SEA·TAC COMMUNITIES PLAN

PORT OF SEATTLE · KING COUNTY

PLAN SUMMARY

THE PLAN. In 1973, the Port of Seattle and King County initiated a jointly sponsored project authorized for the purpose of developing a coordinated plan of improvement for Sea-Tac International Airport and the surrounding community. Assisted by a grant from the Federal Aviation Administration (FAA), the two-year project involved thousands of citizen participants, a host of specialized consultants, Port and County personnel, and many others. The Sea-Tac Communities Plan, as summarized herein, represents the chief end product of this pioneering effort.

BASIC FINDINGS. A wide variety of findings and conclusions were produced by and as a result of the project. Prime examples include:

- No major expansion of the Airport site is required.
- Noise exposure has peaked and, although expected to decrease with time, will continue to be a problem.
- Numerous property owners adjacent or near Sea-Tac Airport are disturbed by aircraft noise and sincerely believe that they should receive some form of relief or compensation for this condition.
- Property owners are also uncertain and nervous about real estate values in the Airport vicinity.
- Acquisition of all noise sensitive lands by the Port of Seattle could adversely affect the local tax base, the operation of certain special purpose districts, and the integrity of numerous neighborhoods.
- Implementation of appropriate noise remedy programs should permit the Airport to effectively function throughout the 20-year planning period and beyond; this will forestall the need to build a second major airport for many years to come.
- Practical solutions to areawide water quality and drainage problems are available.
- Access to the Airport from the south needs to be improved via a coordinated effort by the County, Port, and State Highway Department.
- Operation of the Airport has little effect on air quality in the area.

KEY ACTIONS. In order to achieve a more compatible Airport/Community relationship, the recommended Plan is based on several key actions. They are:

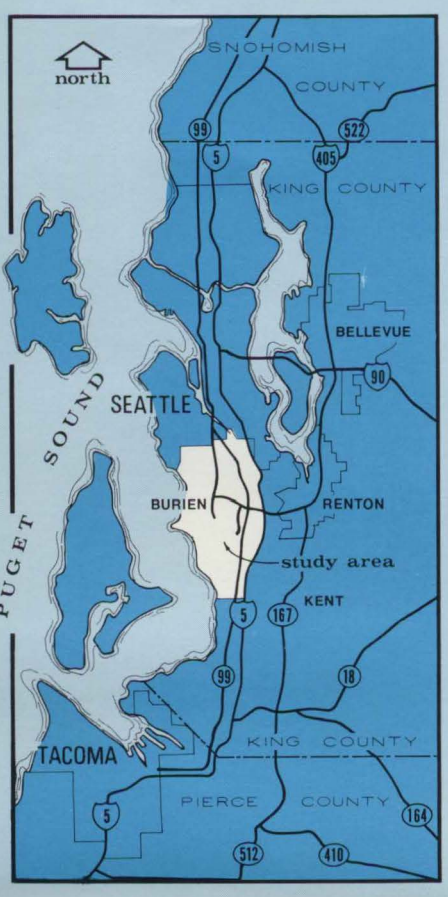
- Establishment of a comprehensive noise remedy program by the Port of Seattle involving acquisition, purchase guarantees, noise insulation, avigation easements, and property advisory services.
- Provision of maximum financial assistance by the FAA for such noise remedy actions.
- Implementation of extensive drainage, water quality, park, and recreation program improvements by King County.
- Recognition of the Plan by HUD/FHA for purposes of improving mortgage insurance policies and practices in the area.
- Agreement by the Port and County to fulfill staffing and budgetary needs of the Plan, and to conduct a Post-Plan Coordination Program. The latter includes the monitoring of (1) noise exposure, (2) water quality, (3) air quality, and (4) actual progress in implementation of the Plan.

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

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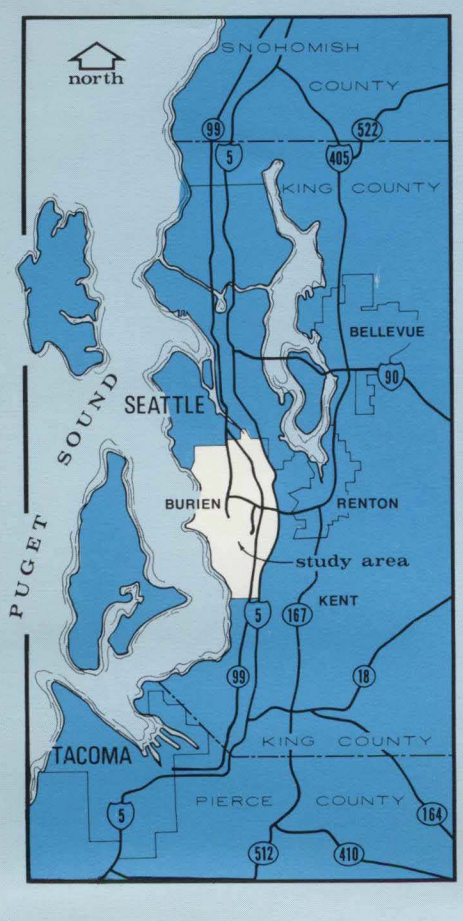

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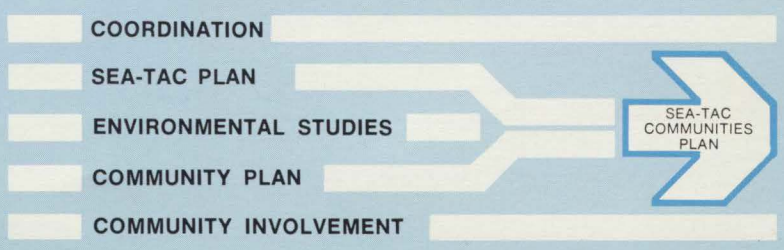
FORMAT OF STUDY. The planning process instituted to develop the Sea-Tac Communities Plan involved five major forms of activity: airport planning; vicinity or community planning; environmental studies; community involvement; and coordination. Technical and/or supportive aspects of these activities were 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 TRAFFIC

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 plan-

AIR QUALITY: The consulting firm of Environmental Sys tems Laboratories, Inc. (ESL) conducted a year-long eva uation of air quality conditions in the vicinity of Sea-Ta International Airport as part of the overall Study. Mobil vans and fixed stations were used to collect data on fiv air pollutants: particulates, carbon monoxide, hydrocarbon nitrogen oxides, and oxidants. Existing air quality in th area and near the Airport passenger terminal was calcu lated, and a computer model employed to predict futur pollution levels. The latter process involved "most probable and "worst case" conditions based on air traffic forecast and community plan alternatives.

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

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

Three different noise descriptor methodologies were em ployed during analytical phases of the work, and appropriat aircraft noise exposure contours were calculated under eac procedure for the years 1973 (observed data), and 197 1983, and 1993 (forecast data). The methodologies utilize were Noise Exposure Forecast (NEF), Adjusted Noise E posure (ANE), and the Aircraft Sound Description Syste (ASDS), all of which are detailed in Element 5.5 reports. addition, noise exposure data was also developed in co nection with a "grid system" made up of 40-acre "cells This latter process proved to be of particular value in th determination of where various noise remedy program could best be applied within the Study Area.

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As documented in the report ***Water Quality Analysis*** (El ment Report 5.3), STR found that standards for Class streams were violated at most of the chemical sampli stations. Violations included temperature, dissolved oxyge and coliform levels. Also, potentially chronic concentratio of pesticides and herbicides exist in the two streams a temperatures exceed maximums for fish propagation. In a dition, the biological data indicated large populations of c ganisms tolerant of siltation, and degraded water qual conditions in both Miller and Des Moines Creeks.

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	1973	1978	1983	1993
..	5,205,157	6,900,000	9,600,000	15,100,000
..	2,589,016	3,450,000	4,800,000	7,550,000
..	56,300	60,100	70,300	86,700
..	53,200	55,200	62,400	77,200
..	3,100	4,900	7,800	9,500
e*	63	76	94	119
..	132	144	165	202
..	48	53	57	59
..	158,131	170,000	200,000	252,000
..	115,445	123,000	144,000	178,000
..	17,866	20,000	24,000	32,000
..	22,878	25,000	30,000	40,000
..	1,942	2,000	2,000	2,000
..	83,915	141,000	243,000	698,000
..	62,055	103,000	187,000	581,000
..	21,860	38,000	56,000	117,000

Source: Peat, Marwick, Mitchell & Co.

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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.

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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	22,878	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.

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As documentated in the report ***Water Quality Analysis*** (E ment Report 5.3), STR found that standards for Class streams were violated at most of the chemical samp stations. Violations included temperature, dissolved oxyg and coliform levels. Also, potentially chronic concentrati of pesticides and herbicides exist in the two streams temperatures exceed maximums for fish propagation. In dition, the biological data indicated large populations of ganisms tolerant of siltation, and degraded water qua conditions in both Miller and Des Moines Creeks.

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

OTHER STUDIES. Two additional studies were also acc plished as part of the overall project. The Port of Sea Engineering Department and STR jointly analyzed s waste management practices relative to the Sea-Tac port and its environs, and The Richardson Associates (T updated previously assembled airport access and par information.

PECIAL PROGRAM. Sponsors of the Sea-Tac Communi-
Plan Study recognized the necessity and value of citizen
cipation in all phases of the effort. An extensive Com-
ity Involvement Program was therefore developed and
ed out under the general direction of King County's
cy Development Commission (PDC), a broad-based or-
zation of citizens who serve in an advisory capacity to
County Council. The PDC, through its Land Use Com-
ee, agreed upon the following objectives as operational
elines for this special program:
omote community interest in the Study.
clude citizen participants in the day-to-day operations
the Community Involvement Program.
aximize public understanding of technical studies.
imulate and respond to community concerns and ideas.
omote community expression of views on Study activities
d plan alternatives.

ES OF ACTIVITY. Shortly after initiation of the Sea-Tac
y, a local office was opened to serve as a focal point
community involvement. Manned on a full-time basis by
nty and Port staff personnel assisted by citizen volun-
s, this office not only provided a visible sign of commit-
t to the community, but also served as a vital communi-
ons, information, and activity center.
ords maintained by the Community Involvement Office
cate that approximately 300 citizens were active par-
ants in the Study. Moreover, some 3,000 persons had
ct contact with the Sea-Tac Communities Plan via news-
rs, information bulletins, questionnaires, committee and
force meetings, seminars, and visits to the local office.
usands of additional residents of the Study Area were
made aware of the project by such means as:
etters from King County to all 36,000 property owners
ithin the area inviting participation in the Study.
hree half-hour video tape programs prepared by an Audio-
sual Task Force consisting of staff, citizens, and local
chnical experts.
television program provocatively entitled *"How Would
ou Like To Sleep With a 747?"* produced as a public
fairs function by a Seattle TV station.
Sea-Tac and Its Neighbors," a brochure prepared and
stributed by the King County League of Women Voters.
continuing education program *"Your 2¢ Worth"* spon-
ored by the Highline School District, Sea-Tac Plan, and
eague of Women Voters.
n 8-page newspaper supplement that outlined alterna-
ve plans and programs under consideration as part of
e Study. This supplement, entitled *"Where Are We Go-
g"* was included in four local newspapers with a total
rculation of some 70,000.

ZEN IMPACT ON THE PLANNING PROCESS. All four
en representatives on the Policy Advisory Committee
ed important roles in the development of a workable
-Tac Communities Plan. In addition, basic planning di-
ions for the Study Area—goals, alternatives, policies,
programs—were formulated (in part) through the Com-
ity Involvement Program.

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

TRAFFIC CHARACTERISTICS. When used in connec-
with a given airport, the term "air traffic" refers to the
ement of people (passengers), goods (cargo), and ve-
s (aircraft) via available terminal and airfield facilities.
ng 1973, the Sea-Tac International Airport processed
5 million total passengers, enplaned almost 80,000 tons
rgo and handled some 158,000 aircraft operations (land-
and takeoffs).

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

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

ENVIRONMENTAL FINDINGS

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.

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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.

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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.

EDY PROGRAM AREAS

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

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

AIRCRAFT NOISE REDUCTION. Improvements relative t the source of aircraft noise can result from several abate ment strategies. Modification of the aircraft engine will caus the most improvement. Changes in landing, takeoff, an overflight procedures can produce additional benefits b further separating the source of noise from receiving areas Several policies concerning aircraft noise reduction wer developed during the Sea-Tac Communities Plan projec They include:

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

COMMUNITY REMEDIAL PROGRAMS. Some 15 separat programs to improve the community-wide noise environmen in the vicinity of Sea-Tac Airport were examined in detail b Study participants. In general, these programs can be class fied under one of the following categories of action, each o 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 avigation easements.
4. Insulation of noise-affected structures.
5. Development controls by public agencies.
6. Property advisory services.

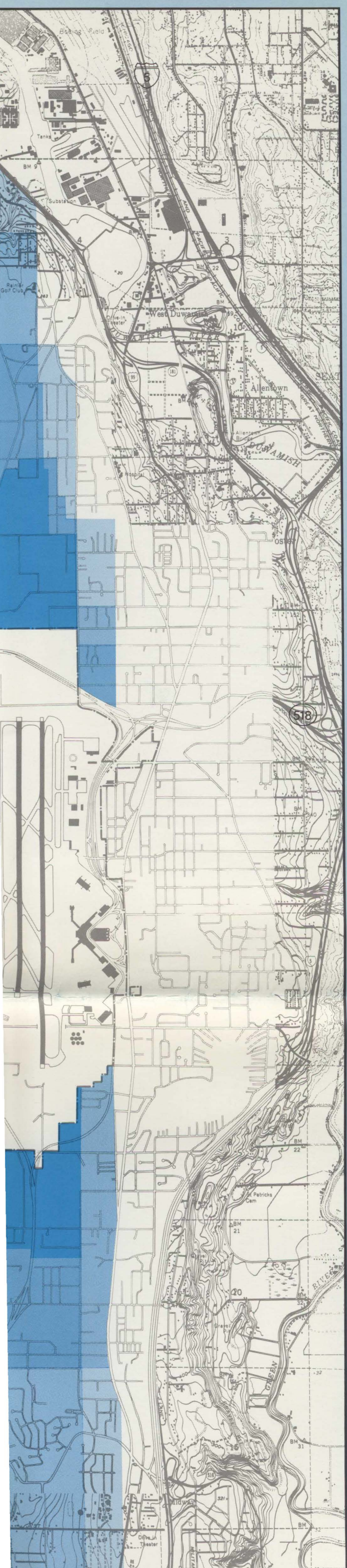
PROGRAM APPLICATION CRITERIA. A unique analytica procedure was developed by the Study Team to determin how and where a given noise remedy program categor could best be applied. As described in the detailed Sea-Ta Communities Plan document, the procedure employed a gri system made up of 40-acre cells and Adjusted Noise Expo sure (ANE) values for each cell. The latter were based o measured (1973) and forecast (1978, 1983, and 1993) expo sure conditions. The application criteria selected for us can be summarized as follows:

1. Noise exposure areas ***permanently*** above ANE 40 shoul be acquired outright to prevent any residential or othe noise sensitive use. [Note: "Permanent" is defined as re maining at an ANE 40 or higher value throughout th 20-year planning period of the Sea-Tac Communities Plan
2. Areas exposed to ***sustained*** noise levels of ANE 40 o above should be eligible for programs that guarante public purchase of noise-impacted private properties, so desired by the affected property owner. [Note: A "sus tained" exposure level is one that is expected to fall be low ANE 40 at some point during the planning period.]
3. For exposure areas permanently above ANE 35 (but belo sustained ANE 40), a program of cost-sharing noise insu lation and acquisition of easements should apply.
4. For areas exposed to sustained noise levels of ANE 3 or above (but below permanent ANE 35), a more limite program of cost-sharing insulation assistance and limite term easements should apply.
5. Programs involving special development controls (zoning subdivision regulations, building codes) and property ac visory services should be applied within the Study Are wherever an ANE value of 25 or higher is indicated.

PROGRAM APPLICATION AREAS. The accompanying ma shows locations within the Sea-Tac Study Area where var ous residentially-oriented noise remedy programs are recom mended to be carried out *as soon as time and resource permit.* A pilot effort is planned to work out detailed proce dures and features of these programs. Capsule description of specific program application areas are outlined below.

Acquisition

Two separate areas, involving some 481 acres, have bee identified for outright acquisition by the Port of Seattl (boundaries as shown are based on noise remedy progra criteria ***and*** a previously established Interim Acquisitio Program). The north area encompasses 305 acres and 70 single family homes. It is 83% developed and also contain



NOISE REMEDIES

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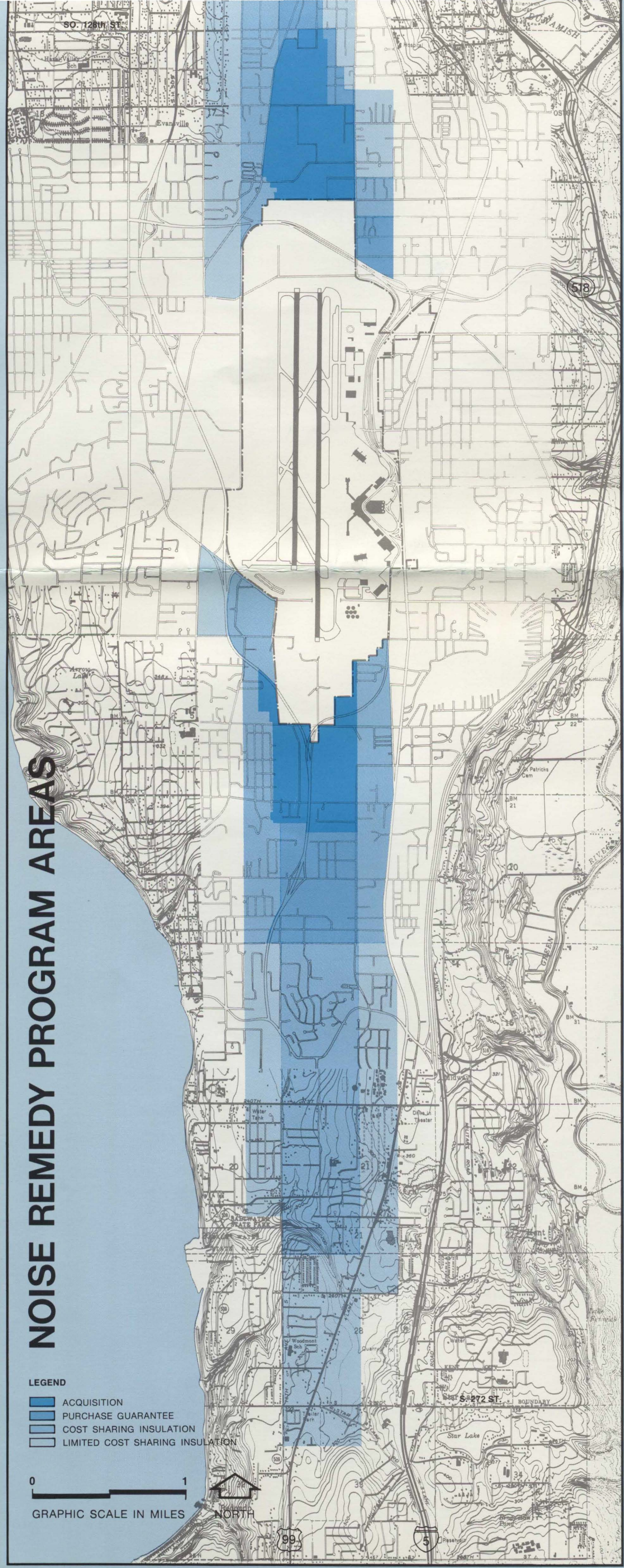
1. Noise exposure areas ***permanently*** above ANE 40 should be acquired outright to prevent any residential or other noise sensitive use. [Note: "Permanent" is defined as remaining at an ANE 40 or higher value throughout the 20-year planning period of the Sea-Tac Communities Plan.]
2. Areas exposed 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 advisory services should be applied within the Study Area wherever an ANE value of 25 or higher is indicated.

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)



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2. Areas exposed to ***sustained*** noise levels of ANE 40 above should be eligible for programs that guarante public purchase of noise-impacted private properties, so desired by the affected property owner. [Note: A "su tained" exposure level is one that is expected to fall b low ANE 40 at some point during the planning period.]
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Purchase Guarantee

Areas designated as being suitable for the application purchase guarantee programs in connection with nois impacted residential properties are located to the north a south of the Airport. The north area contains 220 acres a 576 residential units, while its southern counterpart has 2 acres and a total of 197 homes.

Cost Sharing Insulation

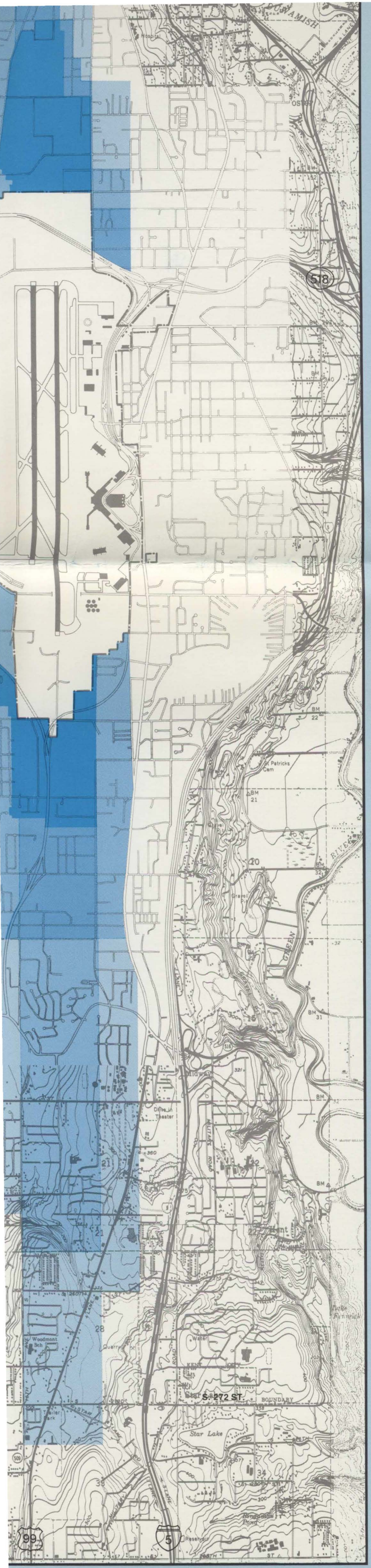
Noise insulation program areas have been identified both the north and south of Sea-Tac International Airport, in kee ing with prevailing aircraft approach and takeoff pattern The northern area contains 500 acres and 1,117 single fam residences. Some 1,320 acres and 1,617 homes are includ within the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

Limited Cost Sharing Insulation

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

Development Controls and Property Advisory Services

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



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 avigation 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 advisory services should be applied within the Study Area wherever an ANE value of 25 or higher is indicated.

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.

Y POLICIES. Consultant, staff, and citizen participants ermined early in the Sea-Tac Study that Miller and Des ines Creek improvement programs needed to focus on protection of the natural function of streams and wetlands, d (b) achievement and maintenance of natural stream ws. A number of key policies were subsequently worked in order to solve Study Area drainage and pollution oblems. Stated in the form of action programs, they are:

Replace septic tank waste disposal facilities with sanitary sewer service as soon as possible.

Establish a public information program to demonstrate the need for and benefits of sewer service.

Assist permanent residential neighborhoods to obtain sanitary sewers in conjunction with noise remedy programs.

Contain and clean up accidental jet fuel spillage at or near the point of such spillage.

Advise property owners (public and private) as to the proper use of fertilizers, fungicides, herbicides, and pesticides.

Plant shade trees in unshaded areas of the upper reaches of Miller and Des Moines Creeks.

Require shade tree planting along streams and wetlands in new developments.

Formulate new land use development criteria for those factors which affect on-site storm water runoff such as "slope," "amount of impervious surface," "vegetative cover," "water holding capacity," and "differential runoff rates."

Require construction sites to have holding ponds for the temporary containment of storm water runoff.

Coordinate roadway drainage systems with overall drainage plans and provisions.

Encourage the planting of trees and ground cover along roadways for aesthetic as well as drainage purposes.

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Establish a system of holding ponds to naturally control and maintain desirable stream flows.

Monitor the effectiveness of water quality and water quantity solutions on a continual basis.

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A high-speed exit should be added between Taxiways B15 and B6 of Runway 16R-34L.

Taxiway C on the Airport's west side should be extended to serve in a dual capacity as a permanent general aviation runway (17-35).

nd Use and Support Facilities

The bulk of Sea-Tac Airport's west side should be reserved for future cargo and maintenance uses.

Approximately 15 acres should be allocated to business aviation within the above cargo/maintenance reserve area.

Specified area on the Airport's west side should be developed as a park for the viewing of aircraft operations.

The existing industrial waste treatment plant should be expanded to include additional holding lagoons.

A new and larger Sea-Tac Airport fire station should be constructed at the intersection of South 170th Street and the North Perimeter Road.

rminal Complex

Permanent remote parking facilities should be provided at the Expanded Services site on the Airport's southeast side

COMMUNITY DEVELOPMENT

DEVELOPMENT POLICIES. How can the Sea-Tac International Airport and surrounding communities become more compatible? In order to answer that difficult question, the Sea-Tac Communities Plan has evolved during the project in response to scores of development goals and policies. As set forth and discussed in the detailed Plan report, these goals and policies include, among others:

- Blend the Airport with its environs on all four sides.
- Recognize freeways and other arterials as potential barriers between neighborhoods and nonresidential use areas.
- Direct the economic and land use development of Airport-related activities, general urban development, and public projects toward deliberate improvement of the local community.
- Preserve and protect the natural environment.
- Use the drainage holding ponds, watercourses, and wetlands of both Miller and Des Moines Creeks for recreation incorporated into a network of open space.
- Use natural features and open spaces to separate different land uses and to define localized areas.
- Enhance and protect permanent residential neighborhoods.
- Resolve the uncertainty connected with noise impact.
- Accomplish land use conversion within or near single-family residential areas via orderly transition programs.

PROGRAMS TO ACHIEVE COMPATIBILITY. Implementation of the Sea-Tac Communities Plan is based on three programs so designed as to achieve compatibility between the Airport and the communities: (1) outright ***acquisition*** of prescribed lands by a public authority; (2) private redevelopment or land use ***conversion;*** and (3) ***reinforcement*** of existing land use areas or neighborhoods. Key features of these interrelated Plan programs are outlined below.

ACQUISITION AREAS. The north and south areas earmarked for public acquisition by the Sea-Tac Communities Plan will primarily be devoted to open-type uses upon removal of the incompatible single-family residences now in existence. These planned open uses include agriculture, parks, landscaped buffer areas, nature trails, golf courses, and other recreational activities such as soccer, rugby, field archery, horseback riding, and water sports. The designated acquisition site between the Airport's west side and Burien has redevelopment potential, although a portion of this site is also needed for future air facility purposes—air cargo, aircraft maintenance, general aviation uses, etc.

CONVERSION AREAS. As recognized by participants in the Sea-Tac planning project, the conversion of land from one use to another often involves a difficult and lengthy process. Important factors in this process, as identified by the Study Team, include such things as economic return, ownership, cost of redevelopment, physical site suitability, transportation provisions, availability of utilities, development of surrounding properties, local qualities and attitudes, governmental assistance, and market suitability.

Because of the many complexities involved, it was determined that Planned Unit Development (PUD) zoning procedures ought to be heavily relied upon. Such procedures permit orderly conversion to take place in accordance with a specific plan of development or redevelopment, as the case may be. Use of Community Development (CD) Program funds now available to King County through the U.S. Department of Housing and Urban Development (HUD) was also pointed up as being of potential value relative to conversion. Areas to the north, east, southeast, southwest, and west of the Airport are designated for use conversion by the Plan. Specific recommendations for each of these locales, as mapped and described in the detailed Plan version, may be summarized as follows:

North Area. Conversion from single family to medium density multi-family residential use with proper sound insulation is to be encouraged for this triangular-shaped 32-acre area just east of the intersection of 24th Avenue South and South 152nd Street.

East Area. High and medium density apartments and airport-related business uses are deemed suitable for the 46-acre East Conversion Area between Highway 99 and 32nd Avenue South east of Washington Memorial Cemetery.

Southeast Area. Site planning and design for the Port's Expanded Services Complex should include conversion of nearby private lands from single family to multi-family and/or office use. Bounded by South 188th Street (N), 28th Avenue (E), South 200th Street (S), and Airport property (W), the Southeast Conversion Area contains some 109 acres.

Southwest Area. To the extent possible, manufacturing and industrial uses should be directed to the 197-acre Southwest Area which adjoins the Airport's western boundary and is bisected by State Route 509.

West Area. Ultimate conversion of this 264-acre single family area should result in a variety of urban uses related to both the Airport and to Burien. The West Area is sandwiched between 12th Avenue South and the S.R. 509 right-of-way.

REINFORCEMENT AREAS. Community Development programs of acquisition and conversion directly respond to land use incompatibilities that now exist between the Airport and its environs. Reinforcement programs, on the other hand,

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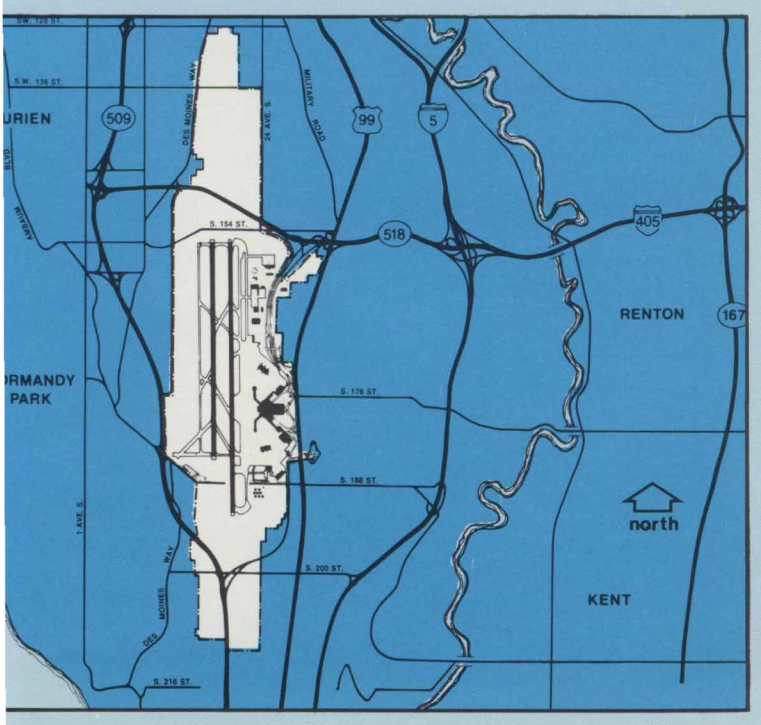
- The addition of new structural parking adjacent to the terminal should also be undertaken as needed.



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REINFORCEMENT AREAS. Community Development programs of acquisition and conversion directly respond to land use incompatibilities that now exist between the Airport and its environs. Reinforcement programs, on the other hand, deal with land areas and neighborhoods that are to be retained in their ***existing*** use and character.

The establishment and implementation of noise remedy programs, as previously described, represent the principal means of achieving desired reinforcement. However, the aforementioned water quality and drainage programs, as well as agreed-upon development goals and policies, have also been designed to aid in the reinforcement process.

Moreover, specialized community planning must be undertaken. Reinforcement areas mapped and described in the final Plan report will be designated as planning units for ongoing community planning activities. Comprehensive park, road, school, and land use planning programs will be developed, as required, along with general neighborhood improvement, community facility, and public utility programs.

IMPLEMENTATION OF PROGRAMS. As with other components of the Sea-Tac Communities Plan, the above programs are to be carried out for the most part through normal administrative mechanisms of the involved public agencies. The Port, for example, has already begun to acquire land in accordance with Plan guidelines. Certain community facility needs can and will be accommodated by appropriate adjustments of the King County Capital Improvements Program. In some cases, funding from other sources will have to be obtained, as discussed in the detailed Plan report.

irect contact with the Sea-Tac Communities Plan via news-
tters, information bulletins, questionnaires, committee and
sk force meetings, seminars, and visits to the local office.

housands of additional residents of the Study Area were
so 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.

ITIZEN IMPACT ON THE PLANNING PROCESS. All four
itizen representatives on the Policy Advisory Committee
layed important roles in the development of a workable
ea-Tac Communities Plan. In addition, basic planning di-
ections for the Study Area—goals, alternatives, policies,
nd programs—were formulated (in part) through the Com-
unity Involvement Program.

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

IR TRAFFIC CHARACTERISTICS. When used in connec-
on with a given airport, the term "air traffic" refers to the
ovement of people (passengers), goods (cargo), and ve-
cles (aircraft) via available terminal and airfield facilities.
uring 1973, the Sea-Tac International Airport processed
ver 5 million total passengers, enplaned almost 80,000 tons
cargo and handled some 158,000 aircraft operations (land-
gs and takeoffs).

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recasts of future change at Sea-Tac for each of the basic
omponents of air traffic. For example, the level of passen-
er activity at the Airport is expected to triple by 1993. At
at time, an estimated 15,100,000 passengers will be han-
ed by the facility.

pproximately 60,000 additional air carrier aircraft opera-
ons are forecast for 1993, along with twice as many com-
uter/air taxi and general aviation operations than were
perienced in 1973. Enplaned cargo, particularly freight
nd express, will substantially expand over the 20-year plan-
ng period, according to these forecasts.

1973	1978	1983	1993
5,205,157	6,900,000	9,600,000	15,100,000
2,589,016	3,450,000	4,800,000	7,550,000
56,300	60,100	70,300	86,700
53,200	55,200	62,400	77,200
3,100	4,900	7,800	9,500
63	76	94	119
132	144	165	202
48	53	57	59
158,131	170,000	200,000	252,000
115,445	123,000	144,000	178,000
17,866	20,000	24,000	32,000
22,878	25,000	30,000	40,000
1,942	2,000	2,000	2,000
83,915	141,000	243,000	698,000
62,055	103,000	187,000	581,000
21,860	38,000	56,000	117,000

Source: Peat, Marwick, Mitchell & Co.

ENVIR

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 documentated 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.

WATER QUALITY

KEY POLICIES. Consultant, staff, and citizen participants determined early in the Sea-Tac Study that Miller and Des Moines Creek improvement programs needed to focus on (a) protection of the natural function of streams and wetlands, and (b) achievement and maintenance of natural stream flows. A number of key policies were subsequently worked out in order to solve Study Area drainage and pollution problems. Stated in the form of action programs, they are:

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Replace septic tank waste disposal facilities with sanitary sewer service as soon as possible.

Establish a public information program to demonstrate the need for and benefits of sewer service.

Assist permanent residential neighborhoods to obtain sanitary sewers in conjunction with noise remedy programs.

Contain and clean up accidental jet fuel spillage at or near the point of such spillage.

Advise property owners (public and private) as to the proper use of fertilizers, fungicides, herbicides, and pesticides.

Plant shade trees in unshaded areas of the upper reaches of Miller and Des Moines Creeks.

Require shade tree planting along streams and wetlands in new developments.

Formulate new land use development criteria for those factors which affect on-site storm water runoff such as "slope," "amount of impervious surface," "vegetative cover," "water holding capacity," and "differential runoff rates."

Require construction sites to have holding ponds for the temporary containment of storm water runoff.

Coordinate roadway drainage systems with overall drainage plans and provisions.

Encourage the planting of trees and ground cover along roadways for aesthetic as well as drainage purposes.

Improve the "Hermes Depression" as a demonstration model of the pot hole method of drainage.

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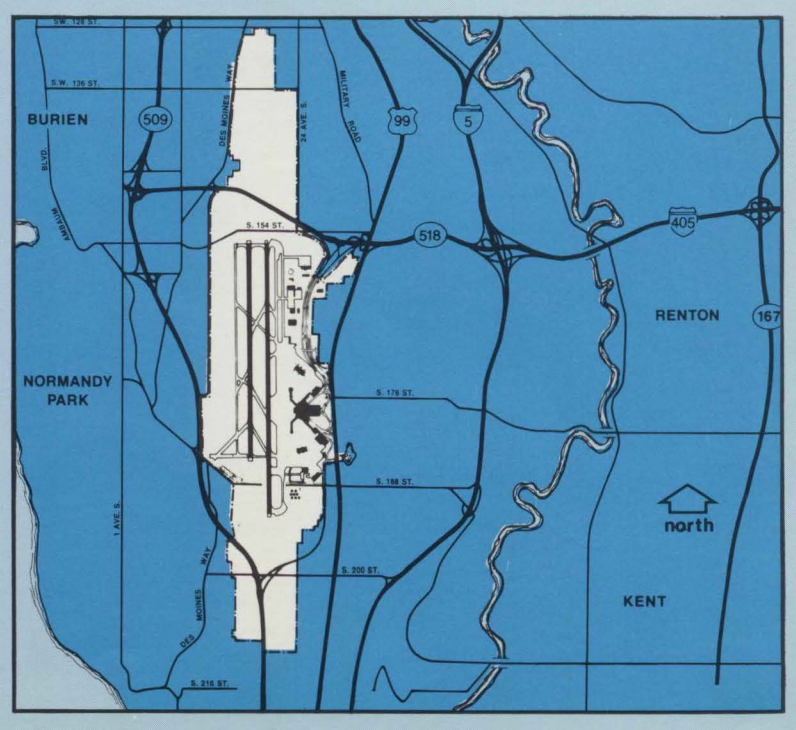

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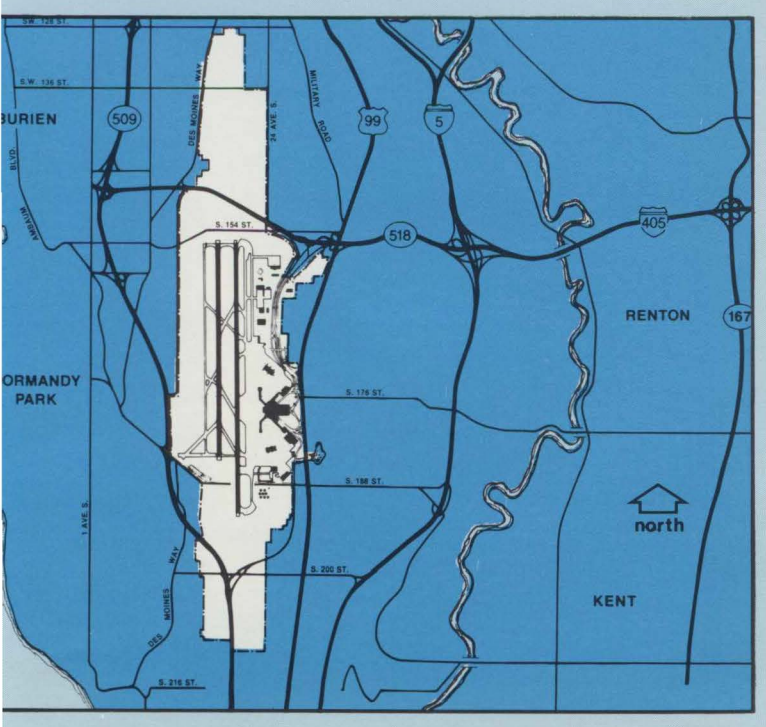

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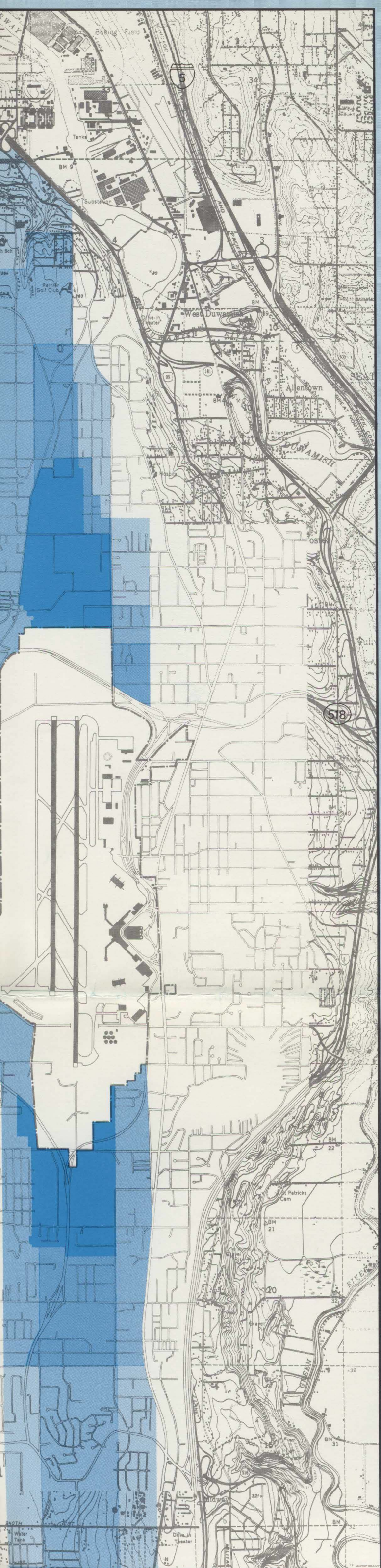


NOISE REMEDIES

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 avigation easements.
4. Insulation of noise-affected structures.
5. Development controls by public agencies.
6. Property advisory services.

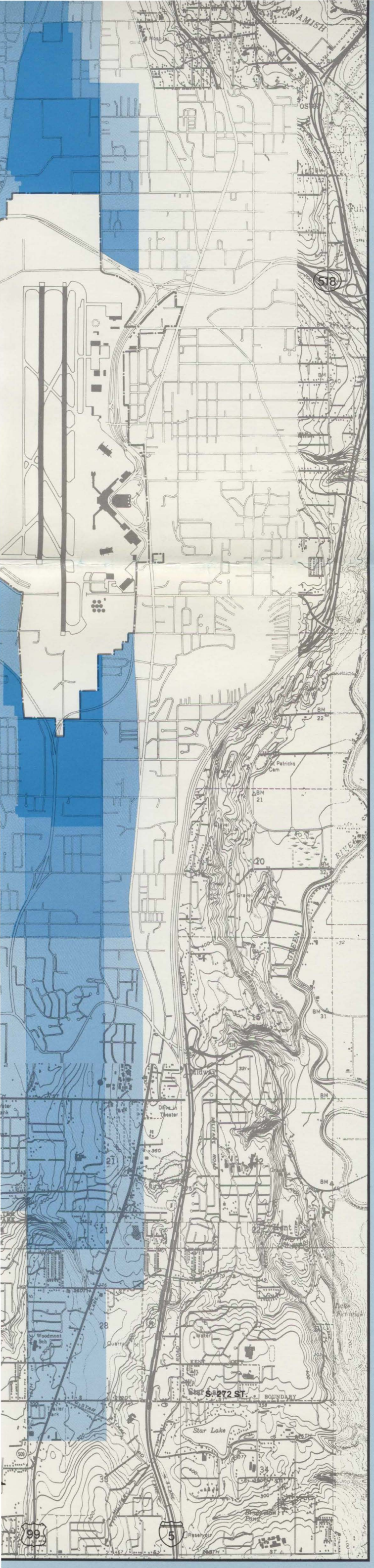
PROGRAM APPLICATION CRITERIA. A unique analytical procedure was developed by the Study Team to determine how and where a given noise remedy program category could best be applied. As described in the detailed Sea-Tac Communities Plan document, the procedure employed a grid system made up of 40-acre cells 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 advisory services should be applied within the Study Area wherever an ANE value of 25 or higher is indicated.

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)



- 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 avigation 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 advisory services should be applied within the Study Area wherever an ANE value of 25 or higher is indicated.

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.

ENVIRONMENTAL FINDINGS

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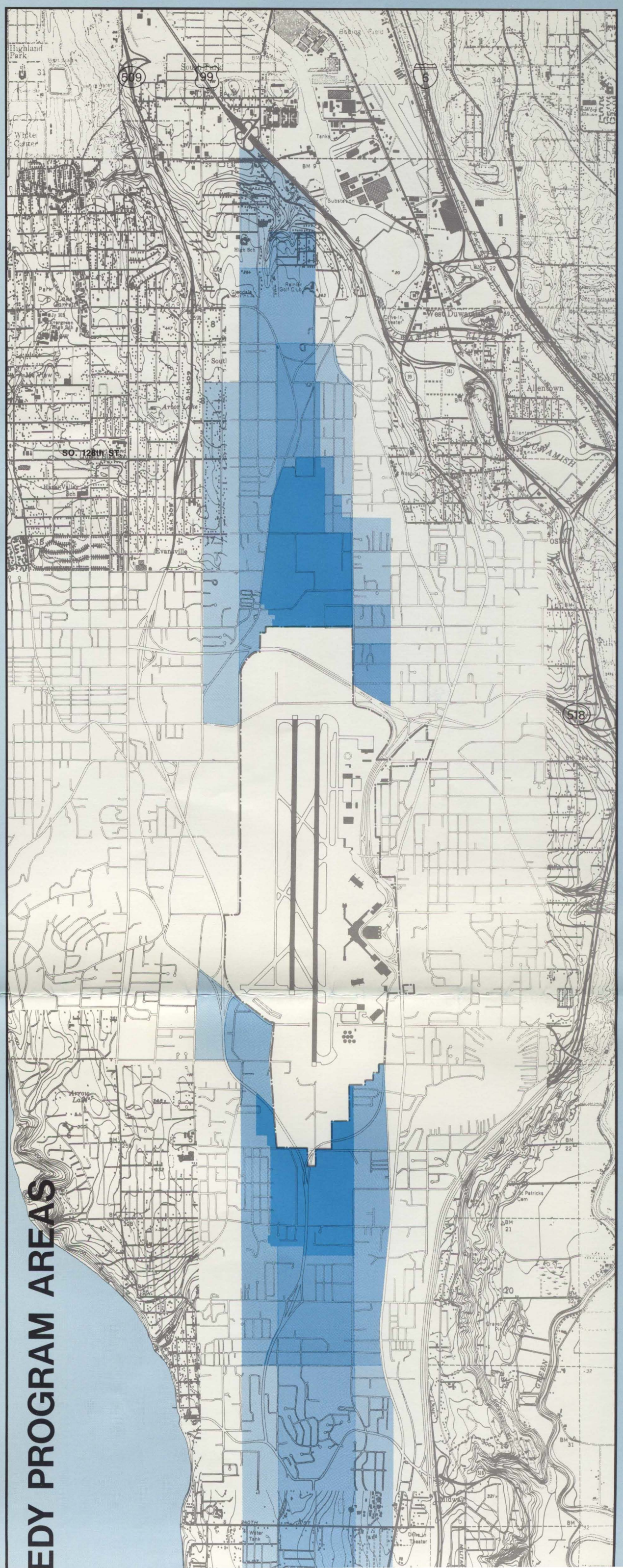

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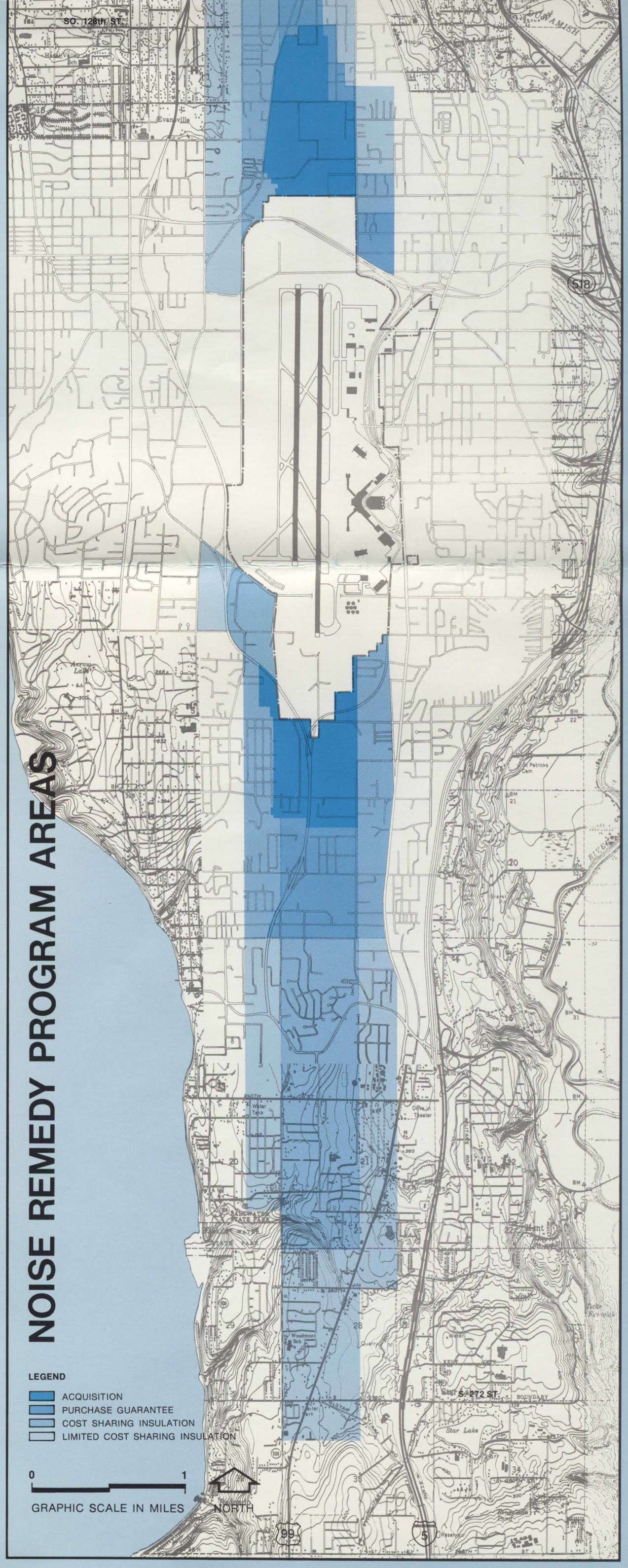
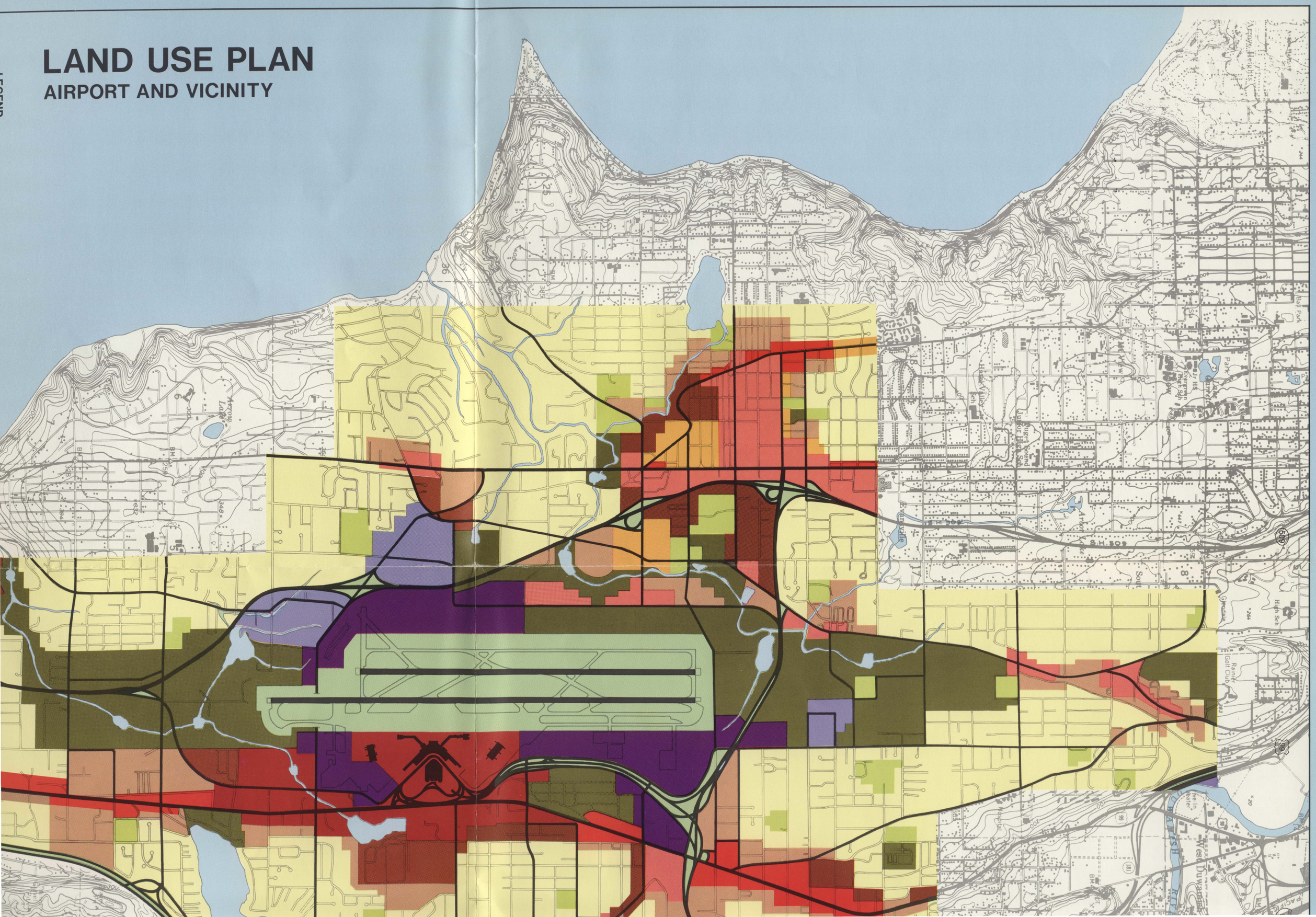
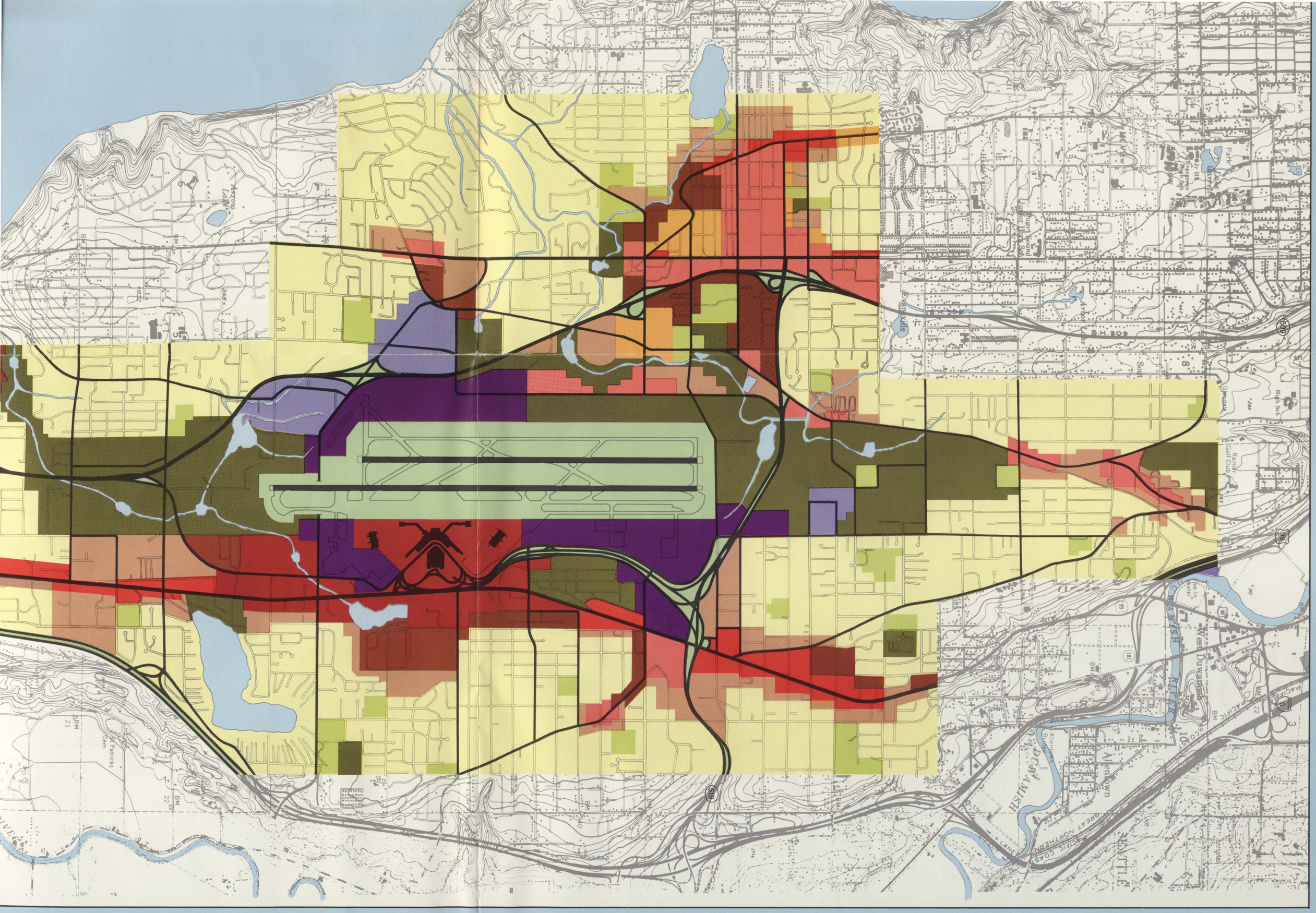


LAND USE PLAN

AIRPORT AND VICINITY




Arrow Lake
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Hillcrest Sch
Lutheran Church
Arbor Lake
S.H. 509
South
Glendale
High Sch
Rainier Golf Club
Allentown
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Duwamish
WEST SEATTLE
RIVER
PACIFIC
GREAT NORTHERN
PACIFIC COAST
LANE
BM 21
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BM 22
BM 250
BM 22

LAND USE PLAN

AIRPORT AND VICINITY

LEGEND

- SINGLE FAMILY RESIDENTIAL
- MEDIUM DENSITY RESIDENTIAL
- HIGH DENSITY RESIDENTIAL
- OFFICE
- COMMUNITY RETAIL BUSINESS
- HIGHWAY ORIENTED BUSINESS
- AIR TERMINAL/RELATED BUSINESS
- AIRPORT FACILITY
- INDUSTRY
- COMMUNITY FACILITY
- OPEN SPACE
- WATER BODY
- MAJOR TRANSPORTATION FACILITY
- KEY CIRCULATION FEATURE

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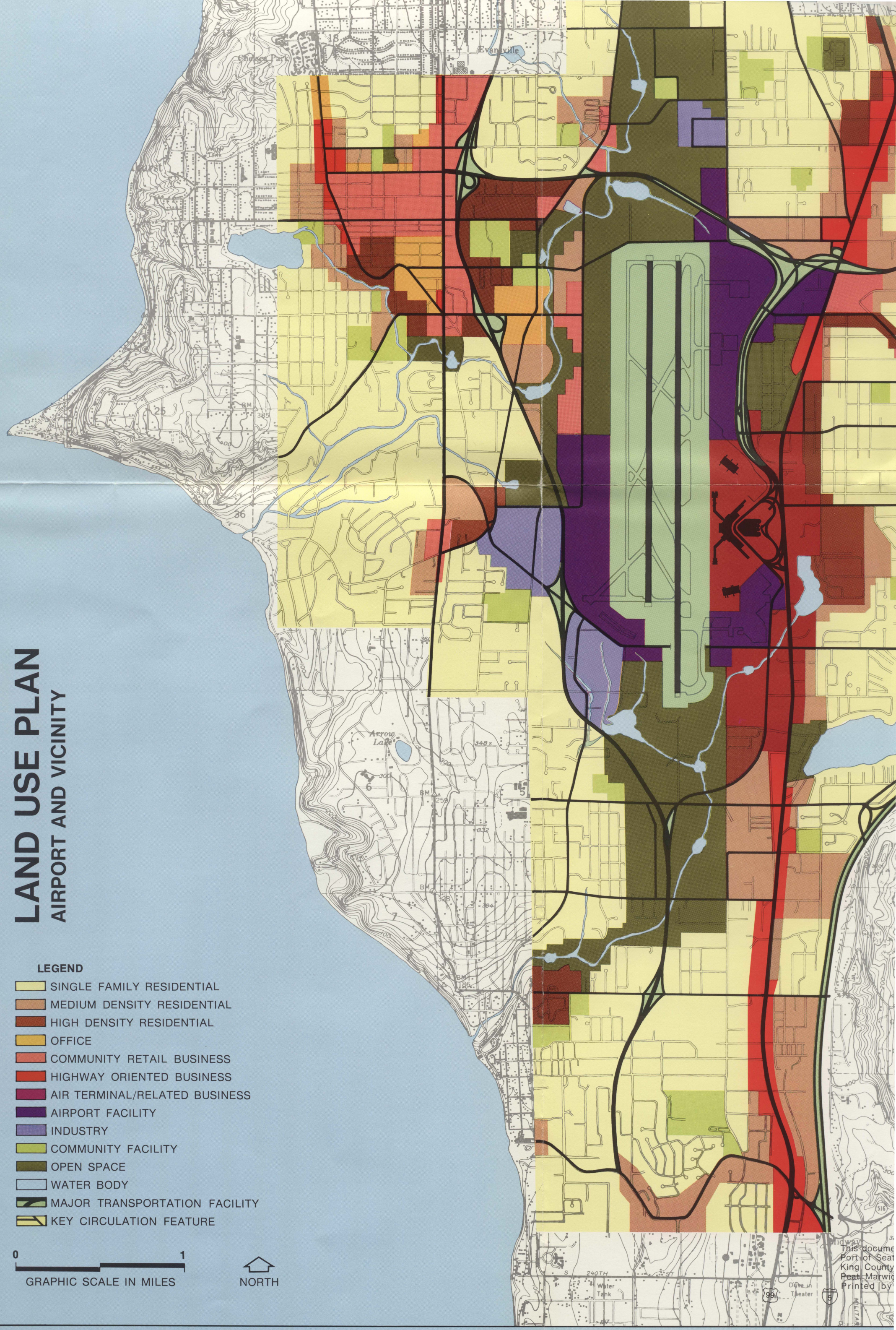
GRAPHIC SCALE IN MILES

NORTH



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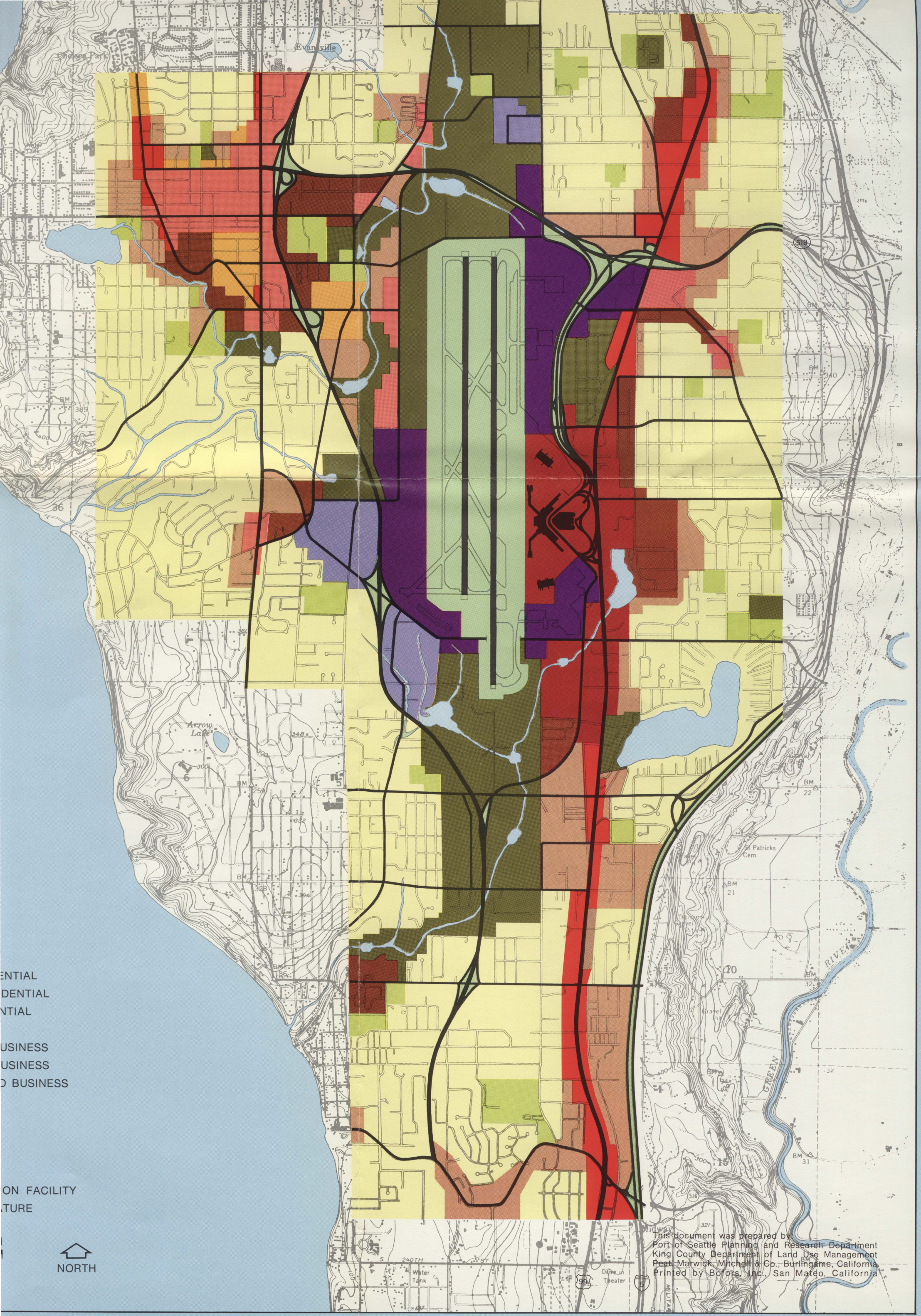

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King County Department of Land Use Management
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