APPENDIX B

NOISE WHITE PAPER

City of Renton
Airport Advisory Committee

Airport Noise White Paper

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Introduction

Like many other general aviation airports in the U.S., Renton Municipal Airport (Renton) faces growing pressure from the combination of a steady growth in airport activity, and new residential and commercial development in areas surrounding the airfield, generating increasing numbers of noise complaints. Growing community concern has led the City of Renton in early 2001 to establish an Airport Advisory Committee consisting of both neighborhood and airport community representatives. The committee was charged with researching noise and other airport-related issues and providing the City Council with recommendations on how to address these issues.

Part 1 provides an introduction into airport noise issues in general

Part 1 of this "White Paper" was developed to educate Renton's Airport Advisory Committee about airport noise issues and present the ground rules for federal and local rights and responsibilities in relation to airport noise management. It provides an introduction to issues related to airport noise and:

- Defines airport noise and explains how it is measured;
- Provides an overview of the tools available for eliminating, reducing, and mitigating airport noise; and
- Outlines the roles and responsibilities of federal, state, and local governments and airport operators (in this case the City of Renton).

Appendix A provides a glossary of terms introduced in this part of the White Paper.

Part 2 outlines existing noise mitigation measures at Renton and makes recommendations for additional effort

Part 2 of this document outlines noise-related issues at Renton Municipal Airport identified by the Renton Airport Advisory Committee. It also provides an overview of existing noise mitigation efforts and recommendations for additional efforts to minimize the impact of airport noise and related environmental factors.

Part 1:
Airport Noise in General

Airport Noise

Noise is unwanted sound

What is noise? In its most simplistic definition, noise is unwanted sound. While sound can be measured, noise is a perception, and can therefore vary widely. A sound is perceived as noise when it disturbs routine activities and causes a feeling of annoyance.

Sound has three important characteristics:

- **Magnitude or loudness**: Sound radiates in waves from its source and decreases in loudness with increasing distance from the source. Sound waves generate sound pressure, also called "sound level" or "noise level," that can be measured in decibels. The louder the sound, the higher the decibel levels. Decibel levels are measured logarithmically. This means an increase of 10 decibels, for example from 50 to 60 decibel (dB) doubles the loudness that people perceive.
- **Frequency or pitch**: Sounds have different pitches; they can be at low, medium, or high levels. The human ear does not hear low or high frequencies as clearly as middle frequencies. Sound measurement takes this into account. "A-weighted" decibel counts focus on the sounds that the human ear can hear most clearly and de-emphasize those that humans do not perceive as clearly.
- **Duration**: The length of time the sound can be heard.

In the airport context, A-weighted decibels are generally the basis for noise measurement. Figure 1 illustrates the typical sound levels of common occurrences:

Figure 1: Typical Noise Levels from Common Occurrences[1]

Event	Sound Level in A-weighted Decibels (dBA)
Rock band (indoors)	108-114
Boeing 747-100 (at take-off/landing)	106
Food blender	88
Super King Air-200 turboprop (at take-off/landing)	69/78
Vacuum cleaner	70
Boeing 737/757 (at takeoff: 2 miles from runway end, under flight path)	70
Cessna Citation III business jet (at take-off/landing)	70
Beechcraft Bonanza (at take-off/ landing)	61/65
Conversation (indoors)	60
Dishwasher on rinse cycle at 10 feet	60
Cessna 150 (at take-off/landing)	56/59
Bird calls (outdoors)	44

At Renton, the most common aircraft are single-engine piston aircraft such as the Beechcraft Bonanza and Cessna 150, which are relatively quiet. There are also a small number of turboprops. Together with a small number of business jet operations, they account for the vast majority of the estimated 150,000 take-offs and landings occurring at the airport this year. Within this total, about 250 take-offs of Boeing 737/757 occur annually.

There are several ways to measure airport noise:

- **Maximum sound level** measures the decibel level based on the maximum sound level of a single take-off or landing without considering the duration of the sound, the number of times it occurs, or the time of the day when it happens.
- **Total Sound Exposure Level** (SEL) measures the entire sound energy generated by an event, taking both sound level and duration into account and averaging the sound level across the duration.

[1] *Federal Interagency Review of Selected Airport Noise Analysis Issues*, Federal Interagency Committee on Noise, August 1992; *Airport Noise, Safety, and Airport Land Use Planning: The Facts About Airport Noise*, AOPA; and *Renton Municipal Airport Master Plan Update,* City of Renton, August 1997.

- **Equivalent sound level** (Leq), is based on SEL but also considers the fact that there is generally more than one sound event within a given time period. It averages the sound levels and durations of all noise events within a given time period.
- **Day-Night average sound Level** (DNL) takes into consideration the fact that noise is generally more disturbing at night when background, or ambient, noise levels are lower. DNL averages all sounds and their duration, looks at a 24-hour period, and assigns a penalty of 10 dB to all flights between 10 p.m. and 7 a.m. The night-time noise penalty means that one night take-off or landing is equivalent to 10 daytime operations generating the same level of noise.

  Under this approach, several different combinations of flight can produce the same noise exposure level. The following combinations all reflect 65 DNL[2]:

  - 500 aircraft operations with an average sound exposure level of 87.4 decibels;
  - 100 aircraft operations with an average sound exposure level of 94.4 decibels; or
  - 50 aircraft operations with an average sound exposure level of 97.4 decibels.

The Federal Aviation Administration (FAA) was required by the Aviation Safety and Noise Abatement Act of 1979 to start using a single method for measuring the impact of airport noise on surrounding communities. It adopted the DNL approach, emphasizing cumulative community noise exposure and placing greater weight on the impact of aircraft noise during the night. This approach was also recommended and adopted by EPA and the Federal Interagency Committee on Noise (FICON). DNL is now used by all federal agencies to measure airport noise under the National Environmental Protection Act (NEPA).[3]

[2] *Aircraft Noise: How we Measure It and Assess Its Impact*, Office of Environment and Energy, Federal Aviation Administration.

[3] *49 U.S.C. 47502; Federal Agency Review of Selected Airport Noise Issues,* Federal Interagency Committee on Noise (FICON), August 1992.

There are many sources of airport noise

The level of noise experienced by an observer on the ground depends mostly on three factors: the loudness of the aircraft engine, its altitude, and the horizontal distance between the person on the ground and the flight path of the aircraft. There are several other factors[4]:

- **Type of aircraft**: Different aircraft produce different levels and frequencies of sound:
  - *Jet aircraft*: New design makes these planes quieter but they are still the noisiest planes;
  - *Propeller aircraft*: The sound varies depending on the number of engines, rotation speed, number of blades per propeller, and type of engine;
  - *Helicopters*: Most notable is the "blade slap" caused by a slow-turning main rotor and most audible on the approach and during low speed descents and high speed cruise; it can also create vibration and rattle structures.
- **Engine run-up noise**: Caused by pre-flight warm-up of aircraft, typically at the end of runways. Engine run-ups can generate noise levels that are higher than actual takeoffs and landings for turbine-powered aircraft.
- **Aircraft maintenance**: Aircraft maintenance requires the use of high power settings, similar to pre-flight warm-ups, with resultant high noise levels.
- **Piloting techniques**: A single aircraft type can generate different levels of noise depending on:
  - Climb angle;
  - Propeller pitch, especially at high takeoff settings;
  - Power adjustments during takeoff, including air speed and lift adjustments such as flap settings.
- **Traffic patterns**: While airports generally define main traffic corridors, there are deviations due to wind, pilot request, or low traffic.
- **Air temperature**: Air molecules change size depending on air temperature and altitude. On hot days, aircraft cannot ascend as rapidly because air molecules are larger and less dense, creating noise impacts further away from the runway. Conversely, on very cold days, air molecules are denser and provide for better lift, reducing noise.
- **Sound deflection**: Sound waves can bounce off nearby structures or hills, and low cloud cover can reflect sound and increase noise.

[4] *Airports and Compatible Land Use, Volume 1*, Washington State Department of Transportation, Aviation Division, February 1999.

- **Topography**: Changes in elevation can increase or decrease actual sound levels on the ground in the flight path.

FAA starts addressing airport noise at 65 DNL

At which point a sound turns into noise is a subjective impression. FAA uses a threshold of 65 DNL. Airports whose surrounding communities experience airport noise of 65 DNL or more are encouraged to consider a noise abatement program, which may be eligible for federal funding. This is based on research conducted in 1978 indicating that only 3% of people living with 55 DNL consider themselves "highly annoyed," while that number rises to 12% for people living with 65 DNL"[5]. This is in part because below 65 DNL, background or "ambient" noise tends to obscure aircraft noise. The research results have since been validated by several subsequent studies.

To determine how far beyond the airport communities may experience noise levels of 65 DNL or higher, FAA uses a computer model, the Integrated Noise Model (INM). It illustrates the area experiencing a certain noise level by drawing a noise contour[6]. The program simulates noise levels generated by the types of aircraft that typically use the airport, taking into account the flight tracks used during different weather and wind conditions.

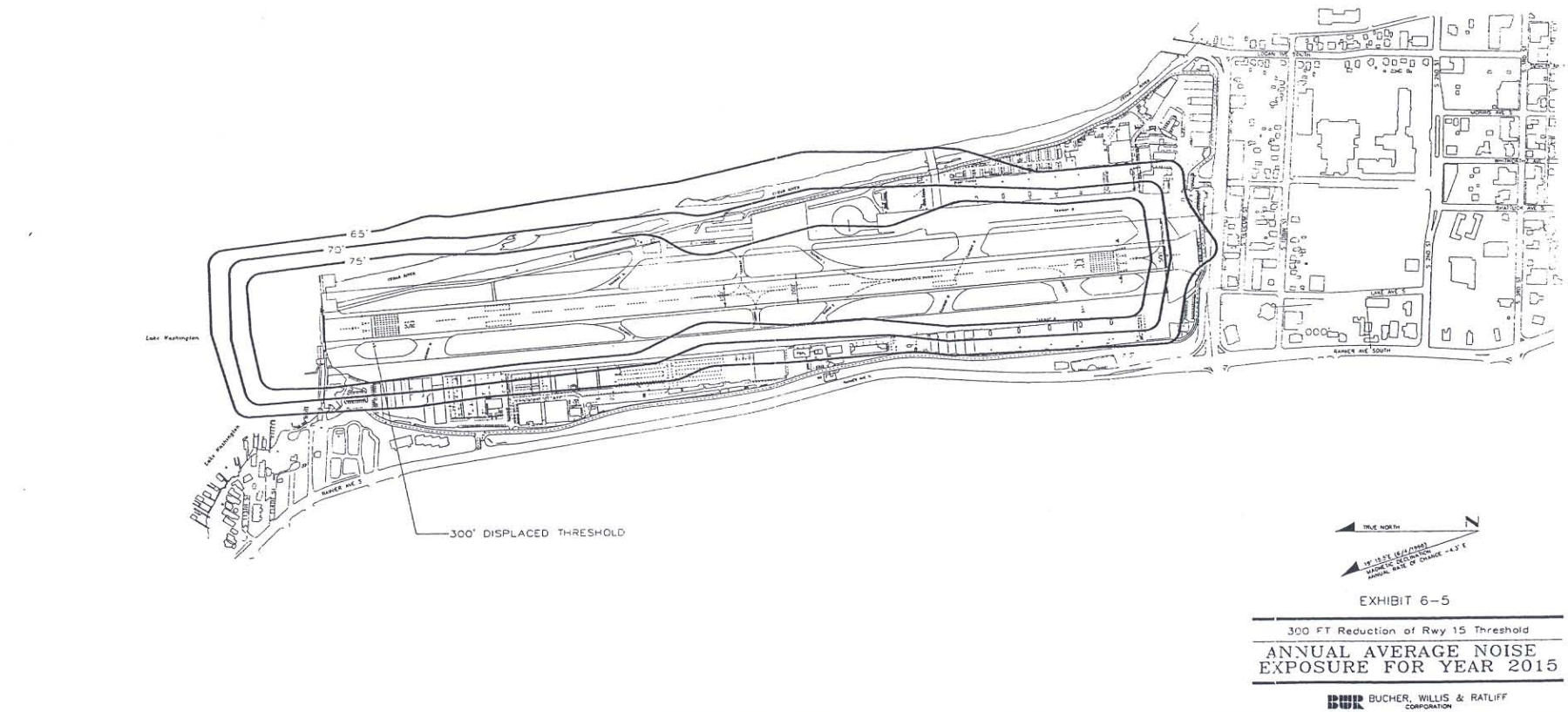
Figure 2 shows the 65 DNL noise contour projected for 2015 for Renton from the 1997 Airport Master Plan. It is projected to grow by less than 10% between now and 2015. At Renton, the 65 DNL noise contour does not affect any land uses other than the airport itself.

Airport noise can reduce quality-of-life and cause health problems

Airport noise affects millions of people each day. The impacts, both short-term and long-term, are difficult to determine. Studies indicate that noise can have a negative impact on one's ability to concentrate and can cause sleep deprivation, potentially harming people's health and well-being. Some studies indicate that continuous exposure to high levels of aircraft noise can lead to hypertension, cardio-vascular and gastrointestinal problems as well as other disorders[7]. In addition, noise may interfere with communication, cause poor performance and work and school, and raise annoyance levels[8].

[5] *Synthesis of Social Surveys on Noise Annoyance,* Journal of the Acoustical Society of America: 64(2), 1978, pp. 377-405.
[6] A noise contour is a continuous line on a map of the airport vicinity connecting all points with the same noise exposure level. Noise contours are generally generated for 65, 70, and 75 DNL levels.
[7] *Flying Off Course: Environmental Impacts of America's Airports*, Natural Resources Defense Council, October 1996.
[8] *Noise and Its Effects 3*, Alice H. Suter, Report to the Administrative Conference of the United States, November 1991.

Figure 2: Projected Airport Noise Contours for 2015



Source: Airport Master Plan Renton Municipal Airport, August 1997.

While FAA sets the threshold for airport noise mitigation at 65 DNL if it occurs outside airport boundaries, there is considerable controversy about both the 65 DNL noise level and the use of DNL. Over 20 years ago, EPA's Office of Noise Abatement and Control suggested that FAA reduce the threshold to 55 DNL. It also indicated that housing should not be developed in areas exposed to noise levels greater than 55 DNL. This suggestion has since been supported by many community groups concerned with airport noise. Many of these groups have also questioned the use of a methodology such as DNL, which averages sound levels, indicating that it does not adequately deal with individual incidents of noise beyond 65 dB ("single-event noise") that can disrupt sleep and other activities.

However, despite community concerns with the approach, federal agencies involved in airport noise issues consider it the most reliable and scientific way to measure noise at airports. A 1992 report by the Federal Interagency Committee on Noise states that public health and welfare effects have not been established below 60 DNL and that noise predictions and interpretations are unreliable below 65 DNL[9].

Who is responsible for managing and regulating airport noise?

The federal government, state and local jurisdictions, airport operators, aircraft operators, and the general public share responsibilities for managing, regulating, and minimizing the impacts of airport noise. The following outlines these responsibilities.

[9] *Federal Agency Review of Selected Airport Noise Issues,* Federal Interagency Committee on Noise (FICON), August 1992

FAA has both a regulatory and advisory role

FAA has regulatory authority in two areas affecting airport noise:

- Regulation and control of noise from aircraft engines; and
- Regulation of navigable airspace –all aspects of aircraft safety and noise during flight are FAA's concern.

In addition, FAA has an advisory and supporting role. The agency provides:

- Guidance for aviation noise compatibility planning on and around airports; and
- Financial support of airport noise mitigation programs.

FAA's responsibilities are detailed below.

FAA regulates aircraft noise emissions

FAA has preemptive authority to regulate and control noise from aircraft engines. The Aviation Safety and Noise Abatement Act (ANCA) of 1979 and the 1990 Airport Noise and Capacity Act provide FAA with the authority to phase out noisier Stage 1[10] and 2 civil subsonic turbojet or other aircraft weighing 75,000 pounds or more, which are the noisiest aircraft in the fleet. Since January 1, 2000, only Stage 3 aircraft or Stage 2 aircraft with hush kits are allowed for domestic carriers.

To date, there are no requirements for lighter jets or aircraft (under 75,000 pounds) or other aircraft—the types of aircraft operating at Renton—to reduce the level of noise they generate. FAA has recognized the need for phasing out small, noisy Stage 1 and 2 business jets but has not made it a requirement. Members of the National Business Aviation Association have signed a voluntary agreement to refrain from adding new Stage 1 jets to their fleets by January 2000 and to phase out Stage 1 jets by January 2005. Currently, there are no FAA provisions for phasing out Stage 2 business jets weighing less than 75,000 pounds.

FAA has also acknowledged the need to reduce noise generated by general aviation activities. It is encouraging the development of user-friendly tools to design quieter propellers and engine

[10] FAA classifies aircraft into three stages: Stage 1,2 and 3 in order from loudest to the least noisiest. Noise levels for stage definition of aircraft are measured at three points: Take-off, approach and fly-over (sideline). In addition, Stage classification is based on the number of engines an aircraft has. Noise term definition and Stage classification information is provided by 14 CFR Part 36.

systems optimized for low noise. It is currently sponsoring research seeking to identify and develop propeller-driven aircraft noise reduction and control technologies with the goal of enabling manufacturers to produce quieter planes.

FAA regulates navigable airspace

FAA, or the federal government, has exclusive sovereignty of the airspace of the United States. Citizens of the United States have "a public right of transit through the navigable airspace." It is the FAA's responsibility to ensure citizen's rights and to "develop plans and policy for the use of the navigable airspace and assign by regulation or order the use of the airspace necessary to ensure the safety of aircraft and the efficient use airspace."[11] Safety is the foremost consideration.

In real terms, this means that FAA has the power to accept or reject any local airport noise control programs if it finds an impermissible impact on citizen's rights of transit. Federal courts have upheld the delegation of authority to the agency.

FAA is also generally involved in the efforts of airports to reduce noise by changing operations. It must be consulted when an airport is contemplating changes to aircraft arrival and departure paths or runway use, or when an airport is contemplating restricting aircraft operations. It has also been consulted regarding this White Paper.

FAA provides guidance for noise compatibility planning

To ensure that national interest is adequately considered, FAA provides guidance for airports attempting to address airport noise issues. The agency does so with implementation of the Part 150 Noise Compatibility Planning Program[12] under the Aviation Safety and Noise Abatement Act of 1979. Part 150 provides for:

- Standard noise measurement methodologies and units;
- A standard noise modeling methodology, the Integrated Noise Model (INM);
- Identification of land uses compatible and incompatible with various levels of airport noise;
- Voluntary development of airport noise exposure maps (NEMs) and Airport Noise Compatibility Programs (NCPs) by airport operators;

[11] *49 U.S.C. 40103(a)(1)* and *49 U.S.C. 40103(b)(1).*
[12] *14 CFR Part 150.*

- Review and approval or disapproval of Part 150 NCPs submitted by airport operators; and
- Procedures and criteria for making projects eligible for funding as noise projects through AIP.

The guidelines contained in Part 150 are voluntary and airport operators are not required to participate. However, the existence of an approved noise compatibility plan under Part 150 is a requirement for receiving federal funding for noise mitigation projects. A Part 150 noise compatibility program provides the required analyses for evaluating the impacts of, or implementing, any constraints on airport operations. It is also the only type of planning for noise mitigation for which there is federal funding. Figure 3 lists the types of land use compatible with airport operations as defined by Part 150.

FAA is encouraging a balanced approach to addressing airport noise problems and discourages "unreasonable and unwarranted" airport use restrictions

While FAA supports local airport operators in mitigating the impacts of airport noise, it considers restrictions on airport operations a means of last resort, to be enacted only if all other means have been exhausted[13]. The reason behind this is to prevent a patchwork quilt of available airports across the country. For airports that want to address noise problems with jet or other aircraft that are defined as stage 2 or 3 aircraft, FAA requires a Part 161 study.

Part 161[14] requires analysis and public notice of any noise and access restrictions proposed by the airport operator. It also outlines the analysis steps and methodology to be used. Part 161 studies are eligible for funding under Part 150 if they are part of an approved Part 150 study. They must include:

- Evidence that the airport operator has published his intent in local newspapers, posted it at the airport, and directly notified interested parties;
- A 45-day comment period;
- Analysis of costs and benefits of the proposal;
- A description of alternative restrictions, comparing their costs and benefits to that of the proposal;

[13] *Policy on Funding of Combined Part 150 and Part 161 Studies and Analyses*, Department of Transportation, Federal Aviation Administration, Docket No. 28683, September 1996.
[14] Title 14 CFR part 161, issued as final rule September 25,1991, implements the Airport Noise and Capacity Act of (49 U.S.C 47521 through 47533) of 1990.

Figure 3: Part 150 allowable land uses

LAND USE	60+ DNL	65-70 DNL	70-75 DNL	75-80 DNL	80-85 DNL
Residential	Y	N*	N*	N	N
Public use					
Schools, hospitals, nursing	Y	RM	RM	N	N
Churches, auditoriums	Y	RM	RM	N	N
Government services	Y	Y	RM	RM	N
Transportation & parking	Y	Y	RM	RM	RM
Commercial					
Offices & professional	Y	Y	RM	RM	N
Building materials, farm equipment	Y	Y	RM	RM	RM
Retail trade	Y	Y	RM	RM	N
Utilities	Y	Y	RM	RM	RM
Communication	Y	Y	RM	RM	N
Manufacturing and production					
General manufacturing	Y	Y	RM	RM	RM
Photographic and optical	Y	Y	RM	RM	N
Farming, mining, & extraction	Y	RM	RM	RM	RM
Recreational					
Outdoor sports	Y	RM	RM	N	N
Outdoor music	Y	N	N	N	N
Zoos	Y	Y	N	N	N
Amusement parks & golf	Y	Y	RM	RM	N

Y=Compatible land use RM=Compatible if appropriate noise reduction measures in place with appropriate noise insulation. N=Not compatible *Can be made compatible

Source: 14 CFR Part 150.

- A description of non-restrictive alternatives, comparing their costs and benefits to that of the proposal;
- A clearly defined study area and use of INM to model noise; and
- Use of a "currently accepted economic methodology" for the cost-benefit analysis.

In recent years, a number of airports have attempted to limit airport noise by conducting Part 161 studies. To date, no airport has been successful in getting the required FAA approval for the implementation of restrictions based on a Part 161 study.

Aircraft that fall under the provisions of Part 161 and operate at Renton include the Boeing 737s and 757s taking off after they are completed, and all types of turbine-driven aircraft such as business jets, turboprops and helicopters. A policy statement published by FAA[15] indicates that Part 161 does not apply to restrictions on operations by propeller-driven aircraft of 12,500 pounds or less (the type of aircraft prevalent at Renton) because none of these aircraft are classified as Stage 2 or 3. Figure 4, on the next page, outlines access requirements and lists the aircraft to which ANCA applies and those to which it does not. Any non-voluntary restrictions on these aircraft require a Part 161 study.

The fact that ANCA applies to jets, turboprops and helicopters makes it very difficult to address noise from these types of aircraft. And, while the stringent ANCA requirements do not apply to propeller-driven aircraft weighing less than 12,500 pounds, it does not mean than airport owners can place restrictions on the operation of these aircraft as other requirements still apply. Figure 5 provides a case study from Oceanside, CA where the city council attempted—unsuccessfully—to implement a curfew and other measures designed to reduce noise from small single-engine aircraft.

[15] Letter issued July 6, 1992, by the FAA's Assistant Administrator for Airports to the Director if the Hawaii Department of Transportation.

Figure 4: ANCA and Airport Access Requirements

Reasonable Access Requirements:

Renton Airport must "be used for public airport purposes, and only for such purposes, **on reasonable terms and without unjust discrimination** and without grant or exercise of any exclusive right for use of the airport ... ." Quitclaim Deed from United States to City of Renton at 5 ¶ 1 (Sept. 25, 1947) (emphasis added).

"Airport use restrictions: (1) must be reasonably consistent with reducing noncompatibility of land uses around the airport; (2) **must not create an undue burden on interstate or foreign commerce**; (3) **must not be unjustly discriminatory**; (4) must not derogate safety or adversely affect the safe **and efficient** use of airspace; (5) [must] meet both local needs and **the needs of the national air transportation system** to the extent practicable; and (6) must not adversely affect any other powers or responsibilities of the FAA Administrator prescribed by the law or any other program established in accordance with the law." FAA Airport Compliance Handbook, Order 5190.6A, § 4-8(f) (1989) (discussing noise-based and other environmental restrictions; emphasis added). Based in part on 49 USC § 40103(a) which gives FAA exclusive sovereignty over U.S. airspace.

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ANCA/Part 161 requirements:

- Virtually bar airport owners and other local governments from instituting new, involuntary, noise-oriented restrictions on operations by certain aircraft, namely that have met "Stage 2" or "Stage 3" noise standards. To restrict Stage 3 aircraft, an airport would have to follow elaborate notice and comment procedures, and satisfy FAA that the restriction is non-discriminatory, efficient, not unduly burdensome, and otherwise consistent with federal policies. See 14 C.F.R. Part 161 Subpart D, §§ 161.301-.325. No airport has succeeded in obtaining such FAA approval. Restricting the few remaining Stage 2 aircraft is not impossible, but still requires notices to aircraft operators, the FAA, and others; extensive supporting analysis; and a formal commenting process.
- "Grandfather" pre-1990 restrictions.
- Allow for new voluntary restrictions, but FAA maintains that restrictions included in standard lease terms that all tenants must sign are not "voluntary" within this exception.

Must airport allow reasonable access?	Does Part 161 further protect access?	Aircraft type
Yes	Yes	Jet airplanes (any weight) that are certified to fly
Yes	Yes	Propeller-driven airplanes > 19,000 lbs.
Yes	Yes	Propeller-driven airplanes between 12,500 and 19,000 lbs., if certified for transport use (only multi-engine craft, and not all of them, could qualify for such use)
Yes	No	Propeller-driven airplanes between 12,500 and 19,000 lbs. And certified for commuter (maximum size 19 seats) rather than transport use
Yes	No	Propeller-driven airplanes between 12,500 and 19,000 lbs. And certified for restricted (agricultural or conservation) rather than transport use
Yes	No	Propeller-driven airplanes < 12,500 lbs. (including all "normal," "utility," "acrobatic," "primary," "very light," "glider," and sailplane" airplanes)
Yes	Yes	Helicopters certified as Stage-2-compliant (generally, those whose usage-type certificate issued after March 6, 1986)
Yes	No	Helicopters not certified as Stage-2-compliant

Source: Spiegel and McDiarmid, Washington, D.C.

Figure 5: Oceanside, CA—A Case Study[16]

In June of 2001, the City of Oceanside, CA placed restrictions on the use of its small general aviation airport. The airport can only accommodate small propeller-driven aircraft weighing less than 12,500 pounds and currently serves as the base for 70 small aircraft and a flight school. The city council, based on noise complaints from neighbors, implemented a curfew from 9 p.m. to 7 a.m. and limited touch-and-go operations to between 10 a.m. and 3 p.m. At the same time, it required owners of aircraft to paint a city-issued identification number on the underside of the wing to facilitate collection of fines and penalties for infractions.

The regional FAA office then informed the city that it is required to "operate the airport for the use and benefit of the public and make it available to all types, kinds and classes of aeronautical activity on reasonable terms, without unjust discrimination" because it had received federal funding for its airport. The FAA further directed the city not to enforce the restrictions and to refrain from implementing any new restrictions. Both FAA and the California Department of Transportation indicated that they would invoke existing grant assurances and require the city to repay a total of $1.65 million in previously received grants if the restrictions were enforced.

At a July 1, 2001 meeting the council reacted to FAA's letter and ordered the curfew on hold without rescinding the restrictions outright. It continues to discuss the future of the airport.

FAA provides financial support for airport noise mitigation programs

A fourth major component of FAA's approach to addressing airport noise is supporting the noise mitigation programs of airports. FAA is administering two programs, the Airport Improvement Program (AIP) and the Passenger Facility Charge (PFC) program, that provide funds for airport projects that mitigate the effects of noise. PFC funding is available only to commercial service airports; AIP funding is granted to both commercial service and general aviation airports.

Most projects that reduce airport-related noise or mitigate its impact are eligible for federal funding. Mitigation activities that can be funded include, for example, the soundproofing of buildings, construction of noise barriers, and purchase of land to prevent incompatible land uses. AIP funding is available only for projects mitigating noise levels above 65 DNL. PFC funds can also be used for projects addressing noise problems outside the 65 DNL noise contour; this does not require a Part 150 study. It should be noted, however, that these programs are focused on large commercial service airports; only a small portion of funds goes to small airports[17].

[16] "*Airport Foes Revving Up: Touch-and-go Landings, Takeoffs Fuel Bid to Close Oceanside Field,*" Lola Sherman, The San Diego Union-Tribune, May 13, 2001; "*Oceanside City Council Puts Curfew on Airport-Noise Complaints Are Cited,*" Lola Sherman, The San Diego Union-Tribune, June 14, 2001; and "*Oceanside Curfew Put on Hold,*" Lola Sherman, The San Diego Union-Tribune, July 12, 2001.

The Airport Improvement Program contains a category for discretionary funds that can be used for general aviation airports included in FAA's National Plan of Integrated Airport Systems (NPIAS). Renton Municipal Airport is part of NPIAS. However, since AIP funding is available only for projects mitigating noise levels above 65 DNL, it is highly unlikely for Renton to receive federal funding for noise mitigation, since it does not have any incompatible land uses within the 65 DNL contour. The types of noise-related projects eligible for AIP funding include:

- Developing information to prepare planning and noise-compatibility program documents;
- Acquiring land;
- Acquiring air rights or easements;
- Purchasing noise-monitoring equipment;
- Constructing noise barriers;
- Soundproofing buildings; and
- Constructing or expanding runways and taxiways with the purpose of reducing community noise impacts[18].

AIP funding for these types of projects is, with few exceptions, only available for if they are part of an FAA-approved noise compatibility program. When FAA selects projects, it gives priority to those projects located in areas where noise exposure levels are 65 DNL or higher, although projects in areas with less exposure are theoretically eligible. Thirty-four percent of AIP funds are earmarked for noise compatibility planning and implementation. In 1999, this amounted to over $240 million nationwide.

[17] According to GAO, from 1982 to 1999, FAA distributed $2.1 billion in AIP funds to large airports and $582 million to small airports. $1.9 billion of PFC funds went to large airports, compared with $46 million for small airports. *Aviation and the Environment: FAA's Role in Major Airport Noise Programs*, United States General Accounting Office, GAO/RED-00-98, April 2000.

[18] On March 27, 1998, FAA issued a policy limiting the approval of remedial noise mitigation measures such as soundproofing, property acquisitions, and relocation to land uses that were in place as of October 1, 1998. The policy was developed based on research indicating that despite implementation of almost 200 noise mitigation plans relatively little implementation of zoning and land use control elements had occurred. *FAA Policy on Part 150 Approval of Noise Mitigation Measures: An Overview*, in "FAA Airport Noise Compatibility Planning Toolkit," Federal Aviation Administration, Office of Environment and Energy, April 2000.

State and local governments are responsible for ensuring compatible land uses in areas surrounding airports

In its 1976 Noise Abatement Policy[19], FAA states:

> "State and local governments are uniquely responsible for ensuring that land use, zoning, and land development activities in areas surrounding airports are compatible with present and projected aircraft noise exposure in the area."

FAA further indicates that state and local governments should work closely with airport operators in their planning efforts to confine serious aircraft noise exposure to areas within the airport boundary and reduce the number of people seriously affected by airport noise. To help facilitate this process, FAA is providing guidance on ways to facilitate compatibility planning. It also funds portions of the compatible land use planning and implementation efforts of local jurisdictions.

State responsibilities:

The primary responsibility of state government is to provide the legal tools for compatible land use planning to local communities, and to oversee their use. Washington State has responded to this mandate and developed its own legislation addressing this issue for general aviation airports. RCW 36.70.547 states:

> "Every county, city, and town in which there is sited a general aviation airport that is operated for the benefit of the general public, whether publicly owned or privately owned public use, shall, through its comprehensive plan and development regulations, discourage the siting of incompatible uses adjacent to such general aviation airport."

The law further requires that the aviation community, including pilots and WSDOT's Aviation Division, be consulted before any plans affecting general aviation airports are adopted.

Local government responsibilities:

Local governments have the sole direct authority and responsibility for land use control. They are responsible for maintaining environmental standards, quality-of-life, and property values. Therefore, according to FAA, "the local government's role is to work in a sincere effort with the airport operator in developing the long-term airport compatibility plan, fitting it into the area's comprehensive planning process, and then to fully implement the plan by enacting such zoning or

[19] *Aviation Noise Abatement Policy 1976*, FAA.

	development controls as may be necessary to make it actually happen."[20] Washington's Growth Management Act specifically refers to the above-mentioned RCW 36.70.547 (siting of general aviation airports) for implementation.
Airport operators have the primary responsibility for reducing the impact of airport noise on surrounding communities	Most airport noise problems are airport-specific and must be addressed by the airport operator, in this case the City of Renton. This responsibility includes making changes to the configuration or operation of the airport to reduce noise, as long as this does not unjustly discriminate against any users or impede safety and federal management of the air navigation system. The use of planning and program development methodologies listed in Parts 150 and 161 provides a vehicle for unbiased and in-depth analysis. FAA also indicates that the airport operator is responsible for ensuring that airport needs are known to local governments and to work with local officials to closely coordinate planning and programming activities. The Supreme Court has determined that airport operators are liable for any excessive noise generated by aircraft using their airport when it has allocated damages.[21]
Aircraft operators are responsible for operating their aircraft in ways that minimize noise pollution	Pilots should fly their aircraft using appropriate noise abatement operating procedures designed to minimize noise impacts on communities surrounding airports. Air carriers, which are currently not in service at Renton, are responsible for assuring that their operating fleets contain only Stage 3 aircraft or Stage 2 aircraft with hush kits.
Airport neighbors should understand the nature of airport noise and its mitigation	FAA indicates that airport neighbors also have responsibilities when it comes to dealing with airport noise. They should learn what the nature of the noise problem is and what steps can reasonably be taken to minimize its impact on people. Prospective airport neighbors, in particular, should be aware of the potential impacts of airport-related noise on their quality of life.

[20] *FAA Airport Noise Compatibility Planning Toolkit: Overview*, Federal Aviation Administration, Office of Environment and Energy, April 2000.

[21] Griggs vs. Allegheny County, 369 U.S. 84, 89-90 (1962). See also *Airport Noise Pollution: Is There a Solution in Sight?*, Kristin Falzone, Boston College Law Review, Vol. 26, pp. 769-807, 1999.

What can be done to reduce or eliminate airport noise and its impact?

There are three major ways to limit aviation noise and its impact on people:

- Source controls;
- Operations controls; and
- Land use controls.

All three are outlined in the following.

Source control: Making aircraft quieter

Airport-related noise can be lowered by reducing the amount of noise an aircraft makes when it takes off or lands. New aircraft are designed and constructed to be quieter. For existing aircraft, noise can be reduced by using quieter engines or by installing equipment that reduces the noise of existing engines.

Over recent decades, FAA has progressively eliminated Stage 1[22] and Stage 2 aircraft over 75,000 pounds. Since December 31, 2000, only Stage 3 aircraft are permitted on domestic flights in the U.S.[23] Given the nature of air traffic at Renton Airport, however, the elimination of large, noisy aircraft is only of minor benefit.

Operations control: Routing aircraft to minimize noise impact on communities

Control of flight operations can reduce noise through:

- Ground procedures;
- Air traffic procedures; and
- New operational technologies.

Ground procedures:

Both the FAA and the airport operator, that is the City of Renton, can take measures to limit the amount of noise to which airport neighbors are exposed. FAA's 1976 Noise Abatement Policy lists several categories of operational actions airport operators can take to control noise.[24]

See footnote on page 9.[22]

[23] *Airport Noise and Capacity Act of 1990*, U.S. Congress.

They include:

- Locating engine run-up areas away and downwind from noise-sensitive land uses; and
- Setting specified times during which engine run-ups for maintenance are allowed.

Air traffic procedures:

In conjunction with FAA, which must approve them, airport operators can negotiate a range of noise control procedures for aircraft takeoffs and landings. Depending on the characteristics and geography of the airport, they may include:

- Flight operational procedures such as thrust reduction or maximum climb on takeoff;
- Steeper glide slope angles and higher glide slope intercept altitudes on approach; and
- Moving the touchdown point further down instead of at the start of the runway.

The airport owner can ask FAA to implement these measures but it does not have control over them. They are implemented by the tower, which is operated by FAA.

Another option is voluntary adjustments to the flight path of aircraft taking off or landing at an airport. Pilots at many general aviation airports around the country, including Renton, have adopted voluntary measures to "fly friendly" to minimize the impact airport noise on surrounding communities.

After consultation with the general public and airport users, the airport operator could at least theoretically, after FAA approval, establish negotiated restrictions on:

- The number of operations per day or year;
- Operations during certain hours of the day (curfew);
- Operations of a particular type or class of aircraft; or
- Any combination of the above.

However, in practice, these types of restrictions are very difficult to implement because FAA's charge is to support air transportation.

[24] *Aviation Noise Abatement Policy 1976*, FAA. FAA is in the process of rewriting the policy. It published a draft version of its new policy in July 2000 and expects to publish the final policy document at the end of 2001.

New operational technologies:

FAA is currently exploring ways to use new operational technologies to mitigate noise impacts while at the same time improving the efficiency of the air transportation system. This includes technologies that can help improve the precision with which aircraft move through the nation's airspace such as the use of global positioning systems and automated flight guidance technologies. However, these technologies are unlikely to be useful at Renton in the near and intermediate future. Renton is mostly used by small piston-driven aircraft and the airport itself is currently not equipped for precision landings.

Land use control: Avoiding incompatible land uses near airports

The encroachment of incompatible land uses in areas surrounding airports is a significant problem at many airports around the country. Washington's legislature has recognized that this is an issue here in Washington as well and has defined general aviation airports as essential public facilities under the Growth Management Act, requiring cities to protect them from incompatible land uses.

Local governments can use a variety of land use planning tools to ensure compatible land uses in areas surrounding airports[25]:

- **Comprehensive planning**: Preparing and adopting a comprehensive plan is a critical and effective part of the process of ensuring land use compatibility—and a requirement in Washington State.
- **Zoning**: Zoning can be an effective tool to reduce or eliminate incompatible land uses surrounding airports, if it is implemented early enough. This is also required by the Growth Management Act.
- **Subdivision regulation**: Subdivision regulations are generally prepared, adopted, and enforces by local legislative bodies and/or planning commissions. Subdivision plat review processes enable local jurisdictions to determine whether a proposed new development is compatible with airport operations.
- **Building codes**: Generally building codes address functional or structural aspects of buildings or structures; it is possible to integrate special noise insulation requirements for properties in high noise exposure areas.

[25] *Land Use Compatibility and Airports, A Guide for Effective Land Use Planning*, Federal Aviation Administration, Southern Region Airports Division, September 1999.

- **Housing codes**: Housing codes determine the minimum requirements for a home to be safe, decent, and sanitary. In combination with building codes and performance standards, housing codes can provide a basis for limiting noise impacts on residents.
- **Capital improvement planning**: Communities use capital improvement plans to realize the goals, objectives, and recommendations of an adopted comprehensive plan. They can be used to encourage certain types of development around airports.
- **Growth policies**: Washington uses comprehensive planning to control growth in certain areas. Identification of airports and surrounding areas is critical for successfully planning for growth.
- **Transferable development rights and purchase of development rights**: Both mechanisms can be useful for airports to either avoid incompatible development or promote compatible development in noise-impacted areas.
- **Avigation easements**: An avigation easement is an agreement between an airport and the owner or developer of land about the use of airspace above the land for the flying of aircraft that use the airport. An easement may include the right of flight of aircraft over the land, noise, vibrations, fumes, dust, fuel particles, etc., and may release the airport and the city in which the airport is located from liability associated with the stipulations included in the easement.[26]
- **Real estate disclosure requirement**: Requires a seller, seller's broker or agent to disclose to a potential buyer of residential real estate whether an avigation easement or other document relating to the flight of aircraft over the property exists.
- **Soundproofing**: Soundproofing is an option for existing residential and public buildings in areas surrounding the airport.

[26] *Fact Sheet for S.B. 1373*, Arizona State Senate, February 2000.