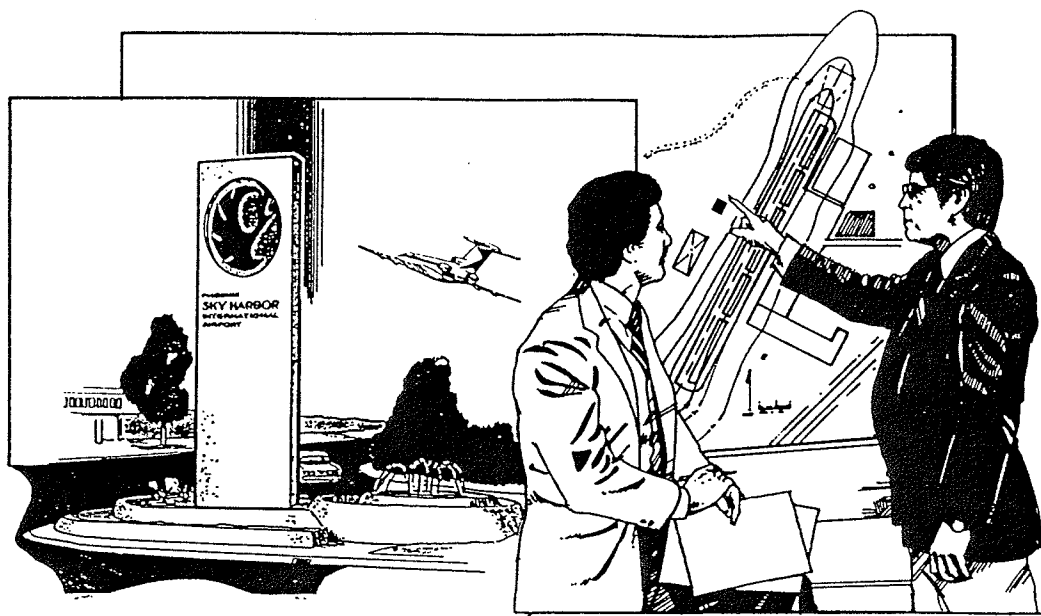


Appendix D
NOISE ALTERNATIVE EVALUATIONS



Appendix D

NOISE ALTERNATIVE EVALUATIONS

The noise abatement alternatives described on the following pages have been drawn from a wide variety of sources, including the requirement evaluations of F.A.R. Part 150, public comment and suggestion garnered from Public Information Workshops held during the course of the study, suggestions from Planning Advisory Committee membership, measures previously identified by local interests as potentially beneficial to the reduction of airport noise, and from the experience of the project consultant. It is important to recognize that these measures are preliminary evaluations and as such are subject to continued review and evaluation.

The measures may be generally described as falling within four separate categories: runway use and flight routing; airport regulations and restrictions; aircraft operating procedures; and facility development alternatives. In each case, one or more alternatives has the potential to reduce noise from aircraft using Sky Harbor International Airport. But, there are normally disadvantages to each measure evaluated, i.e., none have been found to be of unqualified benefit to all concerns.

The format of the following descriptions is as follows. The measure is briefly described as it would be used. Its effect on the airport noise pattern, airfield and airspace capacity considerations, safety, air service and environmental concerns, as well as economic factors are assessed. Where applicable, graphic illustrations or exhibits of the associated noise pattern or procedure are provided. The noise pattern may be compared with the contours of unabated noise exposure for 1992 conditions. A preliminary assessment of feasibility is then provided, followed by preliminary strategies for implementation of the measure.

Following the evaluations of each measure, three scenarios of recommended further evaluation were prepared. The scenarios are presented in Chapter Five, Noise Abatement Alternatives. Planning Advisory Committee members and participants in an Aviation Technical Conference, held October 28, 1987, were provided the opportunity to review and comment on the evaluations and scenarios. These comments are extensive and will be included with the Noise Compatibility Program documentation prepared for submission to the FAA at the conclusion of the study.

EVALUATION OF INDIVIDUAL ALTERNATIVE NOISE ABATEMENT MEASURES

ALTERNATIVE 1 - ROTATIONAL RUNWAY USE (BALANCED FLOW)

Description: This measure would result in an evenly distributed distribution of traffic off the ends of all runways. In theory, this is now the prescribed procedure for Sky Harbor Airport under the terms of an agreement between the Mayors of the Cities of Phoenix and Tempe which calls for a 50-50 distribution of departure traffic to the east and west of the airport during all periods of the day. Based on runway use percentages and counts of instrument departure flight strips, however, this equalized distribution has not yet been fully achieved.

Effect on:

Noise Pattern: Unabated condition.

Airfield Capacity: No change.

Airspace/ATC: Continuing monitoring of traffic flows and counts.

Safety: No change.

Air Service: No change.

Environment: No change.

Costs: No change.

Assessment of Feasibility: In place. The measure could be strengthened by obtaining agreements from all user carriers that pilots will not request, for reasons of convenience, the use of runways other than those assigned by ATC.

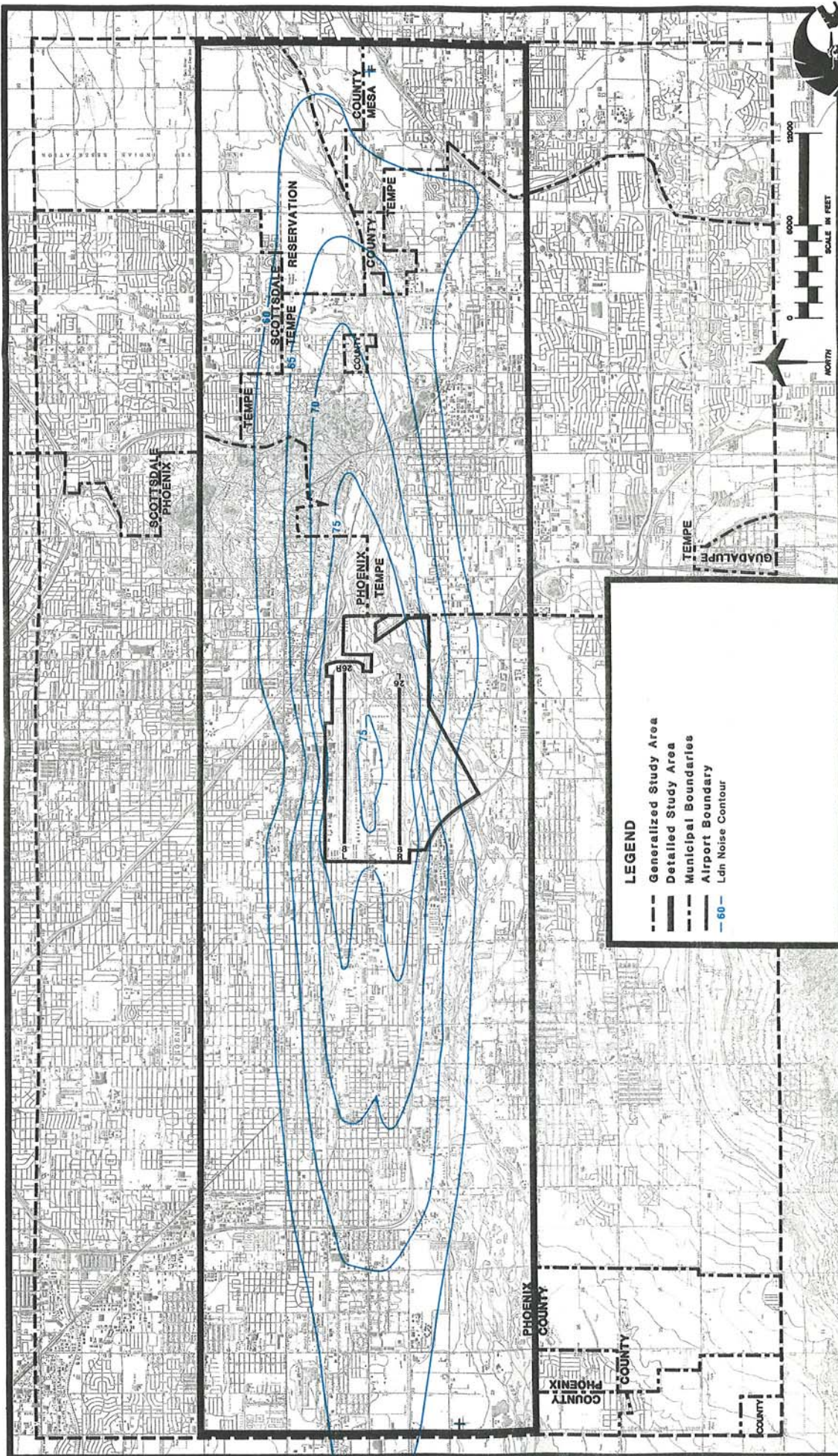
Implementation Strategies: Prepare a letter of agreement between the user carriers, the ATCT and the airport to ensure that operators will use those runways assigned by ATCT in pursuit of the equalization of flight distribution to both the east and west of the airport. The ATA and air carriers have a policy not to become signatory parties to "formal runway use programs", although they may endorse "informal runway use programs".

ALTERNATIVE 2 - PREFERENTIAL RUNWAY USE (EAST FLOW)

Description: Designate Runways 8R and 8L as calm wind runways for use when winds are less than three knots from any direction. The wind observation percentages at Sky Harbor airport are as follows:



ALTERNATIVE 1
ROTATIONAL RUNWAY USE



	<u>Calm</u>	<u>East</u>	<u>West</u>	<u>Total</u>
Day	23.1	39.55	37.35	100.0
Night	37.7	42.10	20.20	100.0

The effect of designating east flow as preferred will result in 62.65 percent of all daytime and 79.2 percent of all nighttime traffic departing to the east and approaching from the west (Source: NOAA Wind, Ceiling, Visibility Data).

Effect on:

Noise Pattern: Technique shifts the noise pattern to the east, providing a decrease of 2-3 Ldn over areas west of the airport and an increase of 1-2 Ldn over areas east of the facility. The number of departure overflights east of the airport would increase by 29 percent, while the departures to the west would be reduced by the same amount. The number of persons within the 75 Ldn contour would be reduced significantly, while the overall number within the 65 contour would decrease from 34,087 to 30,620 (a reduction of 6,694 to the west and an increase of 3,227 to the east).

Airfield Capacity: The required overflight of the Rio Salado NDB by traffic departing on Runways 8R and 8L constrains the flow of traffic to the east. Any measure which increases this flow for departures would further increase delays by aircraft awaiting release for departure during peak periods. Aircraft using the north side gates will encounter increased taxi times, while those using south gates will have reduced taxi times. General aviation will have reduced taxiing.

Airspace/ATC: Again, the more frequent overflight of the NDB may result in airspace delays resulting from the necessity to maintain required separations between aircraft of varying types and speeds.

Safety: No effect on operating safety is anticipated, except on very hot days when large, heavily-loaded aircraft will require the full length of the runway for takeoff and are unable to accept tailwinds of any speed. In this case, those aircraft may require opposite-flow departures.

Air Service: No effect is anticipated.

Environment: Other than adjustments in the noise pattern, no changes in environmental conditions are expected under this operating scheme.

Costs: Slightly increased costs for traffic departing to the west coast and slightly decreased costs for traffic departing to easterly destinations.

Feasibility of Implementation: An existing agreement between the Mayors of the Cities of Tempe and Phoenix calls for the equalization of traffic between east and west flows. The implementation of this measure will directly contradict the spirit and letter of that agreement.

Implementation Strategies: ATCT designates Runways 8R and 8L as the calm wind runways at the request of the airport.

ALTERNATIVE 3 - PREFERENTIAL RUNWAY USE (WEST FLOW)

Description: Designate Runways 26R and 26L as calm wind runways for use when winds are less than three knots from any direction. The wind observation percentages at Sky Harbor airport are as follows:

	<u>Calm</u>	<u>East</u>	<u>West</u>	<u>Total</u>
Day	23.1	39.55	37.35	100.0
Night	37.7	42.10	20.20	100.0

The effect of designating west flow as preferred will result in 60.45 percent of all daytime and 57.9 percent of all nighttime traffic departing to the west and approaching from the east (Source: NOAA Wind, Ceiling, Visibility Data).

Effect on:

Noise Pattern: Technique slightly shifts the noise pattern to the west, providing a decrease of less than 1 Ldn over areas east of the airport and an increase of less than 1 Ldn over areas west of the facility. The number of departure overflights west of the airport would increase by 20 percent, while the departures to the east would be reduced by the same amount. The number of persons within the 75 Ldn contour would increase slightly, while the number within the 65 contour would decrease from 34,087 to 33,243 (an increase of 418 to the west and a decrease of 816 to the east).

Airfield Capacity: The technique would result in little change to airfield capacity. ATCT has indicated that, given the layout of the airport, it can work traffic in an east flow as easily as a west flow. Aircraft operating from the gates on the north side of the airport should experience decreased taxi times. Aircraft operating from the south side gates will encounter increased taxi times. General aviation will encounter increased taxi times.

Airspace/ATC: It is expected that the measure would result in no change in airspace capacity and control efficiencies.

Safety: No derogation of safety criteria is anticipated other than on very hot days when heavily loaded aircraft will require the full length of the runway for take off and cannot accept any tailwind component. In this case, heavy aircraft may require opposite-flow departures.

Air Service: No positive or negative effect is anticipated on air service.

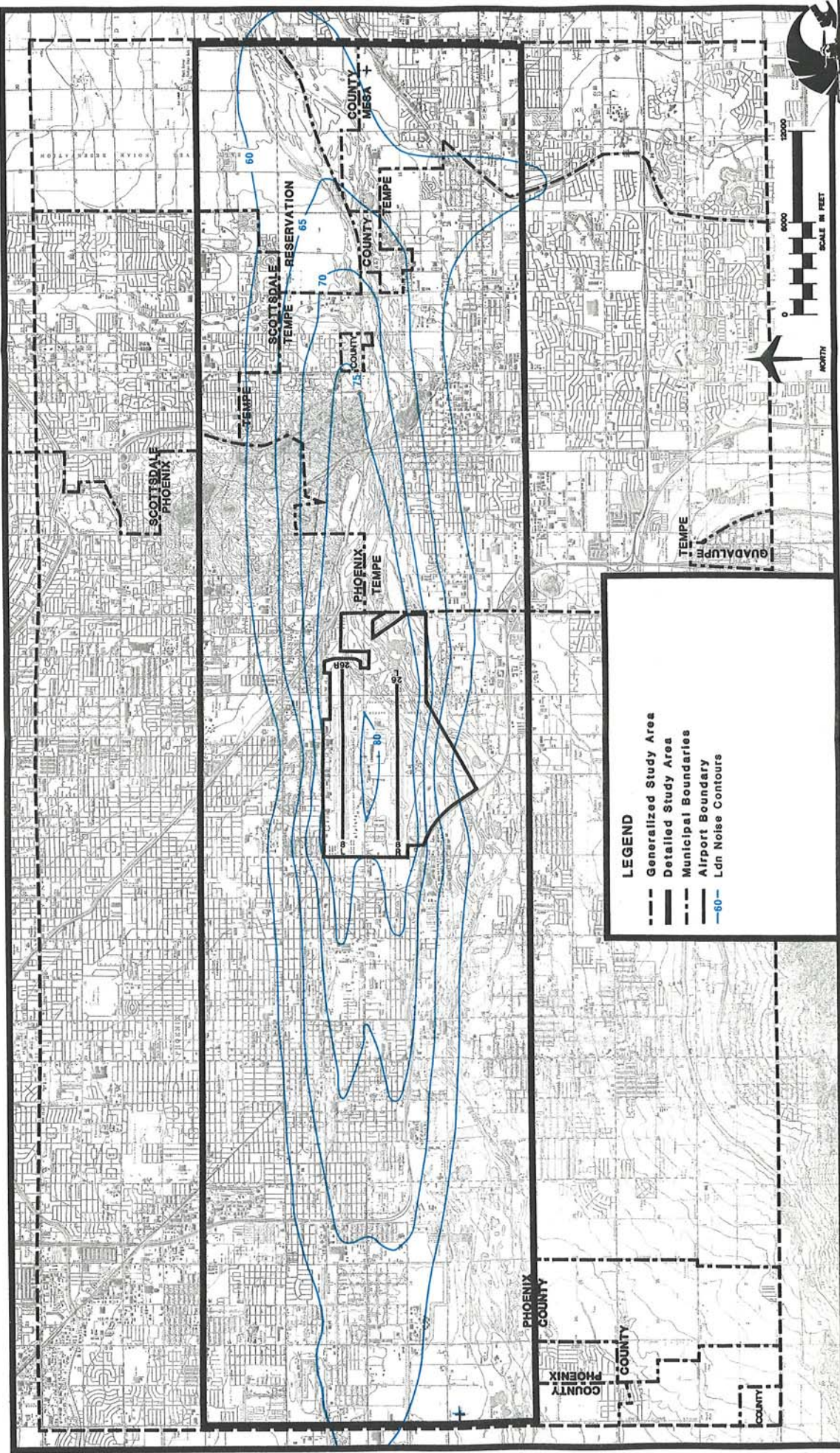
Environment: Other than minor adjustments in the noise pattern, no environmental consequences are anticipated as a result of this measure.

Costs: Slightly greater costs for aircraft operating to the east, balanced by slightly reduced costs for aircraft operating to west coast destinations.

Assessment of Feasibility: Since the measure increases the number of persons impacted by aircraft noise within both the significant and severe levels, the implementation of the measure is considered inadvisable.

Implementation Strategies: ATCT designates Runways 26R and 26L as calm wind runways at the request of the airport.

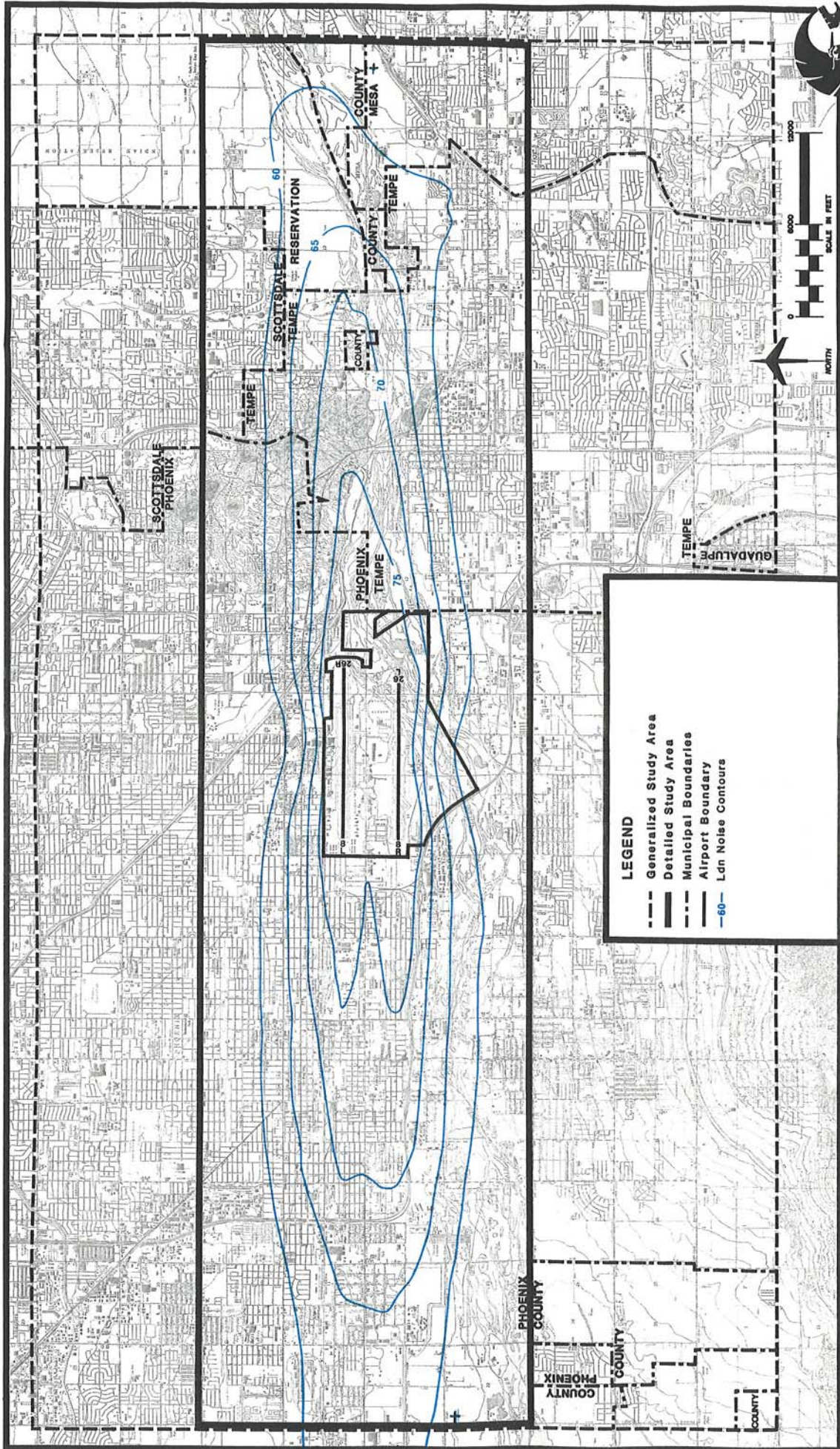
Alternative 2
PREFERENTIAL EAST FLOW



- LEGEND**
- Generalized Study Area
 - Detailed Study Area
 - - - Municipal Boundaries
 - Airport Boundary
 - 60— Ldn Noise Contours



Alternative 3
PREFERENTIAL WEST FLOW



LEGEND

- Generalized Study Area
- Detailed Study Area
- Municipal Boundaries
- Airport Boundary
- 60— Ldn Noise Contours



ALTERNATIVE 4 - RUNWAY 26R/L DEPARTURE TURN TO 243 DEGREE HEADING

Description: On IFR jet departures from either Runway 26R or 26L, turn jet aircraft to a heading of 243 degrees to follow the course of the Salt River southwest of the airport. Upon reaching a point 13 DME from the Salt River VORTAC, turn to COOPR, MOBIE, and STANFIELD SID headings. BUCKEYE and PAYSO SID departures turn right to intercept a 262 radial to the Buckeye VORTAC and a 072 radial from the Buckeye VORTAC respectively.

Effect on:

Noise Pattern: The procedure would shift the noise pattern to the south by 15 degrees, resulting in the significant decrease of the number of persons within each of the contours west of the airport. The channelization of departure traffic over the compatibly-used river bed will result in a reduction in the number of persons within the 65 Ldn contour west of the airport from 24,854 to 12,722. The number of persons falling within the 75 Ldn contour is reduced by approximately 50 percent.

Airfield Capacity: Airfield capacity may be slightly reduced by the measure due to the necessity to assure visual separations between aircraft turning and climbing at different rates from parallel runways. Increased separation requirements would result in slightly increased ground delays. These would not be as great as those encounter under Runway 8 flow conditions.

Airspace/ATC: ATCT does not feel this alternative has merit for all departures. The procedure would create additional workload, especially for Local Controllers who must separate aircraft off of two runways which are operating under both IFR and VFR and go in different directions based on size and speed. The use of a navigational aid to assist IFR departures may be warranted. Such a navaid may be a TVOR located atop the terminal building or a NDB located southwest of the airport. The relocation of departure tracks will direct traffic toward the downwind arrival flows from the west coast, which may need to be adjusted to the south.

Safety: If conducted at an altitude above 400 feet AGL, the turn should not cause a derogation of safety. The use of headings after a turn may result in decreased separations between aircraft. TRACON and ATCT are concerned about the separation of traffic turning across each other after reaching the 13 DME location (south turns from Runway 26R and north turns from Runway 26L).

Air Service: No significant impact is anticipated.

Environment: Other than the shifting of noise and departure pollutants to the south, no significant environmental consequences are anticipated.

Costs: Aircraft using the Stanfield or Mobie SIDs will benefit by decreased flight times (40 seconds per departure), while those using the CoopR or Payso SIDs will encounter a 40 second increase in flight times to their departure gates. Aircraft flying the Buckeye SID would face increased flight times of approximately 15 seconds per departure. For the year 1992, these adjustments will result in a net operating cost increase of \$600,000 in 1986 dollars.

Assessment of Feasibility: The measure provides significant benefits which justify adjustments to procedures.

Implementation Strategies: Revise and publish new SIDs for Runway 26R/L departures. Conduct airspace evaluations as necessary to assure proper separations between approach and departure traffic. Install, if desirable and feasible, a TVOR or NDB to assist the maintenance of the desired heading.

ALTERNATIVE 5 - RUNWAY 26L DEPARTURE TURN TO 243 DEGREE HEADING

Description: On IFR jet departures from Runway 26L, turn aircraft to a heading of 243 degrees to follow the course of the Salt River southwest of the airport. Upon reaching a point 13 DME from the Salt River VORTAC, turn to COOPR, MOBIE, and STANFIELD SID headings. BUCKEYE and PAYSO SID departures turn right to intercept a 262 radial to the Buckeye VORTAC and a 072 radial from the Buckeye VORTAC respectively. Runway 26R departures maintain runway heading to 13 DME.

Effect on:

Noise Pattern: The turn from Runway 26L would split the noise pattern west of the airport, resulting in the significant decrease in the number of persons within each of the contours west of the airport. The channelization of Runway 26L departure traffic over the compatibly-used river bed will result in a reduction in the number of persons within the 65 Ldn contour west of the airport from 24,854 to 19,461. The number of persons falling within the 75 Ldn contour is reduced by approximately 80 percent.

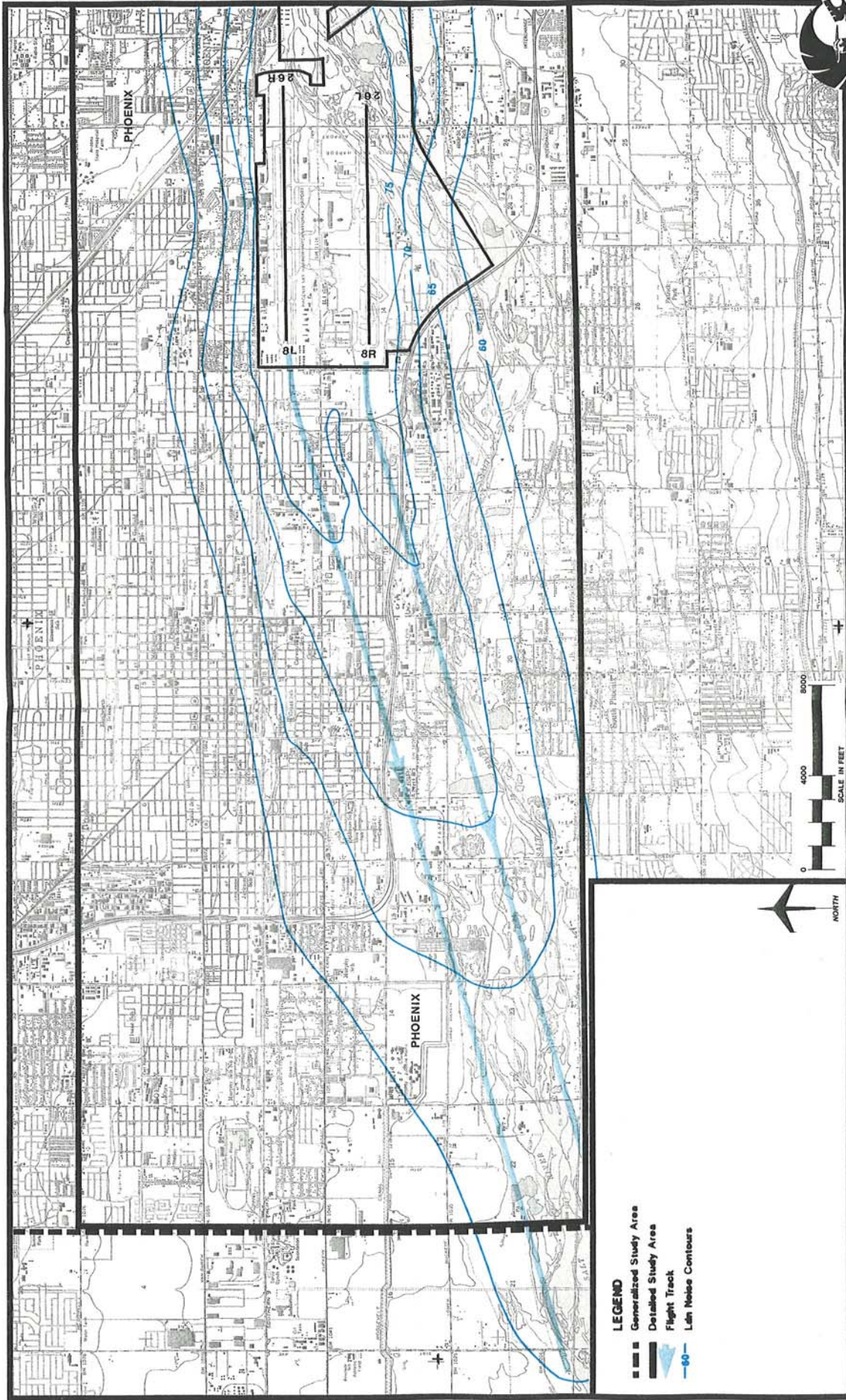
Airfield Capacity: Airfield capacity may be slightly increased by the measure due to the increased separation provided by the divergence between the two initial tracks to the west. This is particularly true when south-turning traffic is departing Runway 26L and straight-out or north-turning traffic is departing Runway 26R.

Airspace/ATC: Again, the enhanced separation between aircraft departing to the west will result in enhanced utility of airspace and more efficient air traffic control when the turns to enroute headings are divergent. The installation of a navigational aid to provide course guidance would further enhance the measure. Such a navaid may be a TVOR located atop the terminal building or a NDB located southwest of the airport. ATCT feels this procedure has merit if two conditions are met: 1) additional taxiways connecting the north and south sides of the terminal complex must be constructed to allow north turning departures to use the north runway and south or west turning departures to use the south runway and make the turn, and 2) an alternative routing for VFR departures must be found which does not conflict with arrivals from Ahwatukee (general aviation traffic).

Safety: If conducted at an altitude above 400 feet AGL, the turn should not cause a derogation of safety. Concerns for the ability of aircraft on the heading to meet minimum vectoring altitudes has been expressed, but altitudes along the indicated heading do not appear to differ significantly from those of the current SIDs to the west.

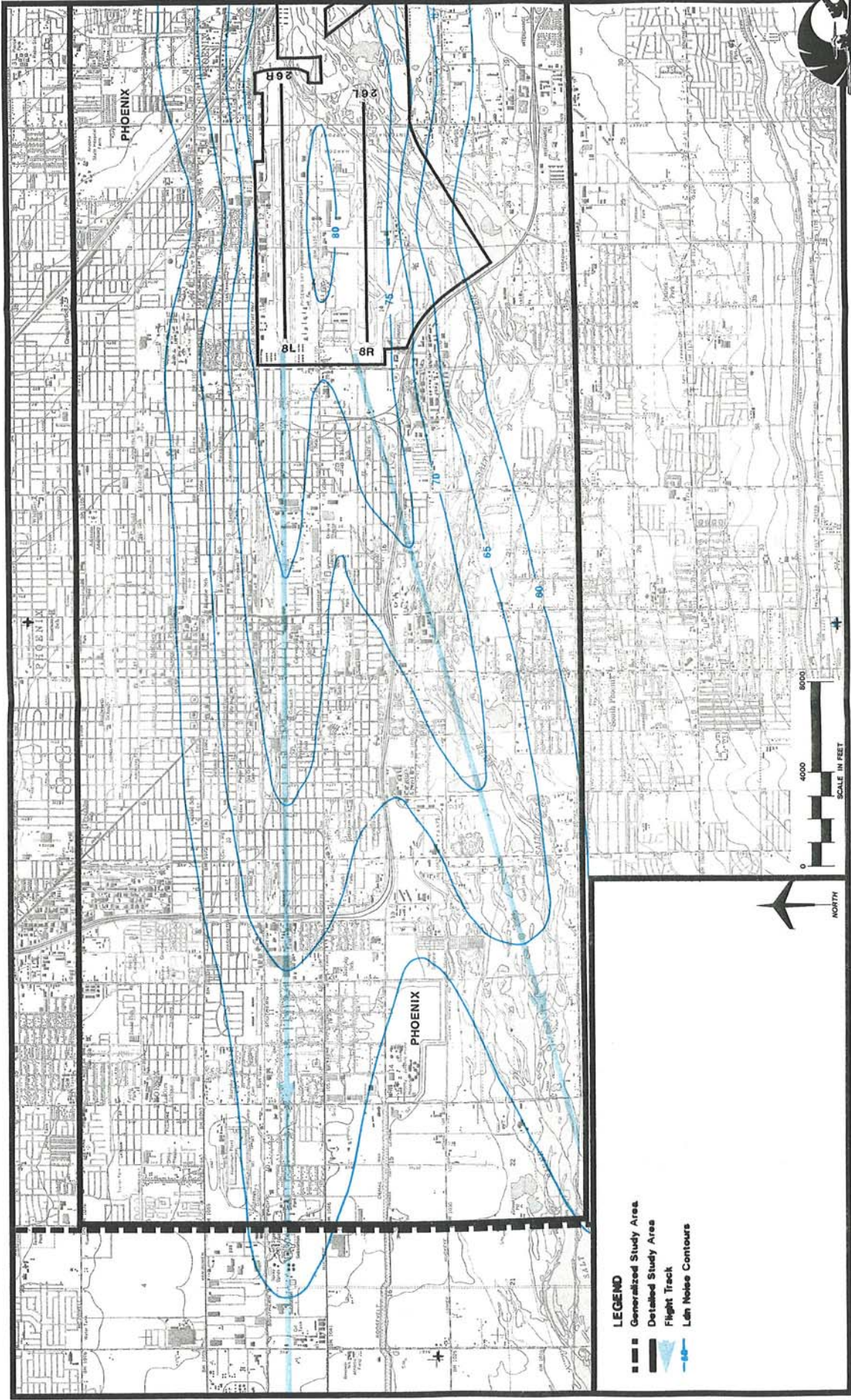
Air Service: No significant impact is anticipated.

Environment: No significant environmental consequences are anticipated.



**Alternative 4
 RUNWAY 26R/L TURN
 TO 243 HEADING**





Alternative 5
 RUNWAY 26L TURN
 TO 243 HEADING



- LEGEND**
- ▬ Generalized Study Area
 - ▬ Detailed Study Area
 - ▬ Flight Track
 - Ldn Noise Contours



Costs: Aircraft using the Stanfield or Mobie SIDs will benefit by decreased flight times (40 seconds per departure), while those using the Coopr or Payso SIDs will encounter a 40 second increase in flight times to their departure gates. Aircraft flying the Buckeye SID would face increased flight times of approximately 15 seconds per departure. For the year 1992, these adjustments will result in a net operating cost increase of \$430,000 in 1986 dollars. Costs of taxiway construction will be delineated in the on-going master plan study.

Assessment of Feasibility: The measure provides significant benefits so that every effort should be given to assure its implementation if the objections to turns from both runways cannot be overcome. Its benefits justify considerable adjustments to procedures.

Implementation Strategies: Revise and publish new SIDs for Runway 26L and 26R takeoffs. Conduct airspace evaluations as necessary to assure proper separations between approach and departure traffic. Install, if desirable and feasible, a TVOR or NDB to assist the maintenance of the desired departure heading. Expedite construction of a second crossover taxiway at the east end of the airport to provide multiple crossing points between the north and south sides of the terminal complex.

ALTERNATIVE 6 - 1 DME DEPARTURE TURNS FROM RUNWAYS 8R/L

Description: Runway 8L departures proceed runway heading to intercept the SRP 265 radial; Runway 8R departures turn left to heading 070 to intercept the same radial. After intercepting the radial, turn left or right at 1 DME west of SRP and resume assigned SID. This measure has been field tested and is a proposed response to meeting the agreement between the Mayors of Tempe and Phoenix to reduce noise levels east of the airport.

Effect on:

Noise Pattern: Since the procedure does not overfly the Rio Salado NDB, the noise pattern is more centered over the river, decreasing Ldn levels in north Tempe and increasing sideline noise in Tempe south of the river. The movement of the turn point to a 1 DME location will result in turns which take place approximately one mile east of their current locations. Thus, aircraft noise will be relocated to the east. Upon crossing the southern boundary of the study area, the aircraft will be approximately 300 feet higher and 3-6,000 feet further east than under current conditions. The procedure would result in reduction in population within the 65 Ldn contour east of the airport from 9,233 to 8,532 and the reduction by about 50 percent of the population within the 70 Ldn contour. Both effects are the result of moving traffic to an alignment more centered over the riverbed.

Airfield Capacity: Delays should be slightly increased as a result of the co-location of departures from both runways along a single departure radial, but the impacts should not be noticed except in high peak periods.

Airspace/ATC: Co-location of all Runway 8R/L high performance departures on a single radial will result in slightly reduced airspace capacity. TRACON indicates that the measure will provide greater consistency in track utilization than the use of the NDB departure procedure.

Safety: No impact on operational safety is anticipated.

Air Service: No impact on air service is anticipated.

Environment: No environmental consequences other than the minor shifting of noise levels is anticipated.

Costs: Increased distance for all departures by approximately 0.3 flight miles. This results in a total cost increase of \$94,000 in 1986 dollars for the forecast 1992 operations and fleet mix.

Assessment of Feasibility: The procedure was tested in late 1986 and found to be feasible from an airspace and operational viewpoint.

Implementation Strategies: Revise SIDs for Runways 8R and 8L to formalize the procedure.

ALTERNATIVE 7 - EXTEND RUNWAY 8R/L DEPARTURES STRAIGHT OUT TO PRICE ROAD (VORTAC)

Description: All Runway 8R and 8L departures fly runway heading until reaching Price Road (a position lateral to the VOR) prior to turning on assigned SIDs. The measure is virtually mirrors the procedure now in place for Runway 26R/L departures.

Effect on:

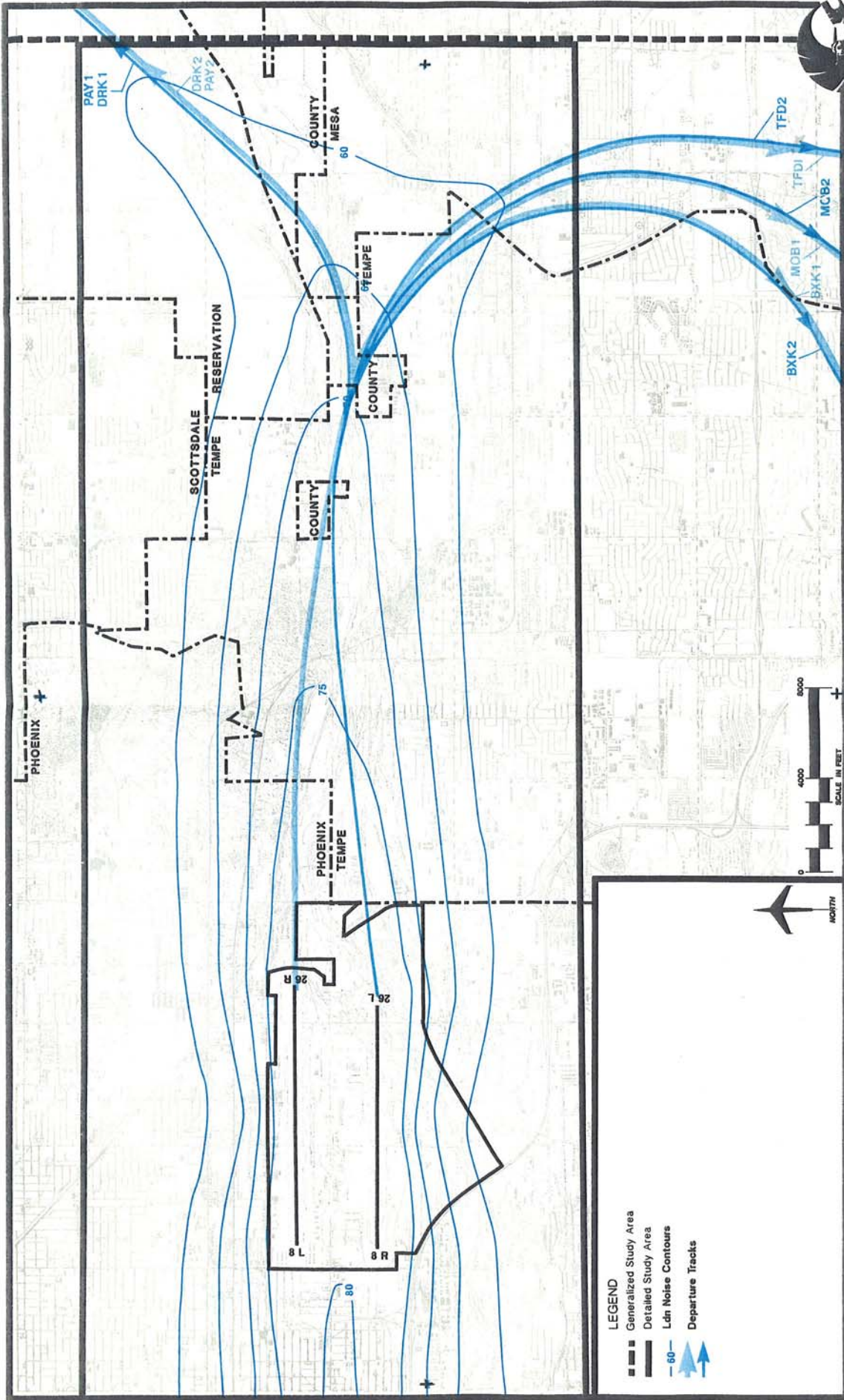
Noise Pattern: This measure will result in an increase in noise by 0-5 Ldn south of the river and a reduction in noise north of the river by 0-2 Ldn. One area of eastern Tempe directly under the existing turning tracks south of the river would experience noise reductions of approximately 2 Ldn. A large area of northwest Mesa would fall within the 60 Ldn contour. The population within the 65 Ldn contour would increase from 9,233 to 14,030.

Airfield Capacity: Capacity would likely be enhanced by the elimination of the requirement to overfly the NDB which would be incorporated into this measure. Consequently, delay times could be expected to decrease in comparison to current operating procedures.

Airspace/ATC: Enhanced airspace capacity and might be expected as a result of the elimination of convergence between departures from Runway 8R/L. Implementation would require restructuring of the Williams airspace, potential redefinition of MOA 1, and redesign of operating procedures at both Williams and Sky Harbor.

Safety: Airspace conflicts between traffic at Sky Harbor, Williams AFB, and Falcon Field, as well as the Chandler VFR flyway, will decrease safety margins if the measure is implemented.

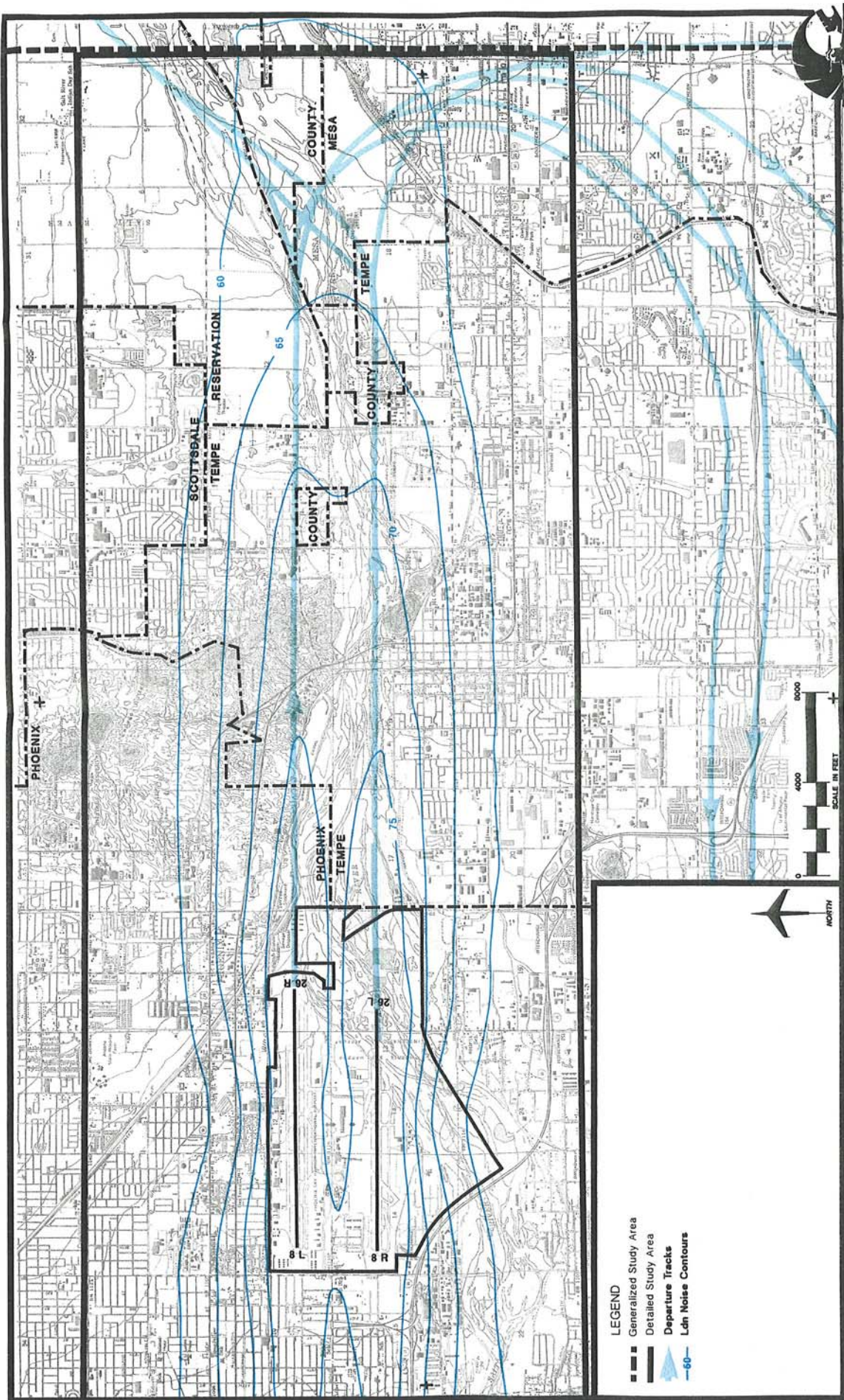
Air Service: No significant change.



Alternative 6
I DME DEPARTURE

LEGEND

- Generalized Study Area
- ▬ Detailed Study Area
- 60 — Ldn Noise Contours
- ➡ Departure Tracks



LEGEND

- Generalized Study Area
- Detailed Study Area
- ▲ Departure Tracks
- Ldn Noise Contours



Alternative 7
 RWY 8R/L DEPARTURES
 STRAIGHT TO PRICE ROAD

Environment: Other than the redistribution of the noise pattern, no significant environmental consequences are anticipated.

Costs: The costs for all operators using the SIDs for easterly departure would increase with the implementation of this measure. Departures to the west may expect increased flight times of approximately 2.2 minutes each, those to the south would be increased by approximately 1.4 minutes, and those to the northeast would increase by 0.4 minutes. Using forecast 1992 operations and fleet mix, the annual operating cost increase for the procedure is \$561,000 in 1986 dollars. If the measure were implemented only during low activity times at Williams AFB, the cost would be \$64,000 for 1992 operations and fleet mix in 1986 dollars.

Assessment of Feasibility: While the measure will result in a redistribution of noise impacts, the benefits of reduction within the contours are minimal at best. The potential for conflicts in airspace utilization, taken in conjunction with the minimal noise benefits do not warrant the measures implementation.

Implementation Strategies: FAA conducts airspace evaluation and restructures airspace allocations; revise SIDs to redefine departure routings.

ALTERNATIVE 7A - EXTEND 1 DME DEPARTURE PROCEDURE (ALTERNATIVE 6) TO VORTAC

Description: Runway 8L departures proceed runway heading to intercept the SRP 265 radial; Runway 8R departures turn left to heading 070 to intercept the same radial. After intercepting the radial, turn left or right at SRP VORTAC and resume assigned SID.

Effect on:

Noise Pattern: Since the procedure does not overfly the Rio Salado NDB, the noise pattern is shifted to the south, more centered over the river, decreasing Ldn levels in north Tempe and increasing sideline noise in Tempe south of the river. The movement of the turn point to the VORTAC location will result in turns which take place approximately two miles east of their current locations. Crossing the southern boundary of the study area, the aircraft will be approximately 900 feet higher and 7-10,000 feet further east than under current operating conditions. The procedure would reduce the population within the 65 Ldn contour east of the airport from 9,233 to 8,739 and the reduction by approximately 50 percent of the population within the 70 Ldn contour.

Airfield Capacity: Delays should be slightly increased as a result of the co-location of departures from both runways along a single departure radial, but the impacts should not be noticed except in high peak periods.

Airspace/ATC: Co-location of all Runway 8R/L high performance departures on a single radial will result in slightly reduced airspace capacity. The relocation of traffic further east than the VORTAC location is of concern relative to conflicts between Sky Harbor and Williams AFB traffic, as well as the Chandler flyway location, a VOR approach to Scottsdale, and airspace at Falcon Field.

Safety: No impact on operational safety is anticipated, but conflicts between traffic using the various airports will reduce safety margins.

Air Service: No impact on air service is anticipated.

Environment: No environmental consequences other than the minor shifting of noise levels is anticipated.

Costs: Increased cost for all departures by approximately 0.9 flight miles. This results in a total cost decrease of \$282,000 in 1986 dollars for the forecast 1992 operations and fleet mix.

Assessment of Feasibility: Given the potential for conflict between aircraft using the two largest facilities (Sky Harbor and Williams AFB), the procedure does not appear to be feasible for use during period of high activity at Williams AFB. However, it implemented during low activity periods (nights and weekends), the procedure may be useful in reducing total noise impacts, but will transfer noise over areas not currently subject to higher Ldn levels. Consequently, its implementation may encounter opposition from the City of Mesa.

Implementation Strategies: Revise SIDs for Runways 8R and 8L to formalize the procedure. Optionally, formal use agreements between TRACON, the sponsor and the users may implement the program for Williams low activity hours.

ALTERNATIVE 8 - 5/7 DME AT NIGHT FROM RUNWAY 8R/L

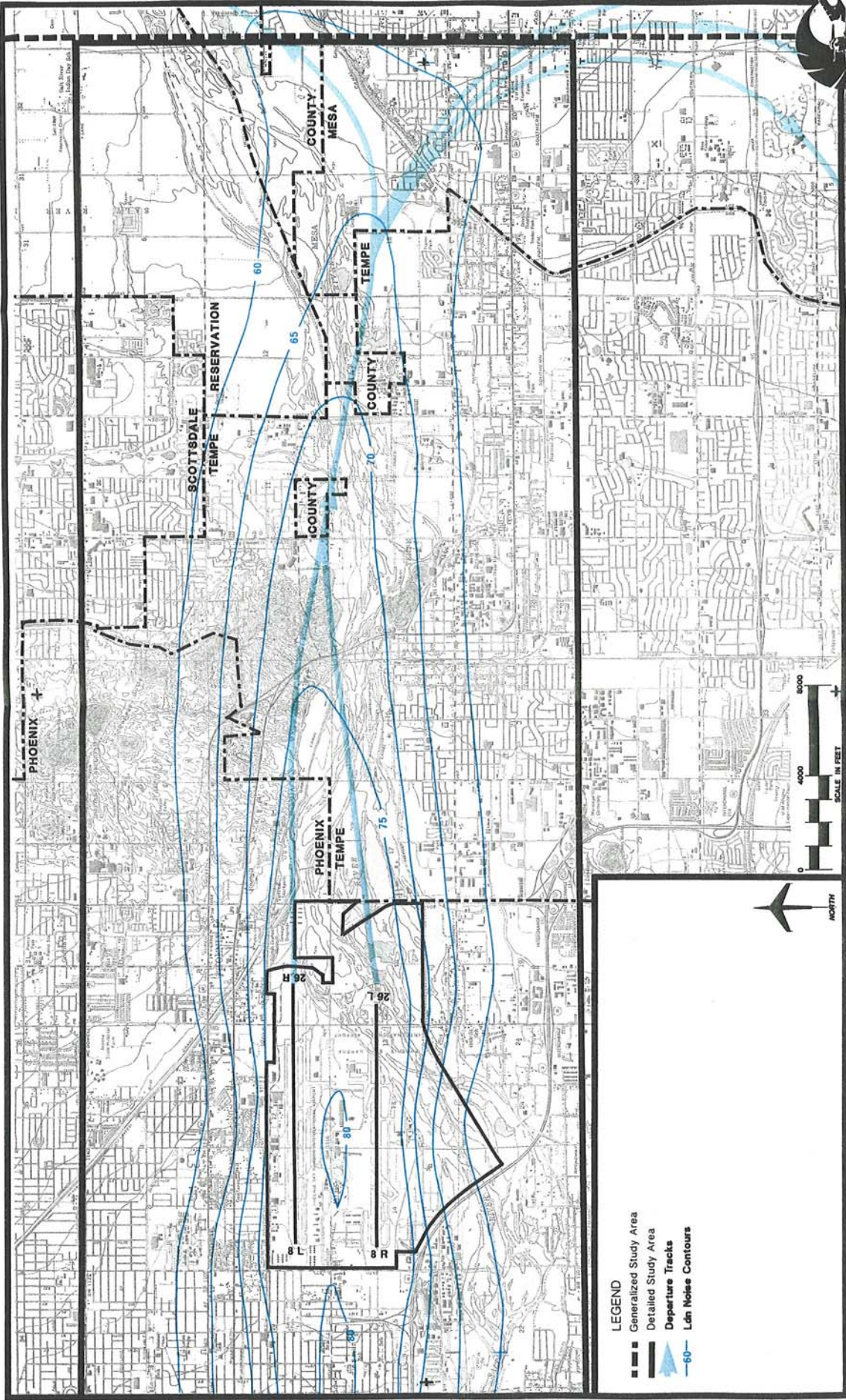
Description: During those periods of low activity at Williams AFB, generally defined as 9 p.m. to 6 a.m., reroute traffic departing from Runway 8R/L on the Stanfield, Mobie, and Buckeye SIDs northeast of the VOR prior to turns to intercept the SID headings. Route traffic over the NDB to intercept a 052 radial from the Salt River VOR, fly that radial until reaching a position 5 mile DME northeast of the VORTAC and turn right to fly a 7 mile DME arc to intercept the 180 radial to the Stanfield VOR, the 200 radial from the Salt River VOR and the 267 radial to the Buckeye VOR. As available, the procedure may also be used on weekends.

Effect on:

Noise Pattern: The measure will have no effect on the noise contours or on single event frequencies west of Scottsdale Road, nor will it significantly change population impacts within the 65 Ldn contour (129 more persons). East of Scottsdale Road, the measure will slightly stretch the 65 Ldn contour (by 1/4 mile) and stretches the 60 Ldn contour by 3/4 mile. These increases are over noise-compatible river bed. Also east of the airport, the 60 Ldn contour recedes to a position north of currently developed residential areas of eastern Tempe.

Airfield Capacity: The measure may result in small increases in delays during periods of heaviest use, but since the procedure is evaluated as a nighttime only measure, little impact on airfield capacity is anticipated.

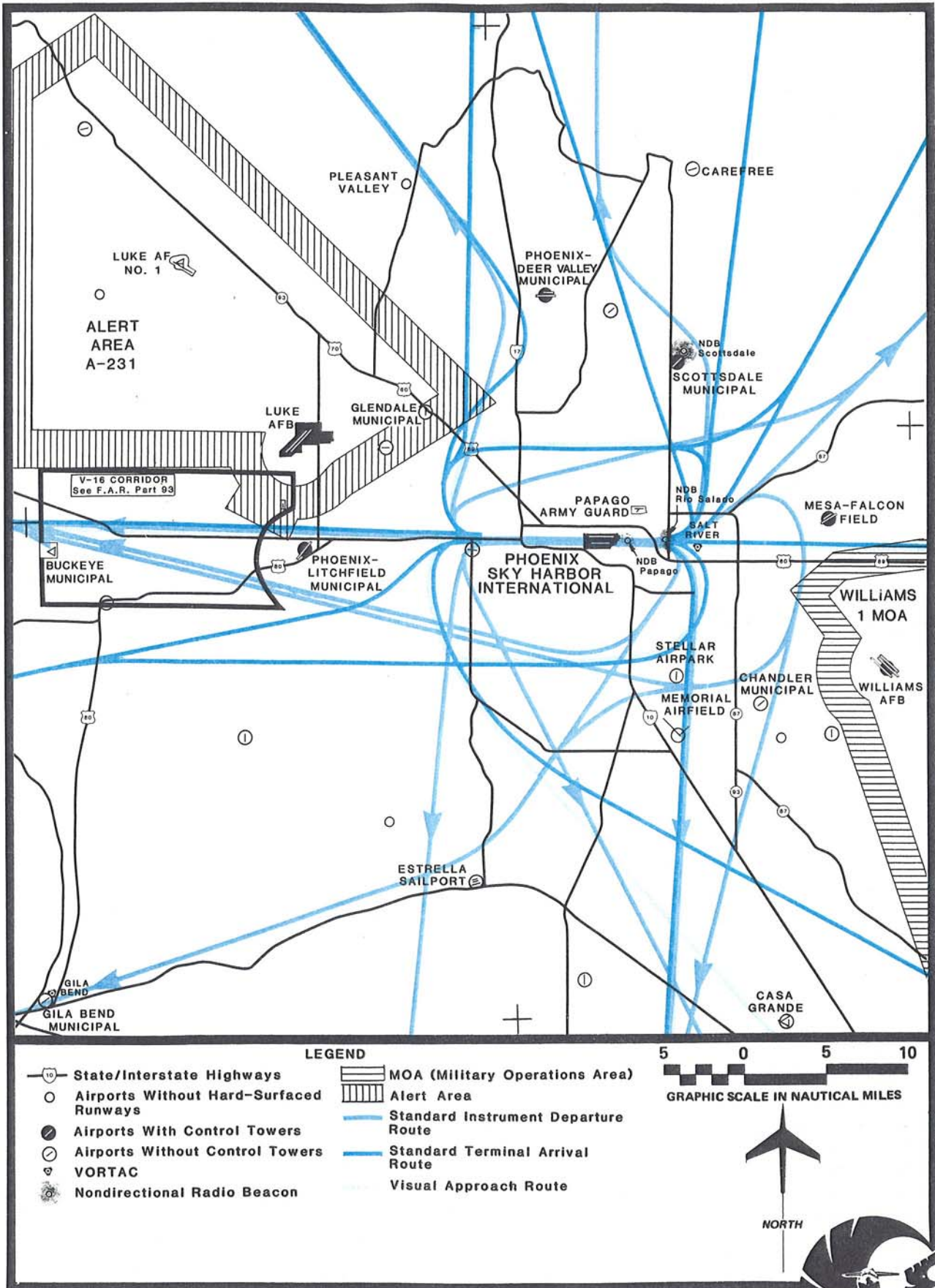
Airspace/ATC: Occasional conflicts with traffic at Williams AFB may be occur during nighttime training exercises. The procedure would, if implemented during the high activity hours, result in major airspace conflicts between operations at the two facilities. Occasional conflicts are possible with traffic from Falcon Field.



- LEGEND**
- Generalized Study Area
 - Detailed Study Area
 - ▲ Departure Tracks
 - 60— Ldn Noise Contours

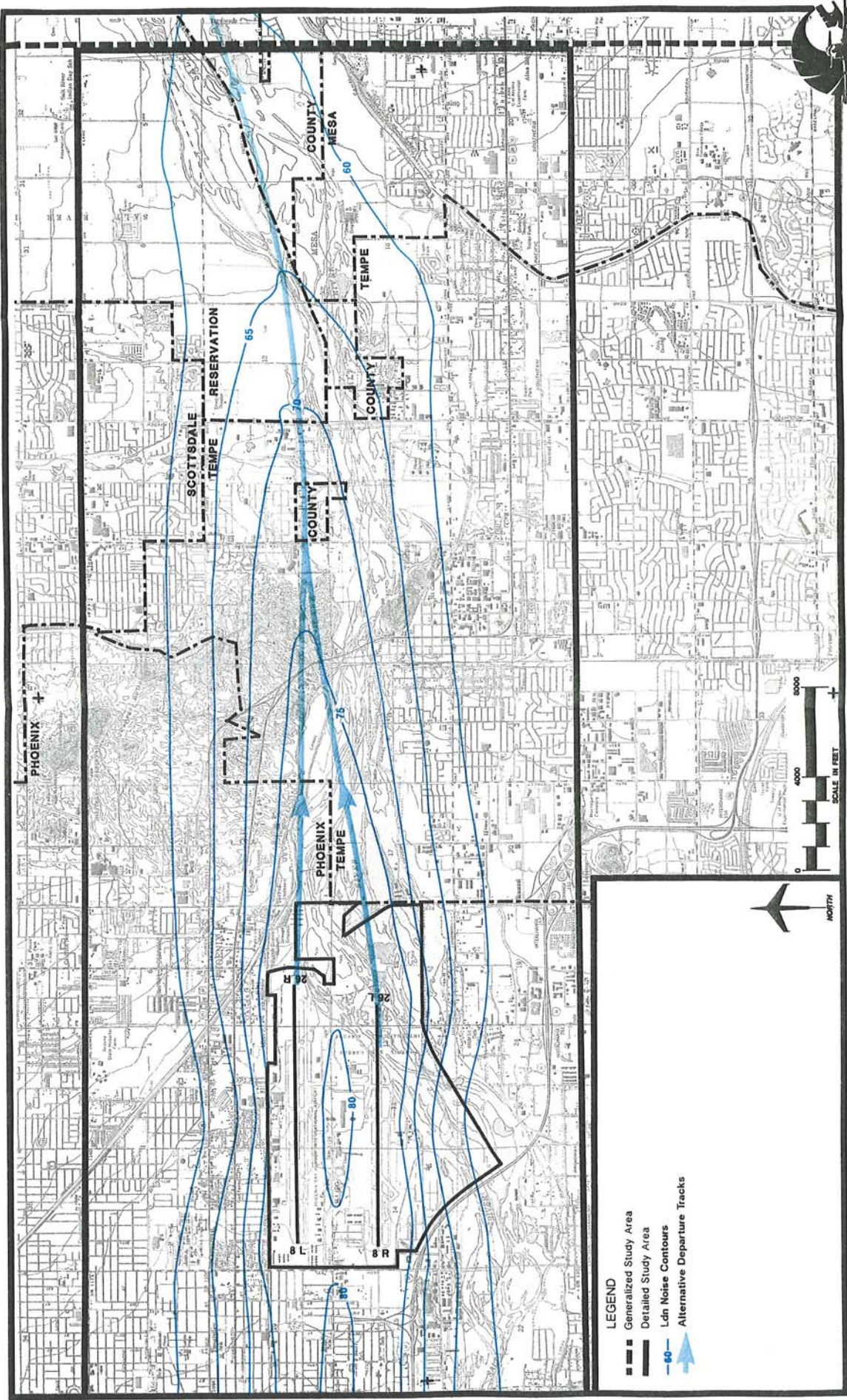
Alternative 7A
 EXTEND 1 DME
 DEPARTURE TO VOR





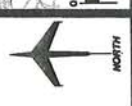
**Alternative 8
5 DME DEPARTURE ROUTES**





LEGEND

- Generalized Study Area
- Detailed Study Area
- Ldn Noise Contours
- Alternative Departure Tracks



Alternative 8
5 DME DEPARTURE
PROCEDURE



Safety: Each airport is under TRACON control, and if a Class I TCA is put in place in Phoenix, positive control may be established for separation of all aircraft. Pilots and ATA have expressed a concern relative to the difficulty of flying an "arc" procedure, particularly with a two man crew, and consequently, recommend that the arc portion of the description be dropped (this could be accomplished by defining radials to which to turn rather than prescribing an arc routing around the VORTAC).

Air Service: Slightly longer flight times for aircraft using the three south-turning SIDs may be expected.

Environment: Noise will be transferred to locations approximately 6-7 miles east of their current location, and will be reduced under areas of daytime activity.

Costs: Flight distances on the Stanfield SID would increase by 11.2 miles, by 12.7 miles on the Mobie SID, and by 18.1 miles on the Buckeye SID using this procedure. Based on 1992 forecasts of operations and fleet mix and the nighttime utilization percentages, the total annual estimated operational cost of effecting this measure is \$613,000.

Assessment of Feasibility: The procedure is effective in removing nighttime overflights from nearly all areas east of the airport (although flybys will remain for most areas). The measure accomplishes the reduction of lower altitude noise events without increasing them over large established populations. The measure would be procedurally improved by elimination of the arc requirement.

Implementation Strategies: FAA conducts airspace study, formal agreements for use between airport, FAA, and users should be developed, and TRACON procedures must be developed before initiation. An off peak SID for south turning departures could be developed.

ALTERNATIVE 9 - REDEFINE BUCKEYE SID FROM RUNWAY 8R/L

Description: Redefine the Buckeye SID to take advantage of the noise compatible corridor to the northeast of the airport along the Salt River. Buckeye SID traffic overflies the NDB, turns left and flies the SRP 030 radial to a location 8 DME northeast of the airport, at which point a left turn to fly a 10 DME arc is initiated. This arc is flown until the BXK 245 radial is intercepted for flight to the Buckeye VORTAC. This routing will take departure traffic directly over the top of Glendale Airport and Luke AFB, through the Luke A-231 Alert Area. If it is necessary to avoid the alert area, the arc may be flown to intercept the 210 radial from the Gila Bend VORTAC which is flown to intercept the SRP 258 radial.

Effect on:

Noise Pattern: No effect on contour pattern west of Scottsdale Road and virtually no changes in population within the 65 Ldn contour (a reduction from 9,233 to 9,097 persons). East of Scottsdale Road, the pattern will shift slightly to the north and east, resulting in reduced impacts south of the river and increased noise exposure over the river bed. The number of south-turning overflights would be reduced by 58 percent.

Airfield Capacity: Delays will be increased commensurate with the increased times required to provide separation between concentrated departures on the 030 SRP radial.

Airspace/ATC: The measure would result in major airspace conflicts with arrival traffic at Sky Harbor and would severely impact Luke AFB operations. Capacity of the airspace to accommodate the volume of traffic anticipated for future years will be reduced with the concentration of departure traffic along a single departure route.

Safety: The procedure may reduce safety margins by providing potential conflicts between approach and departure traffic over north Phoenix and Scottsdale.

Air Service: Increased ground delays for all traffic and increased flight times for those using the SID.

Environment: Reduced noise and pollutant concentrations southeast of the airport offset by increased levels northeast of the VORTAC.

Costs: Based on an increased flight time averaging 3.8 minutes per jet operation using the procedure, the increased operating cost is projected to be \$2,847,000 if the procedure is implemented. This does not include an estimated increase of 48 percent in ground time delay costs above baseline operating conditions.

Assessment of Feasibility: Although the thrust of the technique would result in significant perceived noise reduction south and southeast of the airport, the ability of the airspace and air traffic control to handle significantly greater percentages of the departure traffic along a single radial is questionable. If a separating divergence could be provided between the departures to the northeast, the measure may have greater potential for use.

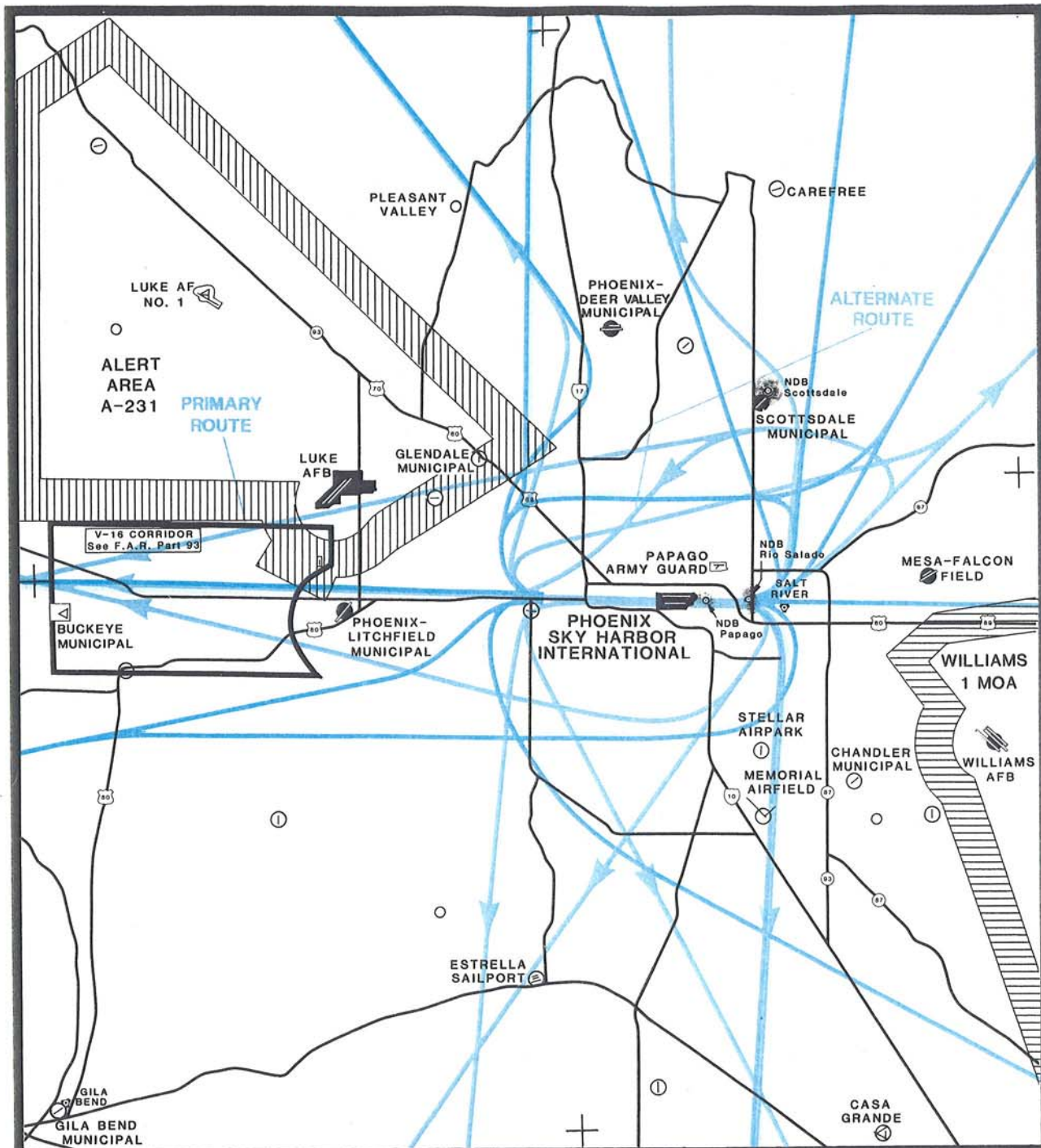
Implementation Strategies: Revise Buckeye SID for Runways 8R/L to reflect selected departure routing.

ALTERNATIVE 10 - ADJUSTMENT OF VISUAL FINAL APPROACHES

Description: This alternative assesses the relocation of visual final approaches from both the east and the west of the airport to determine the effect on the noise pattern. Visual approaches to Runways 26R/L were evaluated from beyond the VORTAC, while visual approaches to Runway 8R/L were extended two additional miles to the west.

Effect on:

Noise Pattern: The extension of visual approach base legs to locations of intercept with the final approach which are further from the airport will not result in any significant change to the noise contours. They will result in the relocation of single event overflight noise to both the east and the west. The differences in the noise levels from these overflights, if the relocation is by a distance of two miles will be approximately 2 dBA over the point of intercept. Approach noise is generally 10 or more decibels less than departure noise over the same distance.



LEGEND

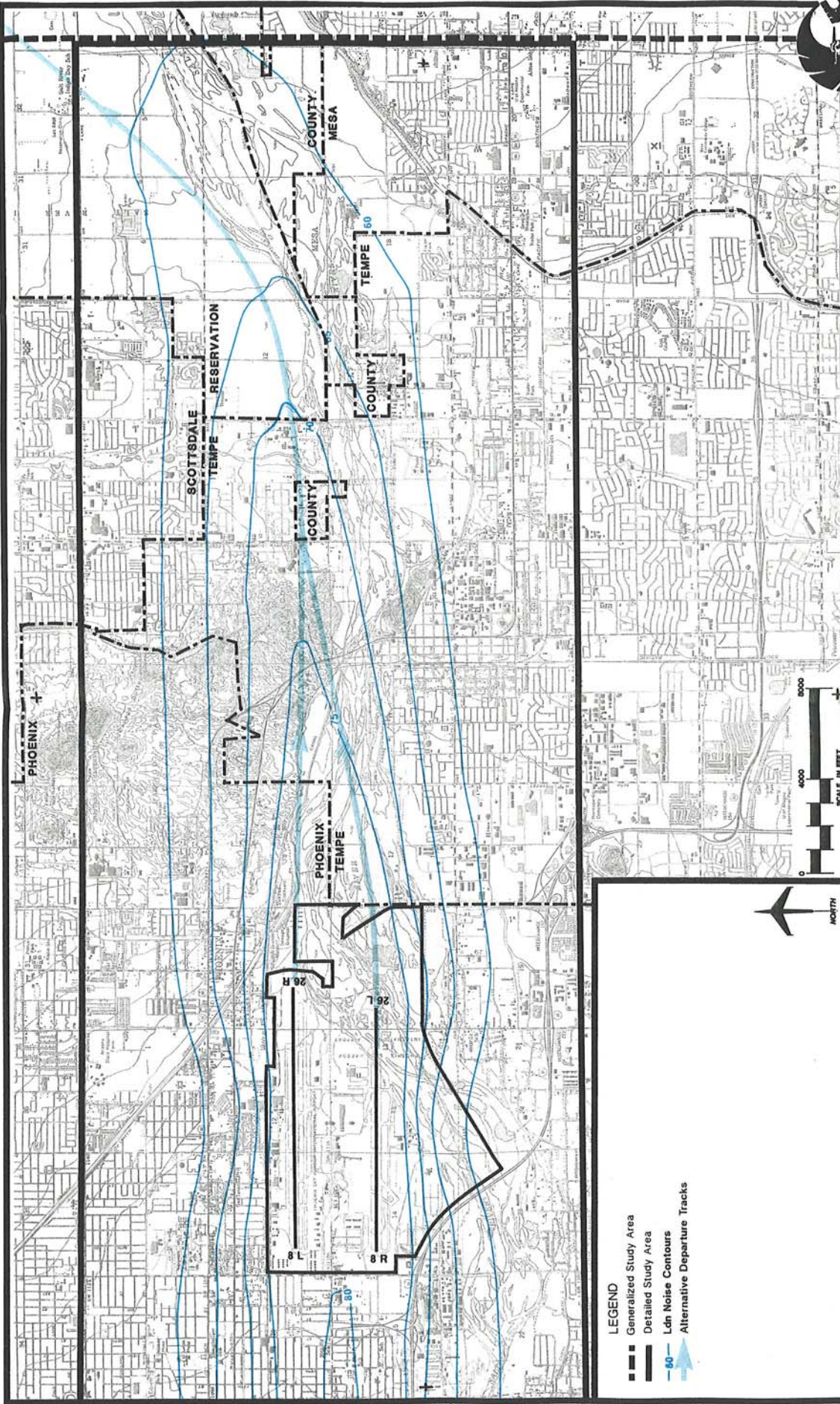
State/Interstate Highways	MOA (Military Operations Area)
Airports Without Hard-Surfaced Runways	Alert Area
Airports With Control Towers	Standard Instrument Departure Route
Airports Without Control Towers	Standard Terminal Arrival Route
VORTAC	Visual Approach Route
Nondirectional Radio Beacon	

5 0 5 10
GRAPHIC SCALE IN NAUTICAL MILES

NORTH

**Alternative 9
REDEFINED BUCKEYE
DEPARTURE ROUTE/RWY 8R/L**





Alternative 9
 REDEFINE BUCKEYE
 DEPARTURE SID



Airfield Capacity: Reduced airfield capacity due to increased in trail separation requirements and delays associated with that separation.

Airspace/ATC: Reduced airspace capacity due to increased in trail separation requirements. Proximity of relocated visual approach to Runway 26R/L from the south may conflict with traffic at Williams AFB.

Safety: No impact.

Air Service: No impact.

Environment: Other than relocation of noise, no significant impact.

Costs: Minor increase in operating costs for Runway 8L/R approaches from the east and Runway 26R/L approaches from the west.

Assessment of Feasibility: The extension of the visual approach corridors to locations further from the airport does not appear to be a substantive noise reduction technique for the general area, although it may have local benefit for persons directly under the existing visual approach base legs.

Implementation Strategies: ATC revise and publish visual approach procedures as necessary.

ALTERNATIVE 11 - ESTABLISH CURFEW ON ALL NIGHTTIME OPERATIONS

Description: Close the airport to all traffic between the hours of 10:00 p.m. and 7:00 a.m.

Effect on:

Noise Pattern: A nighttime curfew will eliminate overflights during the most noise sensitive hours. The effect on the noise contours will be a reduction of slightly less than 3 Ldn throughout their extent (reflecting the 10 dB penalty for traffic during the noise sensitive period) if traffic is not transferred to the less-sensitive hours.

Airfield Capacity: No significant effect unless the operators attempt to schedule an equivalent number of operations to the day and evening hours to replace the curfew hour operations.

Airspace/ATC: No significant effect unless the operators attempt to schedule an equivalent number of operations to the day and evening hours to replace the curfew hour operations.

Safety: No significant effect unless closely timed approaches are late into the area and marginal procedures are used to assure "beating the clock".

Air Service: Significant impact on the capability of operators to position aircraft in other locations via late-night flights. Based on 1992 forecasts, approximately 50,000 operations would be impacted by the measure. General aviation would be less impacted than air carriers because alternative facilities are available in the area.

Environment: Reduction in noise and all other flight related impacts.

Costs: The primary costs associated with a curfew are related to the necessity to reschedule traffic to non-curfew hours. This rescheduling impacts not only the operations at Sky Harbor, but also at all airports at the other end of the affected flight segment. The actual costs associated with rescheduling are unknown. Additionally, general aviation and nonscheduled users will be similarly impacted by an operational curfew.

In addition to the costs of operation or non-operation, a curfew will impact the business community by restricting the capability of overnight information and monetary transfers.

Assessment of Feasibility: Given the absence of substitute facilities for air carrier operations in the local area, the measure is not considered feasible. As such the measure would be unlikely for inclusion in an approved Part 150 program.

Implementation Strategies: Pass an ordinance restricting activity at the airport to non-curfew hours.

ALTERNATIVE 12 - NIGHTTIME JET DEPARTURES RESTRICTED TO STAGE THREE AIRCRAFT

Description: All departures by jet aircraft not certified as meeting Stage 3 noise levels under F.A.R. Part 36 are restricted to the hours between 7 a.m. and 10 p.m. This measure was tested by assigning those operations projected for the nighttime by Stage 2 aircraft to the daytime hours and replacing them with an equivalent number of operations at night by Stage 3 aircraft of similar seating capacity. In that the measure affects only departures, late arriving aircraft may continue to land at the airport, but may not depart until the next morning.

Effect on:

Noise Pattern: While the number of overflights and their location are not changed, the implementation of this measure would reduce the noise contours by approximately 2 Ldn in all noise impacted areas. East of the airport, the number of persons within the 65 Ldn contour is reduced by 39 percent to 5,637, while west of the airport the reduction is similar (a reduction of 27 percent to 18,866 persons).

Airfield Capacity: The measure would have no effect on airfield capacity or delay.

Airspace/ATC: The measure will have no effect on airspace capacity or air traffic control.

Safety: No effect.

Air Service: It is in the provision of air service that this measure provides the greatest impact. The scheduled commercial service carriers will be required to reschedule noncompliant aircraft out of the sensitive nighttime hours and replace them, if they so desire, with quieter aircraft meeting Stage 3 noise levels. Non-commercial general aviation operators will also be subject to the provisions of this measure, and if unable to comply with it, will find it necessary to use another of

the regional facilities (Scottsdale, Falcon Field, Deer Valley, Phoenix-Goodyear, etc.) or wait until the nonsensitive hours. Based on 1987 baseline operations, this measure will require the rescheduling of ten 727 and ten 737-200 and DC-9-30 nighttime departures. Only one of these operations is by a Stage 2 cargo aircraft (a 6:00 a.m. departure by Federal Express, five days per week).

Environment: Reduced nighttime noise, but no other environmental effect.

Costs: There will be system-wide airline planning and scheduling costs associated with the utilization of only Stage 3 aircraft departures at night. The measure does not require the acquisition of new equipment, but rather, the assignment of currently owned equipment to the noise-sensitive hours or rescheduling of noncompliant equipment to the nonsensitive hours.

Assessment of Feasibility: The measure is considered feasible and implementable, particularly if phased in over a period sufficiently long as to allow the smooth rescheduling of equipment. ATA indicates that this measure is "unreasonable and economically impossible for airlines and a preemption of Federal Air Regulation 91.301 - Subpart E - Operating Noise Limits".

Implementation Strategies: Airport establishes a policy to prohibit nighttime takeoffs by jet aircraft not meeting F.A.R. Stage 3 noise levels. Implementation of the measure may be either voluntary by the carriers or controlled by ordinance by the airport owner. For acceptance by the FAA, the measure may need to be defined based on a specific noise level rather than on compliance with Stage 3 since the guideline noise level increases with the weight of the aircraft, allowing some Stage 3 aircraft to takeoff at louder levels than some Stage 2 aircraft. This could potentially impact a greater number of operations.

ALTERNATIVE 13 - ALL NIGHTTIME JET TRAFFIC RESTRICTED TO STAGE 3 AIRCRAFT

Description: All operations by jet aircraft not certified as meeting Stage 3 noise levels under F.A.R. Part 36 are restricted to the hours between 7 a.m. and 10 p.m. This measure was tested by assigning those operations projected for the nighttime by Stage 2 aircraft to the daytime hours and replacing them with an equivalent number of operations at night by Stage 3 aircraft of similar seating capacity. To implement the measure fully, it may be necessary to design the measure around a specific noise level, rather than on compliance or noncompliance with Stage 3.

Effect on:

Noise Pattern: The measure will result in a noise reduction of approximately 2 Ldn over baseline conditions. When compared with the nighttime Stage 3 departure restriction, there are only slightly fewer persons within the 65 Ldn contour (a reduction of 908 or 4 percent). There is virtually no difference in the location of the noise contours. Thus, the inclusion of arrivals in the restrictions will have no effect in reducing the noise contours. Their inclusion will however reduce the nighttime single event noise levels of areas overflowed on approach.

Airfield Capacity: No effect.

Airspace/ATC: No effect.

Safety: The measure may have an effect on late arriving aircraft, particularly since there is no alternative facility currently available in Phoenix.

Air Service: The implementation of the measure would require the scheduled commercial carriers to reschedule approximately twenty departures and twenty-seven arrivals for average 1987 conditions. A number of air cargo arrivals would need to be rescheduled to arrive after 7:00 a.m., consequently delaying their ability to meet early morning delivery schedules.

Environment: No effect.

Costs: The cost of rescheduling aircraft to meet the time restrictions imposed by this measure will be centered in airline planning and traffic departments, while flight operations should encounter no cost change. If differential landing fees or penalty landing fees are imposed for arrival operations after 10 p.m., additional costs will be encountered, but the extent of these is not predictable.

Assessment of Feasibility: The measure is considered feasible and implementable, particularly if implemented over a period of time. ATA indicates that this measure is "unreasonable and economically impossible for airlines and a preemption of Federal Air Regulation 91.301 - Subpart E - Operating Noise Limits".

Implementation Strategies: Airport establishes a policy to prohibit nighttime operations by jet aircraft not meeting F.A.R. Stage 3 noise levels. Implementation of the measure may be either voluntary by the carriers or controlled by ordinance by the airport owner. Enforcement of the arrival restrictions may be via prohibitive landing fees for noncompliant aircraft. For acceptance by the FAA, the measure may need to be defined based on specific noise levels rather than on compliance with Stage 3 since the guideline noise level increases with the weight of the aircraft, allowing some Stage 3 aircraft to takeoff at louder levels than some Stage 2 aircraft. This could potentially impact a greater number of operations by a wider variety of aircraft types.

ALTERNATIVE 14 - RESTRICT ALL JET OPERATIONS TO STAGE THREE COMPLIANT AIRCRAFT

Description: All operations are conducted by aircraft meeting the noise limitations of F.A.R. Part 36. The measure was tested by converting all noncompliant aircraft to compliant types. This measure is theoretical in that there are not enough Stage 3 aircraft in the fleets of the serving carriers (particularly those which hub at Phoenix) to meet anticipated operations levels.

Effect on:

Noise Pattern: The noise level reduction resulting from the limitation of the airport to use solely by Stage 3 compliant aircraft is approximately 10-11 Ldn. The number of persons falling within the 65 Ldn contour would be reduced by 96 percent to a total of 1,260. These 1,260 persons are located directly west of the airport on the extended centerline of Runway 26L departures.

Airfield Capacity: No change.

Airspace/ATC: No change.

Safety: No change.

Environment: Improved air pollutant levels due to lower emission content from Stage 3 high bypass ratio engines. No other change except noise levels.

Costs: The cost for total conversion of the air carrier fleet to Stage 3 compliance has been estimated to be in excess of \$100 Billion. This cost is spread throughout the system and all carriers. Recent costs for Stage 3 aircraft have been:

737-300s - \$30,000,000	757-200s - \$50,000,000
767-200s - \$55,000,000	MD-80s - \$35,000,000
747-400s - \$125,000,000	BAe-146s - \$25,000,000

Additionally, the re-engining of 727 aircraft to meet compliance levels has not yet been accomplished, but the costs of such action is projected to be approximately \$9,000,000 per aircraft, a portion of which is offset by fuel savings. The true costs of the measure for the Phoenix area would be in lost air service and its economic impacts. These are immeasurable, but the construction of a new airport would surely be less.

Assessment of Feasibility: Unrealistic given the level of demand and the rates of manufacture currently being experienced and projected into the future. Boeing is producing 16 new 737-300s monthly at top production, a rate which will require several years just to replace 737-200s currently in the fleet. The absence of alternate local facilities will likely produce unfavorable FAA reaction to the measure. ATA indicates that this measure is "unreasonable and economically impossible for airlines and a preemption of Federal Air Regulation 91.301 - Subpart E - Operating Noise Limits".

Implementation Strategies: Establish a policy limiting the airport to aircraft compliant with Stage 3 noise levels or which meet specified noise levels based on Stage 3 guidelines.

ALTERNATIVE 15 - ESTABLISH A BUDGET FOR THE DISTRIBUTION OF ALLOWABLE NOISE GENERATION TO THE USER CARRIERS

Description: This measure considers the historical contribution of noise by the various carriers using the airport and distributes the allowable proportion of future noise among them based on that history. The measure was evaluated using the total noise levels generated by each commercial carrier during the year 1986, and this evaluation resulted in the distribution of more than 90 percent of the noise to 12 air carriers. The remaining 26 commercial operators contributed less than 10 percent of the total noise energy. The assessment is developed using airport landing records and schedules of all carriers as input to the FAA's Area Equivalency Method model to determine total impacts of each carrier. These are summed and the contribution by any one carrier is divided by the total to determine the proportion of the budget allowable to that carrier.

The measure may be enhanced by applying the budget to only aircraft which do not meet the provisions of F.A.R. Part 36, Stage 3, and by providing equivalencies of operations based on a single common aircraft type (for Phoenix, this would likely be a 737-200). Sample equivalencies based on the 737-200 are:

1 737-200 =	0.540 727-100	1 737-200 =	21.739 737-300
	0.174 727-200		11.590 757
	0.762 DC-9-30		7.813 767
	1.567 DC-9-10		6.289 MD80
	3.000 747-200		5.780 DC-10-30

Any event occurring at night is counted as ten daytime operations.

Effect on:

Noise Pattern: The noise pattern will stabilize based on the level of total noise energy selected for the budget amount. If the historical 1987 or projected 1992 Ldn 65 contour area is selected as the budget level, the contours will remain consistent at that level (unless a declining budget is developed) for all time frames, or until such time as the conversion of the fleet to Stage 3 noise levels results in a reduction from the total energy level.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect.

Safety: No significant effect.

Air Service: The use of a budget will result in rescheduling of operations by both time and equipment to remain within a total budgetary limit. The change out of equipment based on equivalent noise generation will likely result in quieter aircraft or less sensitive timing of operations to meet growing demand levels.

Environment: Other than noise level stabilization, no significant environmental effects are anticipated.

Costs: Costs to the air carriers for rescheduling of operational times and/or equipment cannot be estimated until a budget base period is selected. As the market grows, each carrier may face scheduling costs and/or the effects of lost revenue if quieter equipment is unavailable to replace loud equipment now in use.

Assessment of Feasibility: Budgets are extremely complex, but are feasible and have been recently implemented at Denver and Minneapolis. These are generally directed at the louder Stage 2 aircraft and allow relatively unlimited operations by Stage 3 aircraft. Their implementation is normally a long process that is drawn out by negotiation of percentages, base time periods, and aircraft equivalencies. Large staffs and close monitoring of schedule changes are necessary for the measure to be effective.

Implementation Strategies: The implementation will require the development of an equitable budget which considers not only the use level and available aircraft of each carrier, but also allows room for the initiation of service by additional carriers. The negotiation of such budgets have historically required considerable time and have resulted in signatory agreements between the carriers and the airport that budgeted levels will not be exceeded.

ALTERNATIVE 16 - LIMITATION ON TOTAL OPERATIONS ALLOWED AT THE AIRPORT

Description: Implement a cap on the total number of operations allowed at the facility. This measure is most adequately applied via limitations on the number of scheduled operations allowed during any single day or week. It will require a strong methodology of airport control over airline schedules. The level of the operational cap may be set at any number, but the selection of a level which places a hardship on any user may be a restraint on commerce.

Effect on:

Noise Pattern: The use of an operational cap, unless set at levels considerably below current operating conditions, will not result in significant reductions in noise levels. The use of a cap will result rather in the use of larger aircraft to meet passenger demands which will continue to grow. This means that the airport could experience a delayed change out of louder 727-200 aircraft at the expense of quieter aircraft such as the MD80 or 737-300 as the quiet aircraft are used at airports establishing noise level restrictions. An increase in the number of wide-body aircraft could also be anticipated to meet the passenger demand if an operational cap were in place. These aircraft normally have larger contour footprints and higher SELs than lighter Stage 3 aircraft due to their shallower climb gradients.

Airfield Capacity: The limitation would set the capacity of the airfield. The use of a greater percentage of wide-body aircraft will result in increased delays on the field as greater required separations are maintained. Balanced by limited operational levels.

Airspace/ATC: Greater separations are required, thus reducing airspace capacity over conditions without the measure. This is balanced by the limitation on operations which will provide a limit on the total constraints on airspace.

Safety: Potential enhancement of safety if aircraft groups (such as light piston engine general aviation aircraft) are restricted from the facility.

Air Service: Significant limitation on the ability of the carriers to service the passenger demand.

Environment: Limitation on environmental effects from total operations and a general reduction in total environmental impacts.

Costs: The potential lost revenues associated with limiting total operations will likely be counterbalanced by increased revenues associated with the use of larger individual aircraft. Tourism, transportation and general business communities will suffer if the total number of departure seats were reduced by the measure.

Assessment of Feasibility: Given the anticipated rapid growth of passenger demand and the absence of substitute facilities in the area, the implementation of an operational cap is not considered realistic. If demand levels drop sharply, the use of an operational cap may become more attractive as a noise abatement measure.

Implementation Strategies: Establish a policy limiting the total number of operations allowed at the airport during any given time period. This is likely best approached via the allocation of slots for operation.

ALTERNATIVE 17 - IMPOSE DIFFERENTIAL LANDING FEES BASED ON TIME OF OPERATION OR AIRCRAFT NOISE LEVEL

Description: Impose a graduated schedule of landing fees based on the time a landing occurs and the aircraft making the landing. For example, a schedule may be developed based on the equivalent noise generating relationship between the quietest aircraft on which landing fees are paid and all other aircraft in the commercial fleet. Operations which occur during noise sensitive periods could be penalized by a factor of 10:1 (the Ldn penalty) over landings during non-sensitive periods.

Effect on:

Noise Pattern: Unless steeply graduated, the implementation of noise level or time of day sensitive landing fees will not have a significant effect on the noise pattern. This effect is the result of providing an incentive to the use of quiet aircraft and operating during the non-sensitive hours. The degree of effect on the pattern can range from none at all to the combined effect of a full Stage 3 fleet with a full nighttime curfew, dependent upon the steepness of the fee gradient.

Airfield Capacity: No significant impact.

Airspace/ATC: No significant impact.

Safety: No significant impact other than the potential for a pilot to "beat the box" to avoid landing during a noise sensitive period.

Air Service: Variable impact on air service, dependent upon the level of fee. High degrees of "dollars for decibels" will result in reduced air service capability by reducing the scheduling options for users, while a minimal fee level will have little impact other than to assist in the funding of noise related mitigation measures.

Environment: No significant impact.

Costs: Costs of the measure cannot be estimated without the preparation of a specific fee schedule. In general, the costs should be significant enough to provide an incentive for rescheduling operations, but not so prohibitive as to result in restraint of trade and discriminatory actions against any user. The funds accumulated via an incremental landing fee should be used to offset the expenses associated with implementation of other noise mitigation measures.

Assessment of Feasibility: The measure is feasible and has been implemented at other airports. The level of acceptance of the measure will be dependant upon its financial effects on individual users.

Implementation Strategies: Prepare a graduated schedule of landing fees based on aircraft types, including a multiplier for time of day penalties. Pass an ordinance setting incremental noise related landing fees in place over and above negotiated landing fees based on weight. Dedicate all collections which are related to supplemental fees for noise level or time of day to a separate fund to offset the costs of noise abatement and mitigation actions.

ALTERNATIVE 18 - GROUND ACTIVITY RESTRICTIONS

Description: The only additional ground activity restriction considered for noise abatement is the designation of a specific location and orientation for runup activity conducted on the airport. The use of the new America West ramp with aircraft oriented to a heading of 300 degrees will direct their maintenance runup noise toward the least densely populated areas or areas over which overflight noise exceeds the potential for runup noise impacts. A heading of 120 degrees would also be beneficial for noise abatement. The current 2101 to 0600 hours prohibition on maintenance runup testing should be continued unchanged.

Effect on:

Noise Pattern: The orientation may result in a small increase in the contour bulging directly south of the airport, but the degree of this increase is dependent upon the duration of runups to be conducted on the ramp. The pattern bulge is also mitigated by the imposition of the America West hangar between the aircraft and its primary direction of noise impact.

Airfield Capacity: No effect.

Airspace/ATC: No effect.

Safety: No effect.

Air Service: No significant effect.

Environment: No significant effect.

Costs: No significant effect.

Assessment of Feasibility: Feasible for implementation on completion of ramp facilities and initiation of maintenance service.

Implementation Strategies: Airport administration establish policy of directional orientation and location for maintenance runups.

ALTERNATIVE 19 - CONDUCT NOISE ABATEMENT THRUST CUTBACK AFTER TAKEOFF

Description: All jet aircraft capable of doing so, climb to 1,000 feet AGL at climb power, reduce deck angle and accelerate to velocity necessary to provide stabilized flight with zero flaps, reduce power to 1.7 EPR (if equipped with low bypass ratio engines) or to climb power (if equipped with high bypass ratio engines) and continue climb. At 3,000 feet AGL, power up to climb thrust and continue climb. All business jet operators use the NBAA's "Close-in" Noise Abatement Departure Procedure. This procedure typically helps reduce noise close to the airport and increases the extent of the noise contour further from the airport. The procedure was modeled for departures in both directions from Sky Harbor for average annual conditions.

Effect on:

Noise Pattern: At locations close to the airport, the noise levels are reduced by approximately 4 Ldn by this procedure. The reach of the 60 Ldn contour is reduced by only about 1-2 Ldn, although the sideline noise levels are reduced by approximately five Ldn during the cutback portion of the climb procedure. The measure results in a reduction from 24,854 to 15,865 persons within the 65 Ldn contour west of the airport and a reduction from 9,233 to 2,280 persons east of the airport.

Airfield Capacity: No significant effect if consistently used by all carriers.

Airspace/ATC: No significant effect if consistently used by all carriers.

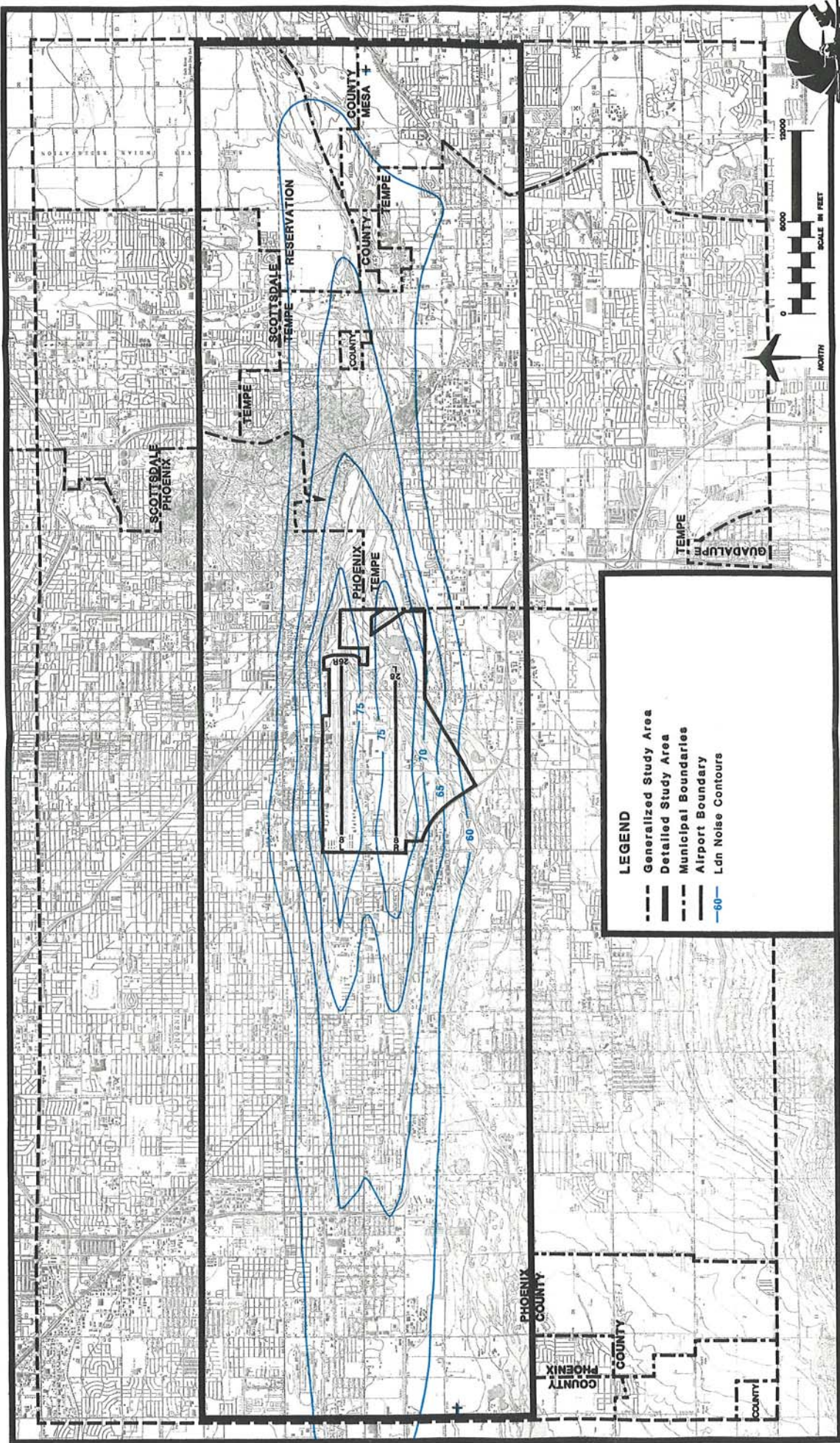
Safety: The measure has been judged safe by FAA flight standards for normal operating conditions, although the temperature extremes of the Phoenix area may result in its inadvisability for all temperature and take off weight conditions.

Air Service: No impact.

Environment: No effect.

Costs: The measure requires a lower fuel burn and less wear and tear on engines, balanced in part by a slower climb to cruise altitude where most efficient fuel use is accomplished. No differential data is available for assessment of the cost differences.

Assessment of Feasibility: Thrust cutbacks in one form or another have been implemented by many carriers as a part of their continuing noise abatement programs. The feasibility of the measure is a function of the airport's ability to communicate its benefits to the carriers not using the procedure. Full implementation by all carriers would require restructuring of flight procedures by those carriers which do not now use a version of the procedure, resulting in a non-standard procedure for local use.



LEGEND

- Generalized Study Area
- Detailed Study Area
- Municipal Boundaries
- Airport Boundary
- Ldn Noise Contours



Alternative 19
DEPARTURE THRUST
CUTBACK PROCEDURE

Implementation Strategies: Airport communicates benefits of cutback program to all user carriers for implementation. The measure is difficult to enforce, particularly if the airport is used by numerous unfamiliar pilots. If desired, formal agreements may be attempted with enforcement via continuous site-specific monitoring.

ALTERNATIVE 20 - MAXIMUM CLIMB ON DEPARTURE FROM RUNWAY 8R OR 8L

Description: Aircraft departing Runway 8R or 8L maintain takeoff power and climb gradient until reaching 6,200 feet MSL (5,000 AGL), then reduce to climb power and gradient to continue climb out on course.

Effect on:

Noise Pattern: The effect of the procedure on the noise pattern is to reduce the reach of the noise pattern under the 75 and 70 Ldn contours, but to increase the area falling within the 60 and 65 Ldn contour. The number of persons falling within the 65 Ldn contour east of the airport increased from 9,233 to 9,993.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect if all operators are using the same procedure. If only partially implemented, the variations between climb rates and velocities may result in reduced airspace capacity from greater separation requirements between in trail aircraft.

Safety: No significant effect.

Air Service: No effect.

Environment: Greater emission levels close in to the airport due to longer fuel burn at higher rates.

Costs: Greater low altitude fuel consumption rates associated with maximum climb will result in somewhat higher fuel costs (by approximately 14 percent to 5,000 above the surface). These are balanced to some extent by a more rapid climb to cruise altitude. The cost of wear and tear on engines and the more frequent periodic maintenance costs from longer high power engine thrust levels are a greater cost factor, but figures are not available on the cost differential associated with this concern.

Assessment of Feasibility: This is a non standard measure, and consequently would require airport specific training and operational directives. This factor will make the measure very difficult to sell to operators. Its implementability is questionable, particularly given the questionable noise benefit.

Implementation Strategies: Design a specialized departure procedure for the airport and obtain letters of agreement between the airport, tower, TRACON and each user to implement the procedure.

ALTERNATIVE 21 - ADJUST APPROACH FLAPS

Description: The noise level created by aircraft on approach increases as the degree of drag (flap level) is increased. This results from both increased air turbulence and additional power needed to maintain flight. The reduction of flap settings to result in decreased noise levels is examined.

Effect on:

Noise Pattern: Reduced single event noise levels from approach operations. No effect on noise contours because 60 Ldn+ contours are driven by departure noise.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect.

Safety: Procedure results in greater descent rates and approach speeds, potentially resulting in higher decision heights for final approaches.

Air Service: No significant effect.

Environment: No significant effect.

Costs: No significant effect in fuel costs. Increased landing speeds will result in greater wear and replacement rates on tires and breaks. Costs associated with construction of high speed taxiway exits for increased airfield capacity may be attributed to this measure.

Assessment of Feasibility: Considered to be a non-standard procedure and may be implemented by individual operators if a benefit is indicated. Otherwise, its implementation is unlikely given the low degree of effect on noise levels.

Implementation Strategies: Obtain letter of agreement between operators and airport that the measure will be used in local operations.

ALTERNATIVE 22 - TWO STAGE DESCENT APPROACHES

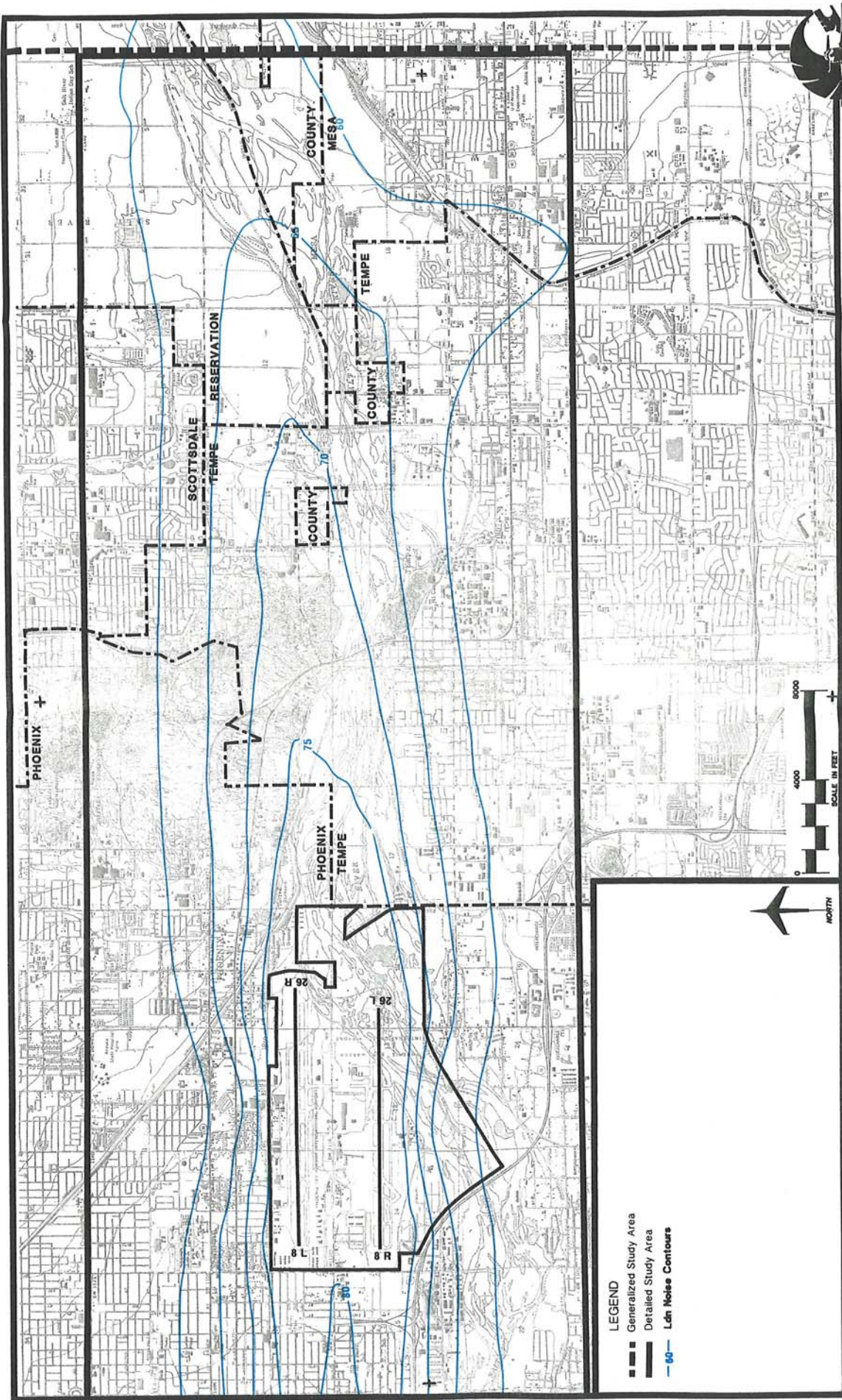
Description: In accordance with the "keep 'em high" philosophy, maintain aircraft at an increased altitude in the downwind stages of their approaches, initiate descent at a rate steeper than the glide slope, and intercept the glide slope at a low altitude.

Effect on:

Noise Pattern: The use of a two stage descent procedure will result in lower noise levels (normally by less than 3 dB) over downwind segments of the approach, and decreasing differences between approach noise levels associated with each procedure as the distant to the runway threshold is decreased.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect if downwind altitudes are sufficiently different from crossing altitudes of departing aircraft.



Alternative 20
 MAXIMUM CLIMB
 TO 5,000' AGL



- LEGEND**
- Generalized Study Area
 - Detailed Study Area
 - Ldn Noise Contours

Safety: The procedure is non-standard and normally opposed by pilot groups for reasons of decreased safety margins unless there are topographic reasons for use. The FAA Administrator, on November 29, 1987, determined not to prescribe two stage visual or instrument approaches for civil turbo-jet powered aircraft.

Air Service: No significant effect.

Environment: No significant effect.

Costs: No significant effect.

Assessment of Feasibility: Non-standard and not recommended for implementation by the FAA. The low potential for noise contour reduction associated with the measure does not warrant its inclusion in an operating program.

Implementation Strategies: Letter of agreement between participating operators and airport administration. Publication in standard instrument and visual approach procedures.

ALTERNATIVE 23 - RAISE GLIDE SLOPE ANGLE

Description: To reduce overflight noise from individual aircraft, raise the glide slope angle to Runway 8R from its current 3 degrees to a steeper angle. A glide slope of five degrees was used to test the effects of noise reduction contributed by this measure.

Effect on:

Noise Pattern: The noise level over the nearest residential area west of the runway end is reduced by approximately 5 decibels. This level of reduction would remain constant for the full length of the approach slope. Benefits are offset by departure noise and increased duration of reverse thrust required for braking.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect.

Safety: Non-standard procedure results in faster approach speeds and longer time required for deceleration.

Air Service: No significant effect.

Environment: No significant effect.

Costs: Higher costs of maintenance for tires and brakes.

Assessment of Feasibility: Non-standard and likely resistance will be encountered based on low degree of noise benefit on contours.

Implementation Strategies: Letter of agreement between users, TRACON and airport. Reset glide slope angle to selected setting.

ALTERNATIVE 24 - LIMIT USE OF REVERSE THRUST

Description: Limit the use of reverse thrust on landing and accept longer landing rolls in an effort to reduce sideline noise impacts.

Effect on:

Noise Pattern: Reduced sideline noise levels, but over basically compatible areas.

Airfield Capacity: Greater time on the runway will decrease airfield capacity.

Airspace/ATC: No significant effect.

Safety: Non-standard procedure which cuts into safety margins required for stopping the aircraft. Particularly unsafe on temperature extreme days.

Air Service: No significant effect.

Environment: No significant effect.

Costs: No significant effect. Reduced engine wear and tear offset by increased tire and brake maintenance costs.

Assessment of Feasibility: Not likely due to little effect on noise contours and absence of adjacent incompatible uses.

Implementation Strategies: Letter of agreement between users, ATCT and airport management.

ALTERNATIVE 25 - CONSTRUCT ANOTHER AIRPORT TO SERVE AIR CARRIER TRAFFIC

Description: The evaluation of construction of another facility to serve the traffic generating the noise impacts around Sky Harbor Airport is beyond the general scope of the study. The general effects of this measure may be addressed to indicate the best case (for local noise impacts) available. The airport would likely continue to be used by nonscheduled operators, including both general aviation and the military, but may also remain useful to cargo carriers.

Effect on:

Noise Pattern: The construction of a new air carrier airport at a remote location would result in the elimination of large portions of the total noise energy from the Sky Harbor environs. The 65 Ldn contours would likely remain over the Salt River channel to the east and within two miles of the airport to the west. The number of single events would be reduced by approximately 65 percent (air carrier and commuter traffic).

Airfield Capacity: Airfield capacity would be enhanced by the decreased proportion of large aircraft in the operating mix.

Airspace/ATC: Impacts on airspace capacity for Sky Harbor are unknown because they would be strongly influenced by the airspace requirements of a new airport.

Safety: Enhancement of safety by reduction of intermixing of large and small, fast and slow aircraft.

Air Service: Demand transferred to new facility.

Environment: Significant improvement of environmental conditions around the Sky Harbor Airport, balanced by derogation of conditions at a new site.

Costs: Unknown, but similar facilities in Denver are projected to cost \$3 to 5 Billion by the time they are completed. Costs would likely be greater for Phoenix due to a delay in initiating construction.

Assessment of Feasibility: Not feasible for short- or intermediate-term noise abatement. The constraints on the existing facility and continued demand for facilities may force the development of a new facility in the long-term. It is unknown whether that will occur prior to the year 2007.

Implementation Strategies: Public commitment required. Feasibility, site selection, airspace, environmental and design studies required. Land acquisition and construction of all necessary facilities. Renegotiation of all long term contracts with all users.

ALTERNATIVE 26 - ENCOURAGE USE OF RELIEVER FACILITIES FOR NONSCHEDULED USERS

Description: Accelerate development of local reliever facilities to enhance their attractiveness to nonscheduled operators. This requires the continued improvement of Phoenix-Deer Valley and Phoenix-Goodyear Airports by the city of Phoenix and the assistance of development at Scottsdale, Falcon Field and other local general aviation facilities. Goodyear is of sufficient size that it may be useful as a supplemental cargo facility for local carriers.

Effect on:

Noise Pattern: The improvement of other airports will not significantly effect the noise pattern because the pattern is driven by the scheduled air carrier traffic. The total number of overflights would be reduced and the number of flights not using the SIDs would be reduced. Consequently, sideline overflights by small aircraft may be decreased.

Airfield Capacity: Enhanced capacity by virtue of reduction in interface between large and small, fast and slow aircraft.

Airspace/ATC: Enhanced airspace capacity by virtue of reduced interface between large/fast and small/slow aircraft.

Safety: Enhanced safety by virtue of reduced interaction between fast and slow aircraft.

Air Service: Potentially reduced service levels for nonscheduled traffic owing to redirection of activity levels and surface transportation needs.

Environment: No significant change at Sky Harbor. Potential decline in environmental quality at other facilities.

Costs: Unknown, owing to the necessity to develop incremental use plans for each reliever facility and assess user costs of relocation.

Assessment of Feasibility: Feasibility is good for assisted development of reliever facilities, but the restriction of nonscheduled use of Sky Harbor may face litigation on grounds of discrimination against user groups.

Implementation Strategies: Contact each reliever sponsor to determine potentials for enhancing those facilities. Assist as necessary the development of plans and designs for development of airport improvements. The implementation of general aviation landing fees would act as an incentive for such users to operate from reliever facilities.

ALTERNATIVE 27 - CONSTRUCT NEW RUNWAY 8R-26L AND USE FOR WEST SIDE ARRIVALS AND DEPARTURES BY JET TRAFFIC

Description: Construct a new parallel runway on the south side of the existing Runway 8R-26L, as indicated on the airport layout plan. Use the facility for operations by general aviation aircraft types on the south side of the central core of the airport. Use the runway for jet air carrier arrivals in an east flow and takeoffs in a west flow. Continue use of existing Runway 8R-26L for arrivals in a west flow and departures in an east flow.

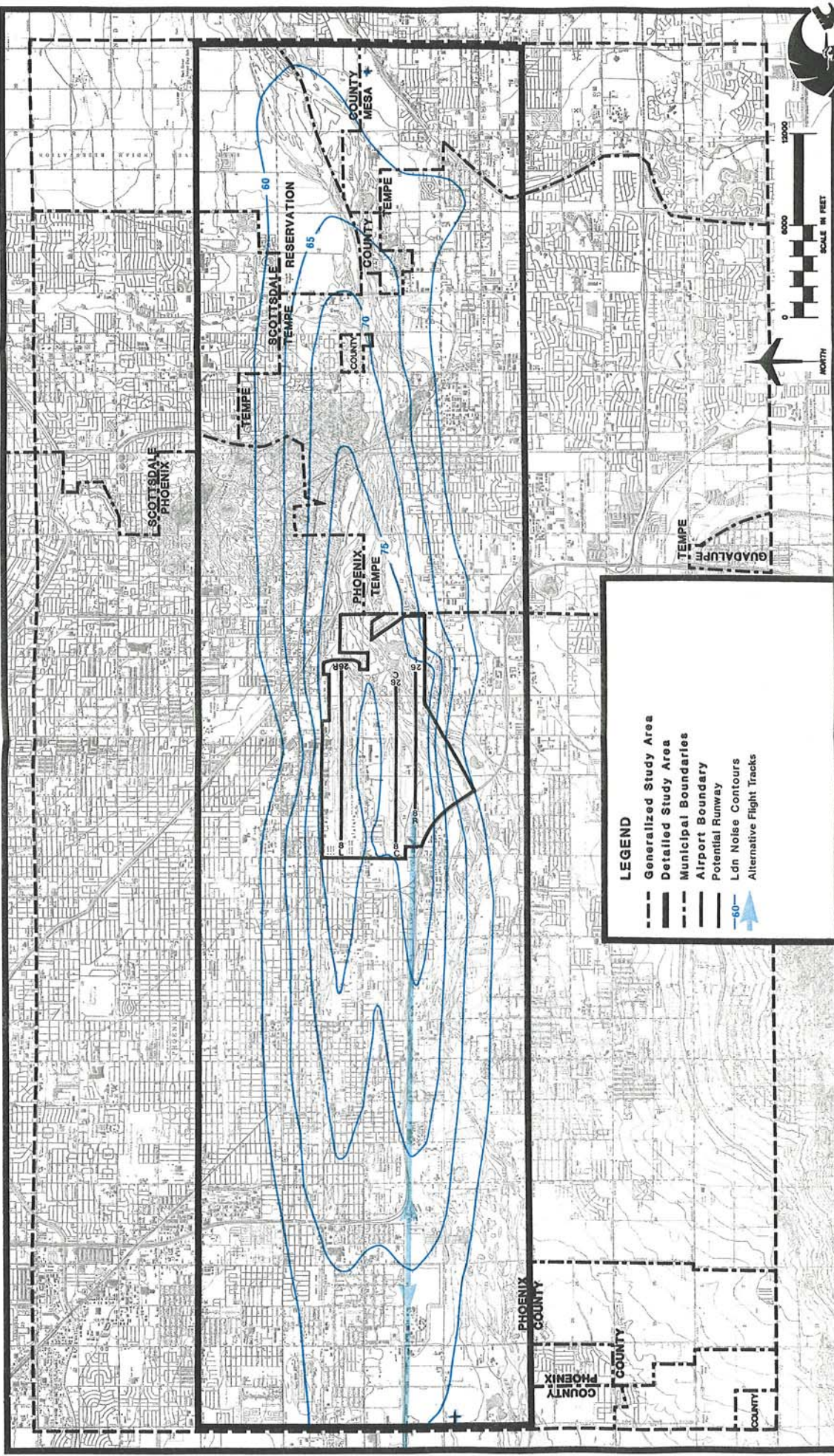
Effect on:

Noise Pattern: To the east and northwest of the airport, the new runway used in the manner described would have virtually no impact on the noise contour pattern. Directly west of the airport, the new runway centerline would closely align with Interstate 10. Flight along this alignment would result in a shift of the noise contours to the south over more compatible areas along the Salt River and over industrially developed properties south of the highway. While the number of persons within the 65 Ldn contour would be reduced by over 3,000 persons, the number within the 70 and 75 Ldn contours would drop even more significantly by virtue of greater separation of the two runways. The number of persons within the 65 Ldn contour west of the airport drops from 24,854 to 21,513, while the east side is unchanged.

Airfield Capacity: Enhanced capacity of the airport through provision of additional operating surfaces. Delays may be encountered for east flow arrivals due to necessity to cross an active departure runway after arrival on new south runway. Similar delays may be encountered by west flow departures on the new runway. This may be overcome by design and construction of additional taxiways.

Airspace/ATC: Enhanced capacity via increased separation between north and new south runways allows simultaneous IFR operations.

Safety: Enhanced by greater separations, but anticipated runway has shorter length than the existing runways.



LEGEND

- Generalized Study Area
- Detailed Study Area
- - - Municipal Boundaries
- - - Airport Boundary
- Potential Runway
- Ldn Noise Contours
- Alternative Flight Tracks



Alternative 27
 CONSTRUCT NEW RUNWAY-
 WEST SIDE FLOWS



Air Service: No significant effect other than reduced delay factors.

Environment: Greatest environmental impacts will be on the course of the Salt River which would require rechannelization. Greatest concentration of noise and air pollutants west of the airport would be shifted 1/4 mile to the south.

Costs: Operationally, the costs of this measure are minor and are based in potentially increased taxiing times for aircraft. These are significantly offset by reduced ground delays. The cost of construction and relocation of displaced users is unknown at this time, but is one of the subjects of an airport master plan study now being prepared by others. The cost of the runway and its accompanying site development is certain to be extensive.

Assessment of Feasibility: The measure will require environmental approval prior to implementation. It is presumed that construction funding could be made available. Although the measure will provide significant noise relief west of the airport, the political acceptability of the measure is uncertain.

Implementation Strategies: Initiate environmental assessments required for construction, develop funding sources, develop and adopt formal runway use agreements describing operational parameters.

ALTERNATIVE 28 - CONSTRUCT NEW RUNWAY, WEST SIDE TRAFFIC ON NEW RUNWAY, EAST SIDE NIGHT TRAFFIC ON 8C-26C

Description: Retain the conditions of Alternative 27. Also, direct all nighttime east flow departures straight-out from Runway 8C and all nighttime west flow arrivals straight-in from the VORTAC to Runway 26C.

Effect on:

Noise Pattern: The east side straight-out/in measure will shift noise from north Tempe to residential areas south of the river. The number of persons impacted within the 65 Ldn contour changes from 9,233 to 13,332 east of the airport, while the noise reduction benefits of Alternative 27 remain to the west.

Airfield Capacity: No significant impact on capacity or delay over Alternative 27, but a significant increase in capacity and reduction in potential delays over existing conditions.

Airspace/ATC: See Alternative 27 comments.

Safety: No significant change from the impacts of Alternative 27.

Air Service: No impact.

Environment: No significant change beyond those discussed under Alternative 27.

Costs: Slightly increased flight time costs associated with straight out procedure. If taken straight out to the VORTAC, the measure would result in cost increases of \$64,000 for the projected 1992 operations and fleet mix. Construction costs of Alternative 27 remain constant.

Assessment of Feasibility: See Alternative 27.

Implementation Strategies: See Alternative 27. Also, implement a runway use program element calling for nighttime departure traffic to the east to be on 8C and nighttime approaches from the east to be on Runway 26C.

ALTERNATIVE 29 - DISPLACED THRESHOLDS

Description: Displace the landing thresholds from the existing runway ends. Maintain the pavement for take off roll. The effect of displacing the landing thresholds on each runway by 1,000 feet was assessed.

Effect on:

Noise Pattern: Virtually no effect on the noise pattern. Noise levels over the nearest residential areas would be reduced by less than 1 dB as a result of a displacement. Each 1,000' of displacement increases the height of the aircraft overflying a site on centerline by only 52 feet, an insignificant amount in noise assessment for aircraft.

Airfield Capacity: No significant effect.

Airspace/ATC: No significant effect.

Safety: Slightly reduced safety margins during temperature extremes.

Air Service: No significant effect.

Environment: No significant effect.

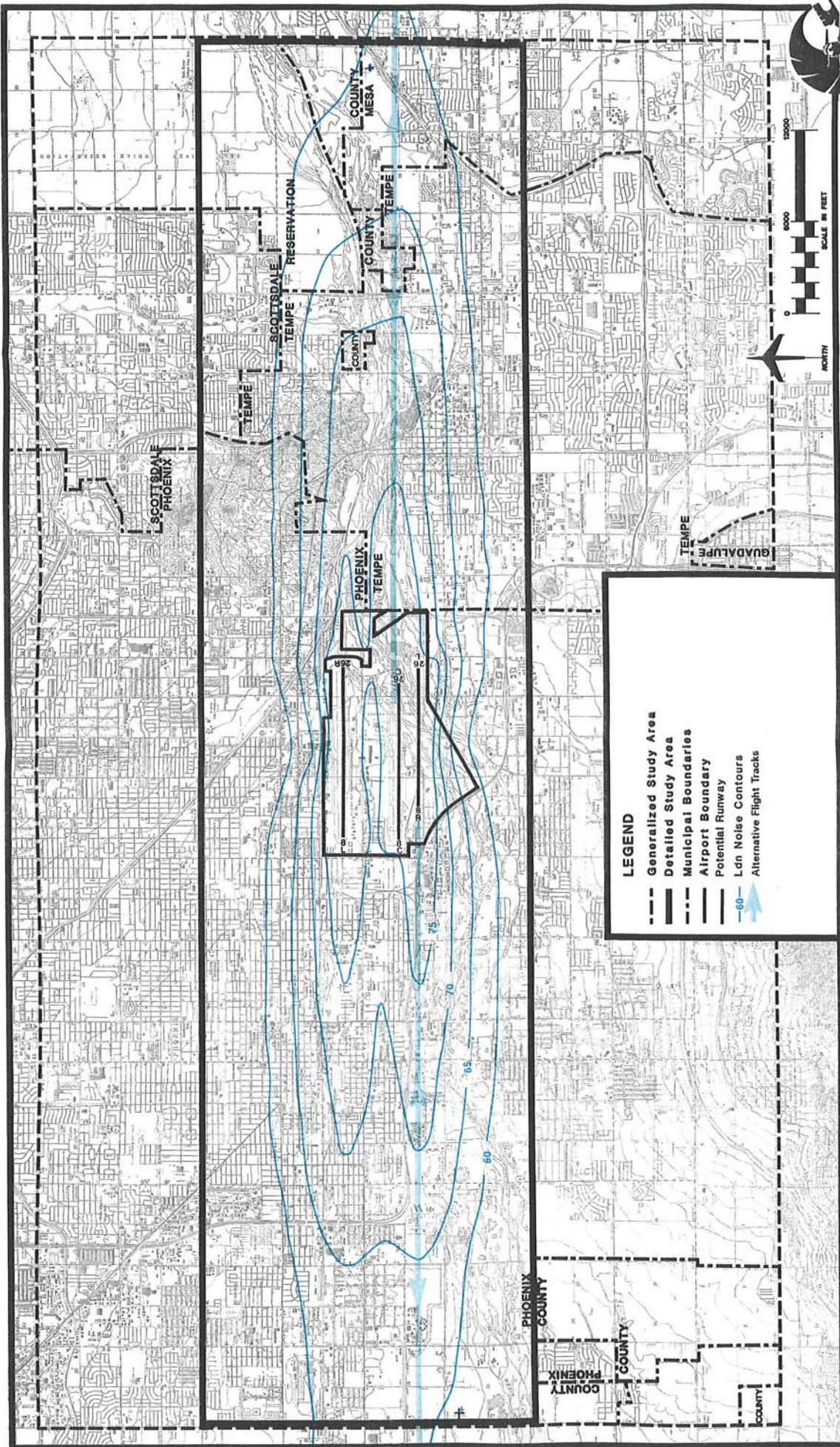
Costs: No significant cost.

Assessment of Feasibility: Feasible, but the measure has little validity for noise abatement.

Implementation Strategies: Accomplished by airport administration with notification to FAA and users.

ALTERNATIVE 30 - ACOUSTICAL SHIELDING

Description: Construct berms, barriers, noise fences, or structures to attenuate noise from ground sources. Barriers were evaluated lateral to the runways on the south and to the north along the airport property lines.



Alternative 28
 CONSTRUCT NEW RUNWAY-
 EAST SIDE FLOWS



Effect on:

Noise Pattern: The attenuation of noise provided by a 12 foot high barrier located along the property line to the nearest area of incompatible use was less than 6 decibels. No attenuation is provided for aircraft above surface level and consequently the noise levels on the incompatible areas were not significantly reduced.

Airfield Capacity: No effect.

Airspace/ATC: No effect.

Safety: No effect.

Air Service: No effect.

Environment: No significant effect north of the airport. Environmental impacts on the Salt River south of the airport.

Costs: Estimated costs of \$200 per lineal foot for either berms or noise fences result in total costs of approximately \$4.4 million for both barriers. Costs associated with the construction of buildings to attenuate noise are not properly costs of the noise program, but rather are development considerations which will meet two goals.

Assessment of Feasibility: Feasible, but little noise related benefit.

Implementation Strategies: Prepare engineering and design studies, commit funding and issue construction authorization.

ALTERNATIVE 31 - RELOCATE RIO SALADO NDB TO MID-CHANNEL OF SALT RIVER

Description: Move the Rio Salado NDB from its current location near the intersection of Curry and Scottsdale Road to a position one-half mile directly to the south in the middle of the Salt River channel. The use of the NDB would be retained for all Runway 8R/L departures, with aircraft overflying the navaid prior to turns onto assigned SIDs.

Effect on:

Noise Pattern: The southward shift of departure tracks to more closely align with the river will result in a southerly shift of the noise pattern, with the degree of shift increasing with distance east of the airport. The relocation of the NDB would result in tighter turning radii for aircraft turning to the south on the Stanfield, Mobie or Buckeye SIDs, and a consequent shift of the departure tracks to the west of current locations. This results in an increase in noise over portions of eastern Tempe by as much as 6-7 Ldn and a decrease of Ldn levels over northern Tempe and southern Scottsdale by similar amounts. The population within the 65 Ldn contour changes from 9,233 to 11,215.

Airfield Capacity: The measure would have no positive or negative effects on airfield capacity or delays.

Airspace/ATC: No change.

Safety: No impact.

Air Service: No impact.

Environment: Other than the relocation of noise pattern, no environmental consequences are expected from flight. The specifics of the site selected in the river bed will govern the impacts of construction on surface conditions.

Costs: Implementation of the procedure will result in increased flight distances for Drake, Payso and J-65 departures of less than one-half mile and decreased flight distances of 1/2 to 1 1/2 miles for south-turning departures. The net result is an aggregate savings of \$242,000 based on 1992 operations and fleet mix forecasts.

Assessment of Feasibility: The measure is included in the agreement between the Mayors of Tempe and Phoenix as a desirable noise abatement measure. Its implementation will result in increased noise impacts over Tempe south of the river and reduced impacts north of the river.

Implementation Strategies: Select site, acquire land, relocate navaid and revise aeronautical charts to indicate new location.

ALTERNATIVE 32 - ESTABLISH FLIGHT CORRIDORS FOR HELICOPTERS USING THE AIRPORT

Description: Helicopters using the airport are not currently assigned to specific routes of flight for approach and departure from the facility. They are generally routed directly north or south from the runways or between the runways to the east and west. The development of tracks along noise compatible corridors of flight is evaluated. Specifically, the routing of traffic from the west over the area south of I-10 or over Van Buren, and from the east along I-10 or over Van Buren would remove the helicopter overflight event from residential to commercial and industrial areas. Traffic bound to the north and south could be initially routed above 40th Street until reaching the altitude of 1,600 to 2,000 feet MSL. The tower handles approximately 100 helicopter operations through its airspace daily, of which a approximately 10 percent actually use the airport.

Effect on:

Noise Pattern: The concentration of helicopter traffic along designated corridors of flight will result in increased noise levels in areas overflowed and decreases in the random single event impacts experienced throughout the study area. The development of such designated routes, will however, have no effect on the overall noise contour pattern within the airport environs.

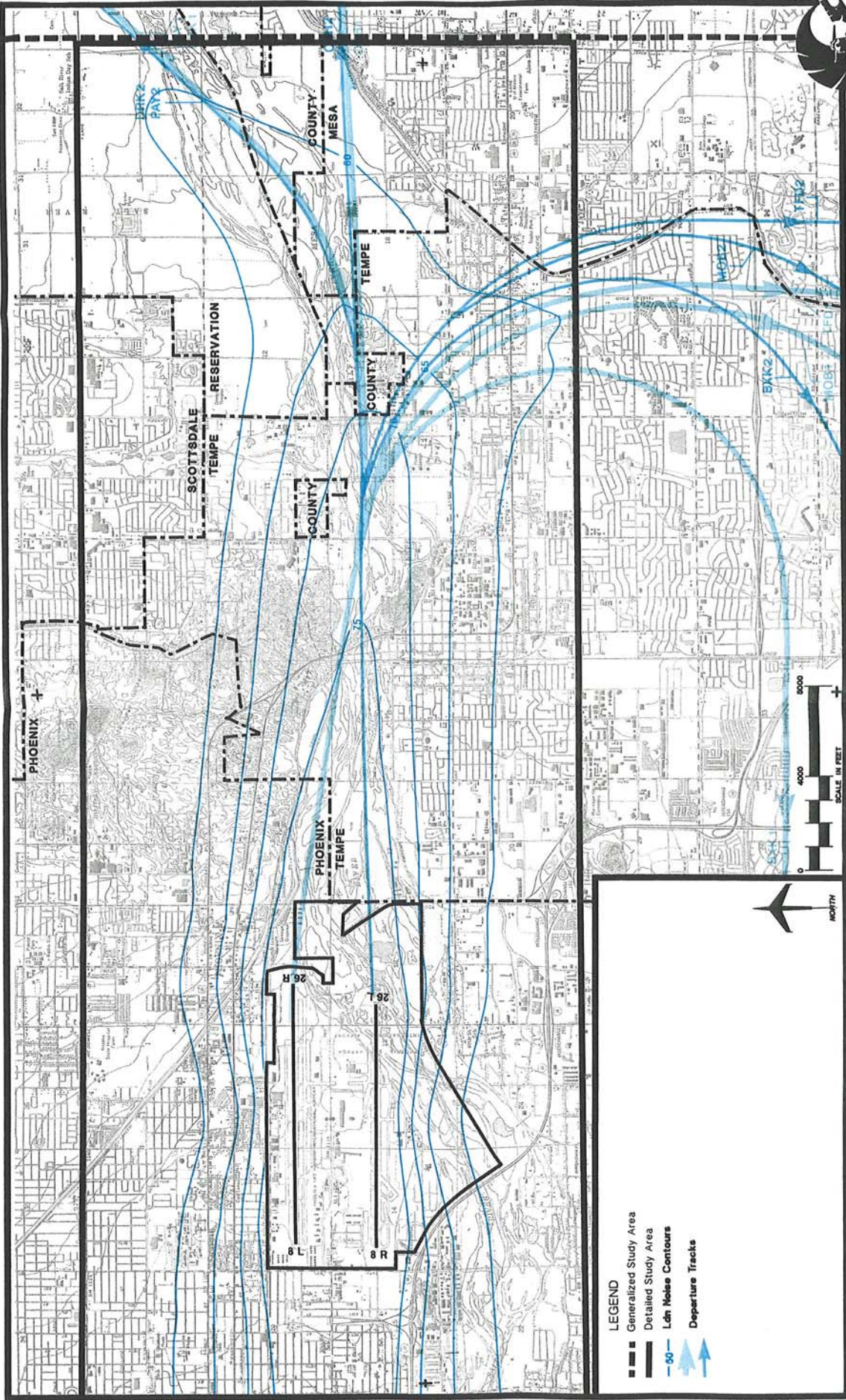
Airfield Capacity: The measure would have no positive or negative effects on airfield capacity or delays.

Airspace/ATC: Designated routings may result in decreased airspace capacity, but should also result in decreased controller workload due to standardization of traffic flows.

Safety: No significant impact.



Alternative 31
RELOCATE NDB TO
MID-CHANNEL



- LEGEND**
- Generalized Study Area
 - Detailed Study Area
 - 50m Noise Contours
 - Departure Tracks

Air Service: No impact.

Environment: Other than the relocation of individual noise events, no environmental consequences are expected from the measure.

Costs: Implementation of the procedure may result in increased flight distances for helicopters crossing the Sky Harbor airspace, but the degree of cost increase is virtually impossible to estimate since the number of origins and destinations are limited only by the number of helistops in the area.

Assessment of Feasibility: The measure is of little value in reducing contour size at the airport, but may be beneficial in reducing irritating single events over residential portions of the study area. The measure is not considered difficult to implement.

Implementation Strategies: ATCT determines most procedurally acceptable flight routes for noise abatement and prepares letters of agreement between helicopter operators and ATCT.

SUMMARY

The table on the following pages summarizes the various measures assessed in this Appendix and indicates those selected for inclusion in a computer-modeled scenario of aircraft noise reduction actions.

TABLE D1 (Continued)
Summary of Detailed
Alternative Evaluations

Alternative Measure	Effects of Measure on ... (see Appendix D)				Air Service	Environment	Costs	Retain for Scenario Consideration ^a	
	Change to Noise Impact in 65 Ldn		Airfield Capacity	Airspace ATC					Operating Safety
	East	West							
Establish a budget for the distribution of allowable noise generation to user air carriers.	Unknown	Unknown	Unknown	None	None	Unknown	No		
Limit the total number of operations allowed at the airport.	Unknown	Unknown	Potential improvement	None	Potential improvement	Unknown	No		
Impose differential landing fees based on time of operation or aircraft noise level.	Unknown	Unknown	None	None	None	Unknown	No		
Expand restrictions on maintenance runup activity.	None	None	None	None	None	None significant	No		
<u>Operational Procedures</u>									
Request the use of thrust reduction after takeoff by all jet aircraft capable of using the procedure.	-6,953	-8,989	None	None significant	None significant	None	Yes		
Request the use of maximum climb departures by all aircraft.	+760	Unknown	None	None significant	None significant	Slight impact	No		
Request the minimum use of flaps during approaches.	None	None	None	None	Slight decrease	None	No		
Establish two-stage approach procedures.	None	None	None	None	Decreased	None	No		
Increase approach angles by raising glide slopes.	None	None	None	None	Reduced	Slight	No		
Limit use of reverse thrust on landing.	None	None	Slight decrease	None	Reduced	None significant	No		

TABLE D1 (Continued)
Summary of Detailed
Alternative Evaluations

Alternative Measure	Effects of Measure on ... (see Appendix D)							Retain for Scenario Consideration ^a	
	Change to Noise Impact in 65 Ldn		Airfield Capacity	Airspace ATC	Operating Safety	Air Service	Environment		Costs
	East	West							
Facility Development									
Construct a new air carrier airport.	Unknown	Unknown	Major increase	Unknown	Increased	Transferred elsewhere	Unknown	Unknown, but major	No
Encourage the use of reliever facilities by non-scheduled general aviation users.	Unknown	Unknown	Increased	Improved	None	Varied by user	None significant	Unknown	No
Construct new Runway 8R/26L. Move west side arrivals and departures from current south to new south runway.	0	-3,341	Increased	Improved	None	Improved	Potentially significant	Unknown, but major	No
Construct new Runway 8R/26L. Move west side arrivals and departures from current south to new south runway. Move east side nighttime operations to center runway.	+4,089	-3,341	Increased	Improved	None	Improved	Potentially significant	Unknown, but major	No
Displace runway approach thresholds.	None	None	None	None	Slightly reduced	None	None	None	No
Install acoustical barriers and shielding.	None	None	None	None	None	None	None	\$4,400,000	No
Relocate Rio Salado NDB to mid-channel of Salt River.	+1,982	0	None	None	None	None	None	<\$242,000>	No

NA - Not Applicable

^a - The measure, while not retained for scenario evaluation, may have utility as a Noise Compatibility Program implementation measure. Several measures are not adaptable to computer scenario modeling.

TABLE D1
Summary of Detailed
Alternative Evaluations

Alternative Measure	Effects of Measure on . . . (see Appendix D)										Retain for Scenario Consideration ^a	
	Change to Noise Impact in 65 Ldn		Airfield Capacity	Airspace ATC	Operating Safety	Air Service	Environment	Costs				
	East	West										
<u>Runway Use And Flight Routes</u>												
Establish a rotational runway use system to equally distribute arrival and departure operations to both the east and west of the airport.	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	Yes
Establish a runway use program favoring the flow of traffic on Runways 8R/L (to the east).	+3,489	-6,694	Reduced	Delays increased	None significant	None significant	None	None significant	None	Balanced changes	Balanced changes	Yes
Establish a runway use program favoring the flow of traffic on Runways 26R/L (to the west).	-762	+418	None significant	None	None significant	None significant	None	None significant	None	Balanced changes	Balanced changes	No
Require a 15 degree left turn, for jet aircraft departing Runways 26R/L, as soon as safe and practical.	0	-12,132	Reduced	Major con- straints	None significant	None significant	None	None significant	None	\$600,000 per year	\$600,000 per year	Yes, with adjustment
Require a 15 degree left turn, for jet aircraft departing Runway 26L, as soon as safe and practical.	0	-5,393	Slight increase	Im- proved	None significant	None significant	None	None significant	None	\$430,000 per year	\$430,000 per year	Yes, with adjustment
Replace the NDB instrument departure overflight procedure from Runways 8R/L with a procedure calling for flight along the 265 radial from the SRP VORTAC to a position 1 DME west of the noavoid before turning on departure SID vectors.	-701	0	Slight decrease	Delays increased	None	None	None	None	None	\$ 94,000 per year	\$ 94,000 per year	Yes
Require Runway 8R/L IFR departures to fly runway heading until abeam the SRP VORTAC (crossing Price Road).	+4,797	0	Slight improvement	Major con- straints	None significant	None significant	None	None significant	None	\$561,000 per year	\$561,000 per year	No
Extend the 1 DME procedure (Measure 6) to overfly the SRP VORTAC.	-494	0	Slight improvement	Increased conflicts	None	None	None	None	None	<\$282,000> per year	<\$282,000> per year	No

TABLE D1 (Continued)
Summary of Detailed
Alternative Evaluations

Alternative Measure	Effects of Measure on . . . (see Appendix D)										Retain for Scenario Consideration a
	Change to Noise Impact in 65 Ldn		Airfield Capacity	Airspace ATC	Operating Safety	Air Service	Environment	Costs			
	East	West									
Establish a SID flying northeast of the VORTAC and then over Williams MOA 1 for Stanfield, Mobile, and Buckeye departures from Runways 8R/L. This SID would be used only during low activity at Williams AFB.	+129	0	Slight decrease	Potential conflicts	None significant	Slight delays	None significant	\$613,000 per year			Yes, with adjustment
Redefine the Buckeye SID from Runways 8R/L to turn northeast and then west to fly over more compatible uses or at higher altitudes over incompatible uses.	-136	0	Moderate decrease	Major conflicts	Potential decrease	Slight delays	Balanced changes	\$2,847,000 per year			No
Extend by two miles the final approach segment of visual approaches to the east and west of the airport.	0	0	Slight decrease	Delays increased	None	None	None significant	Slight increase			No
Establish flight corridors for helicopters using the airport.	0	0	None	None significant	None	None	None significant	Unknown			No
<u>Airport Regulations</u>											
Establish a curfew on all nighttime operations.	Unknown	Unknown	Potential decrease	None	None significant	Major impact	Improvement	Major			No
Restrict jet nighttime departures to F.A.R. Part 36, Stage 3 aircraft.	-3,596	-5,988	None	None	None	Major impact	None	Major impact			Yes
Restrict jet nighttime departures and arrivals to F.A.R. Part 36, Stage 3 aircraft.	-3,821	-6,671	None	None	None significant	Major impact	None	Major impact			Yes
Restrict all jet operations to F.A.R. Part 36, Stage 3 aircraft, regardless of time of operation.	-9,233	-23,594	None	None	None	Major impact	Improvement	Major impact			No