom accurately locating the plot to the overlay districts.
5. *Is it possible that I could buy a home today that is relatively free from aircraft noise and then later find aircraft flying over my new home?* If you only visit a home on a day when wind conditions are keeping aircraft away from that home, it could appear totally tranquil. However, under a different weather pattern, aircraft could be flying over or near that home with great regularity. Your question is a fine example of why

anyone contemplating the purchase of a home should investigate carefully. That's the best way to avoid later surprises.

6. *What time of day is the busiest and noisiest for aircraft flying in and out of Dulles?* As Dulles is an international and transcontinental gateway, flight activity is greatly influenced by time zone changes. Consequently, the busiest period tends to be from around 3:00 p.m. to the middle of the evening. That is also when most of the larger wide-bodied trans-ocean aircraft, which make more noise, will operate. Other busy times are first thing in the morning and around mid-day.
7. *If I complain about aircraft noise near my home, can't the airport just make the airplanes fly over a different area?* For safety, economic and operational reasons, aircraft leaving Dulles are free to take up their desired heading as soon as the aircraft has gained a safe altitude. On landing, aircraft fly what is known as "a three degree glide slope". That means they line up with the end of the runway many miles from the airport and then gradually descend in a straight line along a three-degree slope, which will bring them safely to the end of the runway for touchdown.

The Federal Aviation Administration, not the airport, controls the aircraft while it's airborne. At some airports where houses have been built in noise impacted areas, or where physical constraints like a mountain, or security concerns restrict airspace, the FAA will set up specific flight corridors. Reagan National Airport is an example. However, such restrictions can reduce the capacity of runways and thus an airport's ability to serve regional demand. For Washington Dulles, good public policy has encouraged commercial uses in most noise impacted areas and placed restrictions on housing in those noise impacted areas where construction could not by law be prevented. Housing in this category as well as in other areas that will be conscious of flight operations, requires full disclosure of the airport's presence and the potential for aircraft noise. The primary purpose of this web site is to prevent potential homeowners from getting into a situation in which they would feel a need to complain.

8. *What is an Ldn – also called a DNL?* The federal government uses a unit of noise awareness known as an "Ldn or DNL." This is an abstract measure that is the best unit offered to-date to assess the cumulative "rainfall" of noise from repeated flight operations. The unit is abstract in that it is not a physical measure like a height on a contour map. Ldn's are calculated from a number of factors, some measured, many assumed based on forecasts of aviation activity many years in the future. The unit gives more weight to operations at nighttime than during the day.
9. *I am told aircraft are getting quieter, so isn't it "OK" to buy homes built closer to airports?* It is true that engine advances have enabled the noise from individual aircraft to be reduced. But it is the cumulative "rainfall" of noise from frequent flight operations that is disturbing to most people, rather than the noise from a single flight. That is why Fairfax and Loudoun counties have created Aircraft Noise Impact Overlay Districts around Dulles. The volume of flight operations and the size of aircraft are expected to increase steadily over the years. Both add to the intrusive effect on homes near airports.
10. *Will the aircraft manufacturers continue to make airplanes even quieter?* Yes, for the majority of commercial aircraft, but the gains are likely to be exceedingly small. The Federal Airworthiness Requirements (FAR) mandate that commercial aircraft must

meet the lowest noise levels that are “technically feasible and economically reasonable.” The latest jet engines are remarkably quiet for the power they produce. While the current trend is toward smaller aircraft operating with greater frequency, it is highly possible that as the years go by the average size of aircraft will increase and this will tend to increase the current rainfall of noise.

11. *Why do Fairfax and Loudoun Counties have different noise policies with respect to the airport?* The two counties faced different situations in the early 1990’s when they created their current Airport Noise Impact Overlay Districts. The Fairfax County side of the airport was largely developed and largely in a compatible manner. Conversely, the Loudoun side of the airport was mostly undeveloped. Both counties, however, have the same intent. They wish to ensure that people do not find themselves buying homes where the noise impact would be unacceptable to them.
12. *If homes can be constructed outside the 65 Ldn common line but not inside it, does that mean that the 65 Ldn line is a cutoff point for unacceptable noise levels?* The noise does not stop at the 65 Ldn line, which is why Loudoun and Fairfax Counties have created their airport compatibility policies. Noise heard on any given day is a function of weather conditions. A United States Department of Defense study, for example, showed that noise heard at a given point on the ground from any given set of aircraft operations can vary from one to three miles with changes in weather conditions. That is why Loudoun County bases its policy on a lower measure of noise “rainfall” – 60 Ldn – and extends its Aircraft Noise Impact Overlay District a mile beyond that line.
13. *What is falling airplane syndrome?* Many of the complaints registered as a “noise complaint” with an airport, in fact relate not to the noise the aircraft makes, but to the caller’s concern that the airplane might crash on them. In some instances, complaints which referred to the aircraft “above my house” may relate to an aircraft whose radar track passed a quarter of a mile or more to the side of the house in question. It is the complainant’s perception of the large mass in the airspace adjacent to the property which stimulates the concern. Consequently, no matter how quiet aircraft become in the future, if the airframes get larger, the level of “flyover nuisance” will increase. The Ldn noise contours do not allow for this development. It is good public policy to alert people to the potential presence of aircraft near a particular home as we all have different attitudes and concerns. However the greatest threat is likely to come from the unintended consequences of federal mandates.
14. *Have the planning contours been changed in the past?* In the early 1990’s, Congress enacted legislation requiring the retirement of the noisiest subsonic commercial aircraft. A Maryland-owned bank then argued that one of their subsidiaries should be allowed to build houses closer to the airport, as the retirement of the noisier aircraft would cause the planning contours to shrink toward the airport. Previous court decisions had upheld the right of counties to prevent construction of housing inside the 65 LDN line, but permitted it outside. So the authorities reluctantly plotted a new 65 LDN planning line and at the request of the counties a 60 LDN line. Both counties then developed their current noise policies.
15. *Does the weather and wind direction have anything to do with the amount of noise I will hear?* Weather has a significant effect on the noise you will hear. First, the wind dictates the pattern of operation at the airport on any given day, as aircraft land and take off into wind. Of equal importance, temperature, temperature inversions, cloud

layers, and humidity affect the transmission of noise. As these factors change, so the atmosphere's ability to "carry" noise changes, as will the noise you hear at any given point on the ground. The planning contours are calculated against a stated set of weather conditions defined as the "international standard atmosphere." Under wind and weather conditions, which vary greatly from that standard atmosphere, the rainfall of noise represented by the planning contour could in reality be heard a mile or more outside that contour under certain weather conditions. The counties have sought to allow for this real world variation with their noise overlay districts.

16. *What is the projected growth in passengers and flight operations at Washington Dulles over the next few years? Will the growth impact the value of my home?* While precise annual growth will reflect economic conditions, expect substantial growth in flight operations and aircraft size as the years go by.

Residents in this region are heavy users of air travel. A recent *Washington Post* study shows that as a region, we make two and one-half times as many trips by air as the average American. Some people who fly a lot find a location convenient to the airport beneficial.

### **Contact**

Anita Kayser, Director Aviation Policy  
Washington Airports Task Force  
44701 Propeller Court, Suite 100  
Dulles, VA 20166

Email: [anita@washingtonairports.com](mailto:anita@washingtonairports.com)

*This document is presented by the Washington Airports Task Force as a public service. It provides guidance only and directs its readers to other sources for more precise and current information. The area surrounding Dulles Airport is in a state of change, so readers are encouraged to do their own research to verify and/or amplify the general information provided. Readers should base their decisions on their own research, as this guide does not provide precise and complete information for each individual existing or proposed dwelling in the general vicinity of Dulles Airport.*