

BACKGROUND

THE PROJECT. In March of 1973, the Port of Seattle Commission and the King County Council initiated a jointly sponsored study to develop a plan for the coordinated improvement of Sea-Tac International Airport and surrounding communities. Based upon a detailed work program, and funded in part by a grant from the Federal Aviation Administration (FAA), the project was undertaken for the express purpose of determining how the Airport and its neighbors could best achieve maximum compatibility. The Sea-Tac Communities Plan, summarized by the text and exhibits that follow, represents the key end product of this important effort.

THE AIRPORT. According to the latest published figures on passenger enplanements, Sea-Tac International Airport ranks as the 19th busiest air carrier airport in the United States. In 1974, a total of 5,772,216 passengers and 106,466 airline aircraft operations were handled by this public facility located in the southwestern part of King County some 15 miles south of Seattle.

Starting from an initial 906-acre site acquired by the Port of Seattle in 1942, the Sea-Tac Airport has been expanded and improved through the years to keep pace with the Pacific Northwest's dynamic and specialized air travel market. Within its present boundary of 2,200 acres, the Airport now accommodates a parallel runway/airfield system; a terminal complex designed to process up to 20 million passengers per year; a computer-operated subway circulation network; and air cargo, aircraft maintenance, and airport support facilities or services. In addition, the Sea-Tac installation provides full-time employment for some 11,000 persons, and is estimated to contribute nearly one-half billion dollars annually to the four-county Puget Sound regional economy.

THE COMMUNITY. In general terms, that part of King County most directly affected by the presence and operation of Sea-Tac International Airport is bounded by the Seattle corporate limits on the north, the Green River Valley/I-5 Highway corridor on the east, S. 288th Street on the south, and Puget Sound on the west. The cities of Des Moines and Normandy Park fall within this area of influence, as do portions of two other municipalities (Kent and Tukwila), and all of the Highline School District. By 1993 (end of the 20-year project planning period), the combined population of this 44+ square mile area is expected to increase from a 1970 census total of 137,000 to some 155,000 residents. From a topographic standpoint, the Sea-Tac Communities Area may be characterized as a gently rolling plateau, ranging from 350 to 450 feet in elevation with very abrupt slopes falling off to the east, northeast, and west. Several small creeks on the plateau's east side, together with the larger Des Moines, Miller, and Salmon Creek drainage basins on the west side, have created numerous rugged wooded ravines as they course down from the uplands to either the Sound or the Valley.

Much of the single-family home development now in existence within the Sea-Tac Communities locale took place during and as part of the area's most rapid growth period, which occurred between 1940 and the early 1960s. In recent years, more duplex and apartment units have been constructed than detached single-family homes, a trend projected to continue.

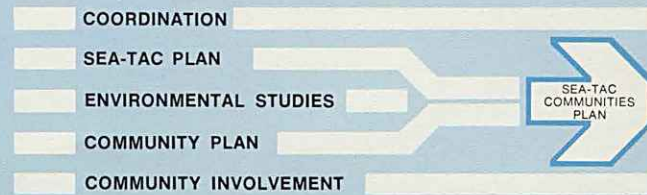
Other uses that characterize the Study Area's urban residential pattern include business concentrations at Burien, White Center, Des Moines, and along Pacific Highway South near the Sea-Tac Terminal; a number of playgrounds, parks, and schools (including a community college); greenhouses, horticultural nurseries, commercial truck gardens, and small pastures for horses and cattle; and certain specialized forms of housing—trailer parks, low-income public projects, and large private estates.

NEED FOR A PLAN. The rapid post-World War II growth experienced by the Airport and surrounding communities generated numerous problems (as well as opportunities) for the Port of Seattle, King County, property owners, businessmen, and other parties of interest. By the summer of 1972, it had become clear to the Port Commission, the County Council, and the FAA that a coordinated plan and program of improvement for the Sea-Tac area was required. As identified at that time, some of the key problems were as follows:

- Owners of residential properties near the Airport had become increasingly concerned about aircraft noise.
- Information about such aircraft noise exposure was either unavailable or in dispute.
- In addition to numerous lawsuits against the Port, the aircraft noise situation had caused HUD to withhold mortgage commitments in certain areas near the Airport.
- Since the Sea-Tac installation had continued to grow through the years, nearby property owners were unsure as to what additional land might be needed in the future.
- The combination of factors cited above had produced a "climate of uncertainty" about property value and real estate in the vicinity of Sea-Tac Airport.

FORMAT OF STUDY. The planning process instituted to develop the Sea-Tac Communities Plan involved five major forms of activity: airport planning; vicinity or community planning; environmental studies; community involvement; and coordination. Technical and/or supportive aspects of these activities were handled by a Study Team composed of Port and County planning, engineering and research personnel, together with several highly specialized consultants. In addition to the Study Team, a Policy Advisory Committee (PAC) and a Technical Advisory Committee (TAC) were formed to provide reactions and inputs to the process. The PAC membership included four citizen appointees as well as key Port and County administrators, while the TAC was composed of appropriate local, regional, state, and federal agency representatives.

As illustrated by the diagram shown below, the Plan's evolution was based on a deliberate "coming together" of airport and community plans dependent to a large extent upon environmental conclusions. Community involvement and coordination components were on-going throughout all phases of the project, as shown.



COMMUNITY INVOLVEMENT

A SPECIAL PROGRAM. Sponsors of the Sea-Tac Communities Plan Study recognized the necessity and value of citizen participation in all phases of the effort. An extensive Community Involvement Program was therefore developed and carried out under the general direction of King County's Policy Development Commission (PDC), a broad-based organization of citizens who serve in an advisory capacity to the County Council. The PDC, through its Land Use Committee, agreed upon the following objectives as operational guidelines for this special program:

- Promote community interest in the Study.
- Include citizen participants in the day-to-day operations of the Community Involvement Program.
- Maximize public understanding of technical studies.
- Stimulate and respond to community concerns and ideas.
- Promote community expression of views on Study activities and plan alternatives.

TYPES OF ACTIVITY. Shortly after initiation of the Sea-Tac Study, a local office was opened to serve as a focal point for community involvement. Manned on a full-time basis by County and Port staff personnel assisted by citizen volunteers, this office not only provided a visible sign of commitment to the community, but also served as a vital communications, information, and activity center.

Records maintained by the Community Involvement Office indicate that approximately 300 citizens were active participants in the Study. Moreover, some 3,000 persons had direct contact with the Sea-Tac Communities Plan via newsletters, information bulletins, questionnaires, committee and task force meetings, seminars, and visits to the local office.

Thousands of additional residents of the Study Area were also made aware of the project by such means as:

- Letters from King County to all 36,000 property owners within the area inviting participation in the Study.
- Three half-hour video tape programs prepared by an Audio-Visual Task Force consisting of staff, citizens, and local technical experts.
- A television program provocatively entitled "How Would You Like To Sleep With a 747?" produced as a public affairs function by a Seattle TV station.
- "Sea-Tac and Its Neighbors," a brochure prepared and distributed by the King County League of Women Voters.
- A continuing education program "Your 2¢ Worth" sponsored by the Highline School District, Sea-Tac Plan, and League of Women Voters.
- An 8-page newspaper supplement that outlined alternative plans and programs under consideration as part of the Study. This supplement, entitled "Where Are We Going" was included in four local newspapers with a total circulation of some 70,000.

CITIZEN IMPACT ON THE PLANNING PROCESS. All four citizen representatives on the Policy Advisory Committee played important roles in the development of a workable Sea-Tac Communities Plan. In addition, basic planning directions for the Study Area—goals, alternatives, policies, and programs—were formulated (in part) through the Community Involvement Program.

AIR TRADE AREA. As determined by the consulting firm of Peat, Marwick, Mitchell & Co. (PMM&Co.) in *Aviation Demand Forecast* (Element Report 2.0), the primary air trade area served by Sea-Tac International Airport is the Central Puget Sound Region consisting of King, Kitsap, Pierce, and Snohomish Counties. Approximately 80% of Sea-Tac's airline passenger traffic is generated from within this Region. The remaining 20% is largely derived from a secondary air trade area which lies beyond the urban, heavily populated Seattle-Tacoma complex. This includes about two-thirds of the State of Washington.

AIR TRAFFIC CHARACTERISTICS. When used in connection with a given airport, the term "air traffic" refers to the movement of people (passengers), goods (cargo), and vehicles (aircraft) via available terminal and airfield facilities. During 1973, the Sea-Tac International Airport processed over 5 million total passengers, enplaned almost 80,000 tons of cargo and handled some 158,000 aircraft operations (landings and takeoffs).

As outlined in the table that follows, PMM&Co. has developed forecasts of future change at Sea-Tac for each of the basic components of air traffic. For example, the level of passenger activity at the Airport is expected to triple by 1993. At that time, an estimated 15,100,000 passengers will be handled by the facility.

Approximately 60,000 additional air carrier aircraft operations are forecast for 1993, along with twice as many commuter/air taxi and general aviation operations than were experienced in 1973. Enplaned cargo, particularly freight and express, will substantially expand over the 20-year planning period, according to these forecasts.

AIR TRAFFIC FORECASTS: 1973-1993
Sea-Tac International Airport

	1973	1978	1983	1993
1. Total Passengers	5,205,157	6,900,000	9,600,000	15,100,000
2. Enplaned Passengers	2,589,016	3,450,000	4,800,000	7,550,000
3. Scheduled Air Carrier Departures	56,300	60,100	70,300	86,700
Passenger	53,200	55,200	62,400	77,200
All Cargo	3,100	4,900	7,800	9,500
4. Enplaned Passengers Per Departure*	63	76	94	119
5. Average Seats Per Aircraft*	132	144	165	202
6. Boarding Load Factor (%)	48	53	57	59
7. Annual Aircraft Operations	158,131	170,000	200,000	252,000
Air Carrier	115,445	123,000	144,000	178,000
Commuter/Air Taxi	17,866	20,000	24,000	32,000
General Aviation	25,878	25,000	30,000	40,000
Military	1,942	2,000	2,000	2,000
8. Enplaned Cargo Tons	83,915	141,000	243,000	698,000
Freight and Express	62,055	103,000	187,000	581,000
Mail	21,860	38,000	56,000	117,000

*Average Day/Peak Month

Source: Peat, Marwick, Mitchell & Co.

AIR QUALITY: The consulting firm of Environmental Systems Laboratories, Inc. (ESL) conducted a year-long evaluation of air quality conditions in the vicinity of Sea-Tac International Airport as part of the overall Study. Mobile vans and fixed stations were used to collect data on five air pollutants: particulates, carbon monoxide, hydrocarbons, nitrogen oxides, and oxidants. Existing air quality in the area and near the Airport passenger terminal was calculated, and a computer model employed to predict future pollution levels. The latter process involved "most probable" and "worst case" conditions based on air traffic forecasts and community plan alternatives.

In their final report *Air Quality Analysis* (Element Report 5.2), ESL concluded that "The present and projected air quality near Sea-Tac Airport is not expected to pose any threat to human health as a result of airport operations. As the population expands and the communities around Sea-Tac grow, the combined effects of the Airport and communities may produce air pollution problems. Careful planning coupled with the implementation of available mitigation measures should prevent future air quality problems from developing."

NOISE EXPOSURE: Inasmuch as aircraft noise is clearly one of the most difficult and complex problems associated with the operation of Sea-Tac Airport, a very extensive noise exposure study was undertaken and carried out. This *Noise Exposure Analysis* (Element Report 5.5) was executed by Robin M. Towne & Associates (RMTA) and MAN-Acoustics and Noise, Inc. (MAN). Twelve full months of noise measurements were obtained in order to document and compare exposure characteristics under all time, weather, and operational conditions. A total of 4,516 individual measurements were made by the consultants at 6 locations throughout the Study Area.

Three different noise descriptor methodologies were employed during analytical phases of the work, and appropriate aircraft noise exposure contours were calculated under each procedure for the years 1973 (observed data), and 1978, 1983, and 1993 (forecast data). The methodologies utilized were Noise Exposure Forecast (NEF), Adjusted Noise Exposure (ANE), and the Aircraft Sound Description System (ASDS), all of which are detailed in Element 5.5 reports. In addition, noise exposure data was also developed in connection with a "grid system" made up of 40-acre "cells." This latter process proved to be of particular value in the determination of where various noise remedy programs could best be applied within the Study Area.

In essence, the analysis revealed that aircraft noise exposure had peaked and will be decreasing in the future. This is due largely to changes by airlines and aircraft manufacturers in response to Federal Aviation Regulation Part 36 (Noise Standards). Such changes include engine retrofitting, increased use of new, quieter aircraft, and modification of current operating procedures. Moreover, the reduction in Sea-Tac generated noise exposure is projected to take place even though aircraft operations at the Airport are expected to increase by 1993.

WATER QUALITY AND DRAINAGE. Stevens, Thompson and Runyan, Inc. (STR) focused on water quality and drainage considerations as part of the Study Team. In particular, the consultant evaluated conditions in and affecting Miller and Des Moines Creeks.

Basic data for the STR investigation was compiled from year-long (May 1973-April 1974) chemical and biological sampling programs, as well as by appropriate hydrologic studies. Water chemistry was measured to determine the basic makeup of the two creeks, and to check for compliance with Washington State water quality standards for Class A streams. The biological program determined the type, number, and variety of organisms present in each stream. Both the chemical and biological information was required to classify levels, types, and sources of water pollution, whereas the hydrologic studies were conducted for the purpose of identifying major areas that contribute to water runoff, and to note the levels and frequency of flooding.

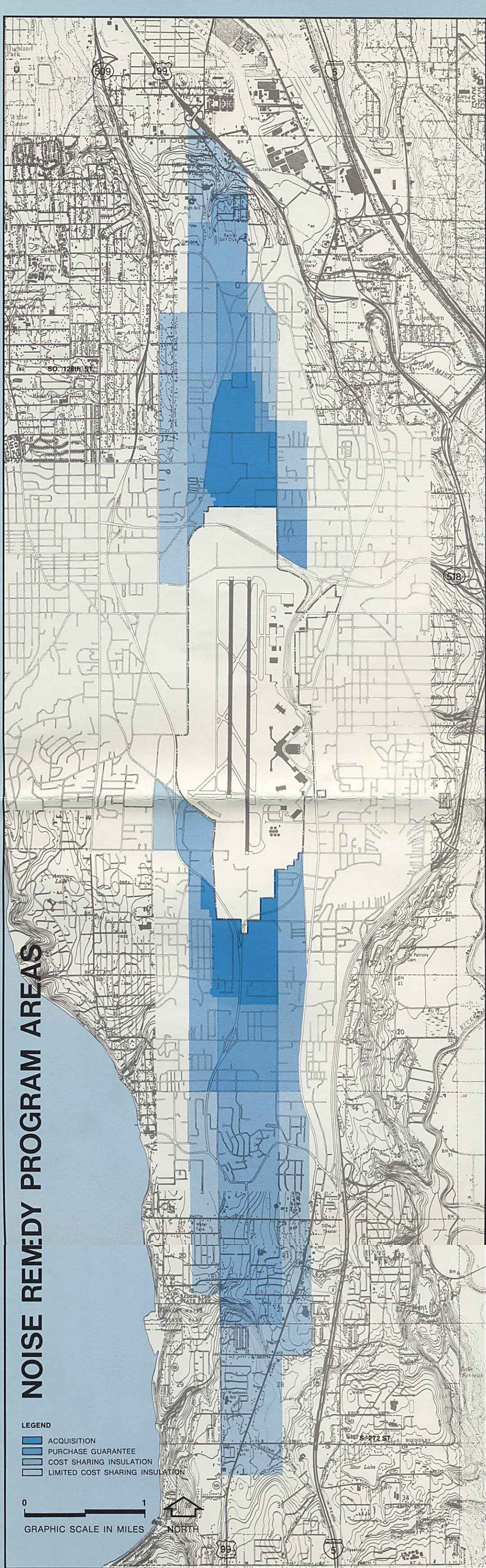
As documented in the report *Water Quality Analysis* (Element Report 5.3), STR found that standards for Class A streams were violated at most of the chemical sampling stations. Violations included temperature, dissolved oxygen, and coliform levels. Also, potentially chronic concentrations of pesticides and herbicides exist in the two streams and temperatures exceed maximums for fish propagation. In addition, the biological data indicated large populations of organisms tolerant of siltation, and degraded water quality conditions in both Miller and Des Moines Creeks.

ENVIRONMENTAL ASSESSMENT STUDIES. A host of work assignments relating to the Study Area's natural and man-made environment were undertaken and completed by the King County Land Use Management Division of the Department of Community and Environmental Development. As detailed in the document *Six Month Report: Environmental Assessment* and the *Map Supplement* thereto, these assignments covered such topics as: Community Trends and Characteristics (population, housing, employment, forecasts); Land Use (residential, commercial, industrial); Public Facilities (schools, parks, libraries, fire, police, sewer, and water); Ground Transportation and Traffic Volumes (streets and highways, transit); Aesthetic and Visual Characteristics; and Natural Determinants (geology, soils, topography and slope, natural hazards, and hydrology). The products of this work activity were used extensively during plan development phases of the overall Study.

COMMUNITY ATTITUDES. A special survey designed to assess prevailing attitudes of full-time residents of the Highline District in King County was carried out by the research firm of Battelle Northwest during the initial phase of Study activity. Involving some 516 personal and telephone interviews conducted both within and without the Study Area, the survey confirmed that residents in high noise exposure zones were definitely affected by aircraft noise. In contrast to this expected conclusion, however, most of survey respondents indicated their desire and intent to remain in the community, if at all possible.

OTHER STUDIES. Two additional studies were also accomplished as part of the overall project. The Port of Seattle Engineering Department and STR jointly analyzed solid waste management practices relative to the Sea-Tac Airport and its environs, and The Richardson Associates (TRA) updated previously assembled airport access and parking information.

ENVIRONMENTAL FINDINGS



PROGRAM OBJECTIVES. The thorough analysis of noise exposure associated with Sea-Tac International Airport has provided a basis for the development of a variety of noise remedy programs. Designed to assist the Airport and surrounding community to be more compatible over time, these remedial efforts are based on three policy objectives:

- Minimize noise at the source directly through local programs where possible.
- Accurately identify and support national and/or aviation industry noise source reduction programs.
- Apply a complete set of community-based remedies directly in neighborhoods significantly affected by noise exposure; remedies which deal with the residual problems not resolvable at the source.

AIRCRAFT NOISE REDUCTION. Improvements relative to the source of aircraft noise can result from several abatement strategies. Modification of the aircraft engine will cause the most improvement. Changes in landing, takeoff, and overflight procedures can produce additional benefits by further separating the source of noise from receiving areas. Several policies concerning aircraft noise reduction were developed during the Sea-Tac Communities Plan project. They include:

- Support through local advocacy rapid implementation of aircraft noise source reduction efforts, such as those covered by Federal Aviation Regulation Part 36.
- Support through local advocacy rapid development and adoption of all operational procedures effective in reducing noise exposure, such as "Keep 'Em High" and the "two-segment approach."
- Establish an ongoing noise monitoring program at Sea-Tac Airport.
- Utilize new locations for engine maintenance run-ups in order to minimize off-Airport exposure patterns.
- Enforce a stricter curfew on nighttime maintenance run-ups at the Airport.

COMMUNITY REMEDIAL PROGRAMS. Some 15 separate programs to improve the community-wide noise environment in the vicinity of Sea-Tac Airport were examined in detail by Study participants. In general, these programs can be classified under one of the following categories of action, each of which is discussed further in subsequent paragraphs:

1. Outright acquisition of noise-affected properties.
2. Purchase assurance for impacted property owners.
3. Acquisition of appropriate aviation easements.
4. Insulation of noise-affected structures.
5. Development controls by public agencies.
6. Property advisory services.

PROGRAM APPLICATION CRITERIA. A unique analytical procedure was developed by the Study Team to determine how and where a given noise remedy program category could best be applied. As described in the detailed Sea-Tac Communities Plan document, the procedure employed a grid system made up of 40-acre cells and Adjusted Noise Exposure (ANE) values for each cell. The latter were based on measured (1973) and forecast (1978, 1983, and 1993) exposure conditions. The application criteria selected for use can be summarized as follows:

1. Noise exposure areas *permanently* above ANE 40 should be acquired outright to prevent any residential or other noise sensitive use. [Note: "Permanent" is defined as remaining at an ANE 40 or higher value throughout the 20-year planning period of the Sea-Tac Communities Plan.]
2. Areas exposed to *sustained* noise levels of ANE 40 or above should be eligible for programs that guarantee public purchase of noise-impacted private properties, if so desired by the affected property owner. [Note: A "sustained" exposure level is one that is expected to fall below ANE 40 at some point during the planning period.]
3. For exposure areas permanently above ANE 35 (but below sustained ANE 40), a program of cost-sharing noise insulation and acquisition of easements should apply.
4. For areas exposed to sustained noise levels of ANE 35 or above (but below permanent ANE 35), a more limited program of cost-sharing insulation assistance and limited term easements should apply.
5. Programs involving special development controls (zoning, subdivision regulations, building codes) and property ad-

PROGRAM APPLICATION AREAS. The accompanying map shows locations within the Sea-Tac Study Area where various residentially-oriented noise remedy programs are recommended to be carried out as *soon as time and resources permit*. A pilot effort is planned to work out detailed procedures and features of these programs. Capsule descriptions of specific program application areas are outlined below.

Acquisition

Two separate areas, involving some 481 acres, have been identified for outright acquisition by the Port of Seattle (boundaries as shown are based on noise remedy program criteria *and* a previously established Interim Acquisition Program). The north area encompasses 305 acres and 702 single family homes. It is 83% developed and also contains two schools and one industry. A mobile home park (21 units) and 285 homes are located within the 176-acre south area, along with 48+ acres of King County park lands.

Purchase Guarantee

Areas designated as being suitable for the application of purchase guarantee programs in connection with noise-impacted residential properties are located to the north and south of the Airport. The north area contains 220 acres and 576 residential units, while its southern counterpart has 290 acres and a total of 197 homes.

Cost Sharing Insulation

Noise insulation program areas have been identified both to the north and south of Sea-Tac International Airport, in keeping with prevailing aircraft approach and takeoff patterns. The northern area contains 500 acres and 1,117 single family residences. Some 1,320 acres and 1,617 homes are included within the more extensive southern area.

Limited Cost Sharing Insulation

Based upon the Program Application Criteria listed above, a total of 1,680 acres and 2,283 residential units are included within areas designated for limited cost sharing insulation on the adjoining map.

Development Controls and Property Advisory Services

Land use and other development control programs, as well as various property advisory services, are also to be applied throughout most of the original Study Area.

NOISE REMEDIES