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Proposed Final

**ENVIRONMENTAL ASSESSMENT
FOR THE PROPOSED DEPARTURE ROUTE
CHANGES AT HILL AFB, UTAH**

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FINDING OF NO SIGNIFICANT IMPACT FOR THE PROPOSED DEPARTURE ROUTE CHANGES AT HILL AIR FORCE BASE, UTAH

Description of the Proposed Action

As a result of increased air traffic flow into the Salt Lake City area, the Air Force proposes to modify the aircraft departure routes at Hill Air Force Base (AFB). The new departure routes would improve military readiness without increasing costs, while allowing for efficient management of increased commercial and military air traffic within the Wasatch Front region. Military readiness would improve as a result of increased training opportunities due to reduced transit time to the Utah Test and Training Range (UTTR) and additional departure route flexibility. The efficiency of air traffic management would improve as a result of increased separation between military and commercial aircraft. Increased aircraft separation would result in expedited releases from Hill AFB, reduced air traffic controller workload, and increased capacity at the Salt Lake City International Airport (SLCIA).

Four alternative actions were evaluated in this environmental assessment (EA). The Proposed Action would modify the current Devlin Departure route and add the south Wasatch Departure route. Alternative 1 would modify the current Devlin Departure route and would not add the Wasatch Departure route. Under Alternative 2, the current Devlin Departure route would remain unchanged, but the Wasatch Departure route would be added. The No-Action Alternative would maintain the current Devlin Departure route.

For each alternative, the maximum mission scenario was evaluated, i.e., approximately 127,000 aircraft operations and all available aircraft parking spaces were assumed for the modeling effort. Only the departure routes varied from one alternative to another. The proposed alternatives would not result in any additional employees at Hill AFB.

Summary of Environmental Impacts of the Proposed Action

Surface Water

The proposed action would not change current ground activities at Hill AFB. Therefore, the proposed action poses no impacts to surface water. Similarly, the alternative actions would not result in any impacts to surface water in the area.

Groundwater

The proposed action would not change current ground activities at Hill AFB. Therefore, the proposed action poses no impacts to groundwater. Similarly, the alternative actions would result in no impacts to groundwater in the area.

Geology and Soils

The changing of flight paths would not impact soils and geology. Therefore, neither the proposed action nor the alternative actions would pose any adverse impacts to geology or soils.

Vegetation

The changing of flight paths would not impact vegetation at or around Hill AFB. In addition, no known endangered or threatened plant species exist at Hill AFB. Therefore, the impacts of the proposed and alternative actions would not be significant.

Wetlands

The proposed and alternative actions would not change current impacts on wetland areas. Therefore, no adverse environmental impacts to wetlands are expected.

Air Quality

The proposed and alternative action evaluations are based on the current maximum mission scenario at Hill AFB. Therefore, air emissions at the Base would not change as a result of implementing any of the alternative actions. Consequently, no adverse impacts to air quality are anticipated.

Wildlife

Due to the lack of protected species or habitat on Base, there are no expected significant impacts on wildlife from the proposed action. Likewise, the alternative actions would have no adverse impact on wildlife.

Archaeological and Historical Resources

Changing of flight activities would not affect archaeological or historical resources at Hill AFB. Therefore, the proposed action and alternatives would not adversely impact archaeological or historical resources.

Land Use

Noise levels and accident potential zones (APZs) can define land use on and adjacent to Hill AFB. Aircraft noise modeling performed in conjunction with this EA indicates that noise contours for air traffic at Hill AFB would change only slightly within the 65 dB noise contour at the south end of the runway as a result of the proposed or alternative actions. Therefore, noise levels from the proposed and alternative actions are not expected to result in any adverse impact to land use. The original location and dimensions of the APZs at Hill AFB were established independently from the flight paths. Therefore, the proposed flight path changes would not cause any changes to the established APZ areas. No adverse impacts to land use are expected as a result of implementing the proposed or alternative actions.

Noise

Neither the proposed action nor the alternative actions would cause significant changes to the Day-Night average sound level (DNL) noise contours of 65 decibels or greater. Therefore, there are no significant impacts to noise levels expected as a result of implementing the proposed and alternative actions.

Health and Safety

Under Alternative 2 and the No-Action alternative, increased separation of military and commercial aircraft would not occur, thereby inhibiting expedited releases from Hill AFB due to safety concerns. The proposed action and Alternative 1 optimize separation between military and commercial aircraft thereby expediting releases and reducing air traffic controller workload.

APZs at Hill AFB were established based on a 1973 Air Force Study that identified areas surrounding Air Force installations that had the highest incidents of aircraft accidents. These zones were centered along the runway centerline, and their locations and dimensions were entirely independent from the flight tracks. Therefore, proposed changes to the flight tracks at Hill AFB are not expected to adversely impact health and safety at Hill AFB or in the surrounding community.

Transportation

The proposed alternatives would not result in any additional employee traffic at Hill AFB. Therefore, there would be no impacts to transportation level of service or patterns on or around the Base.

Socioeconomics

The proposed alternatives would have no significant adverse impact on the local economy or employment. However, increased training opportunities as a result of the proposed action would increase the value of Hill AFB as a DoD asset. This may be one of many considerations for any future base closure evaluations.

Cumulative Impacts

There are no expected adverse cumulative impacts from the proposed action or alternatives.

Conclusion

Based on the results of this Environmental Assessment, no significant impacts are expected from any of the departure route alternatives. Therefore, in accordance with Air Force Instruction 32-7061, a Finding of No Significant Impact (FONSI) may be issued. Preparation of an Environmental Impact Statement (EIS) is not necessary.

Hill Air Force Base, Utah

Authorized Signature

Date

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LIST OF ACRONYMS

AFB	Air Force Base
AFCEE	Air Force Center for Environmental Excellence
AFI	Air Force Instruction
AICUZ	Air Installation Compatible Use Zone
AO	Approval Order
APZI	Accident Potential Zone I
APZII	Accident Potential Zone II
APZs	Accident Potential Zones
CATEX	Categorical Exclusion
CFR	Code of Federal Regulations
dB	Decibel
DNL	Day-Night Average Sound Level
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
FAA	Federal Aviation Administration
FONSI	Finding of No Significant Impact
HAPs	Hazardous air pollutants
Lmax	Maximum overflight sound levels
NAAQS	National Ambient Air Quality Standards
NCA	Noise Control Act of 1972
NEPA	National Environmental Policy Act
NM DME	Nautical miles distance measuring equipment
OO-ALC	Ogden Air Logistics Center
RCS	Report Control Symbol
SEL	Sound exposure level
SLCIA	Salt Lake City International Airport
TACAN	Tactical aid to navigation
UDAQ	Utah Division of Air Quality
UTTR	Utah Test and Training Range
VFR	Visual flight rules
VOCs	Volatile organic compounds

EXECUTIVE SUMMARY

Increased air traffic flow into the Salt Lake City area resulted in the construction of a new runway at the Salt Lake City International Airport (SLCIA). As a result of the new runway, air traffic patterns also changed. The air traffic pattern changes compelled the Air Force to reevaluate the aircraft departure routes at Hill Air Force Base (AFB). Consequently, the Air Force proposes to implement new departure routes that would improve both military readiness and air traffic management within the Wasatch Front region.

The new departure routes would reduce transit time and provide additional departure route flexibility, which would increase training and, thus, improve military readiness. The new routes would expedite releases, reduce air traffic controller workload, and increase capacity at the SLCIA. These changes would increase the separation between commercial and military air traffic within the Wasatch Front.

Air Force instructions require the completion of an Environment Assessment (EA) for all proposed Air Force actions that potentially could have adverse environmental impacts. Four different departure route scenarios have been proposed by the Air Force. The Proposed Action would modify the current Devlin Departure route and add the Wasatch Departure route. Alternative 1 would modify the current Devlin Departure route as in the Proposed Action, but would not add the Wasatch Departure route. Alternative 2 would maintain the current Devlin Departure route, and would add the Wasatch Departure route. The No-Action Alternative would maintain the current Devlin departure route.

Section 1 of this report presents the purpose and need for the proposed action. In addition, a brief history of the departure routes at Hill AFB is presented.

Section 2 describes the proposed action and the alternative actions considered in this EA. Selection criteria for evaluating the alternatives are also presented in this section.

Section 3 describes the existing environmental conditions at Hill AFB.

Section 4 describes the anticipated environmental impacts of the proposed action and the alternatives.

Based on the findings of this EA, modification of the aircraft departure routes at Hill AFB is not expected to have any significant and unavoidable adverse environmental impacts. A Finding of No Significant Impact (FONSI) statement has been prepared and is included at the beginning of this report. Preparation of an Environmental Impact Statement (EIS) is not necessary.

Section 1

PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 Background and History of Hill AFB

Hill Air Force Base (AFB) is an Air Force Materiel Command base located in northern Utah about 25 miles north of Salt Lake City and approximately 5 miles south of Ogden (Figure 1-1). The Base was established by congressional order in 1935 and was constructed adjacent to the Ogden Army Arsenal beginning in 1940. In 1955, the Ogden Army Arsenal was transferred from the U.S. Army to the U.S. Air Force, doubling the size of the Base to a total of almost 6,700 acres and 1,171 buildings. The Ogden Air Logistics Center (OO-ALC) serves as the Base host organization, providing worldwide engineering and logistics management for the F-16 Fighting Falcon (Hill AFB, 2000a).

In addition to maintaining F-16, C-130, and A-10 aircraft, Hill AFB repairs hydraulics, avionics, and instrument and electronic equipment, and provides overhaul and repair of landing gear for all U.S. Air Force aircraft and approximately 70 % of Department of Defense (DoD) aircraft. Other active units operating and training out of Hill AFB include the 388th Fighter Wing and the 419th Fighter Wing (Reserve). In addition, Hill AFB is responsible for worldwide logistics management for the nation's fleet of strategic intercontinental ballistic missiles.

1.2 History of Departure Routes at Hill AFB

Prior to 1998, the Standard Instrument aircraft departure route at Hill AFB was called the Island Departure. The Island Departure required that an aircraft departing from Runway 14 (south) make a right turn at 1.5 to 2 nautical miles distance measuring equipment (NM DME) from the Hill AFB tactical aid to navigation (TACAN) to a heading of 280 to intercept the 240 radial of the Hill TACAN. Departures from Runway 32 (north) were required to turn left to a heading of 190 at 3 NM DME to intercept the 240 radial of the Hill TACAN (Wasatch Regional Council, 1995).

In February 1998, an Air Force Form 813, *Request for Environmental Impact Analysis*, was submitted to delete the Island Departure's turn restrictions at the end of the runways (Hill AFB, 1998a). This form was submitted because anytime the Air Force proposes to change departure routes, they must comply with requirements of the National Environmental Policy Act (NEPA) and examine the environmental consequences of changing the routes. The route change proposed in the Form 813 allowed for aircraft departing Hill AFB to turn westbound at the departure end of each runway; 0.8 NM DME from the TACAN on Runway 14 and 1.6 NM DME from the TACAN for Runway 32. The purpose of the change was to reduce fuel consumption and reduce conflicts with the Salt Lake City International Airport (SLCIA) traffic, allowing for automatic departure releases from Hill AFB. The 813 was signed in May 1998, and it was determined that the action qualified for a categorical exclusion (CATEX) from further environmental analysis based on category A2.3.36 of Air Force Instruction (AFI) 32-7061, *The Environmental Impact Analysis Process*. Category A2.3.36 excludes adopting procedures that do not route air traffic over noise-sensitive areas or patterns that occur at or above 3,000 feet above ground level regardless of underlying land use. Another Form 813 was submitted in May 1998 to establish this new traffic pattern as the Devlin Departure. This proposal was made in conjunction with the previous Form 813. This form was signed in September 1998 and also qualified for a CATEX under the Category A2.3.36 (Hill AFB, 1998b).

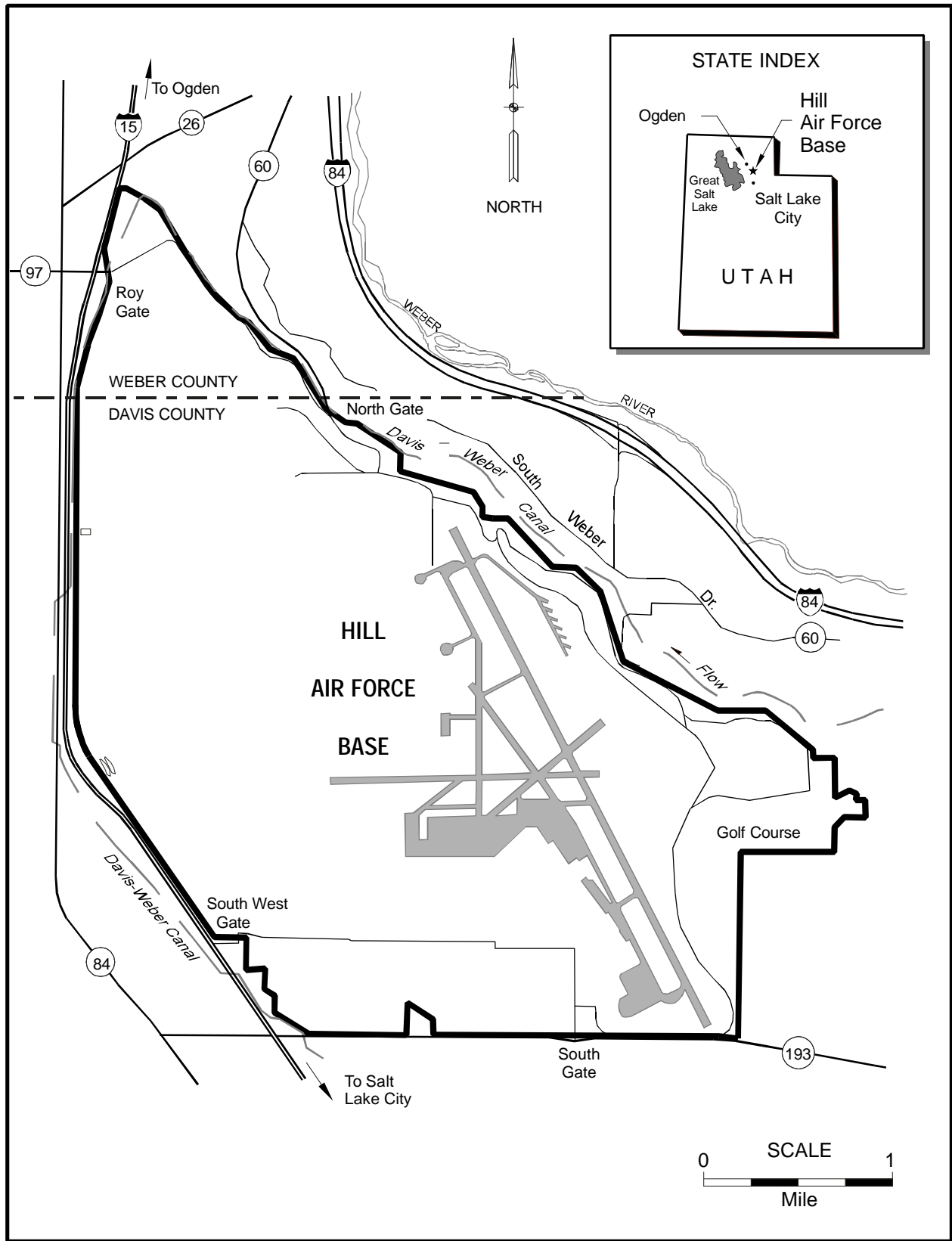


Fig 1-1. CDR-WEH 05-18-00 SLC

Figure 1-1. Location of Hill Air Force Base

Subsequent to the September 1998 approval of the new Devlin Departure, it was determined that additional environmental study was needed prior to fully implementing the new departure route because the desired Devlin would route aircraft over noise sensitive areas and patterns would occur below 3,000 feet above ground level. However, reversion to the exact Island Departure was not possible due to Federal Aviation Administration (FAA) legal minimum safety buffer requirements. The Island Departure did not comply with FAA minimum requirements and created increased air traffic controller workload and potentially dangerous situations. Therefore, another Form 813 was submitted in January 1999 to revert back to a modified version of the Island Departure, known as the current Devlin Departure, until the desired Devlin Departure route could be properly assessed. The current Devlin Departure, in compliance with local procedures, requires that departing aircraft must maintain a 30-degree maximum angle of bank and 300 knots airspeed through the turn. In addition, the current Devlin Departure requires aircraft to initiate departure turns at approximately 0.8 NM DME from the TACAN on Runway 14 and at approximately 1.6 NM DME from the TACAN on Runway 32, rather than the 1.5 NM DME and 3 NM DME required by the Island Departure (Hill AFB, 1999). This reversion was determined to qualify for a CATEX under Category A2.3.7, which is for the resumption of pre-existing actions. This Environmental Assessment (EA) is now being completed to satisfy the requirement to analyze the impacts of implementing the original desired Devlin Departure. In addition, Hill AFB is also analyzing under this EA the impacts of adding a new Wasatch Departure route at the base.

1.3 Purpose and Need for the Proposed Action

Air traffic into the Salt Lake City area has increased in recent years and is expected to continue rising, particularly as a result of the 2002 Winter Olympic Games. To accommodate the increased air traffic, a new runway, known as the West Runway, was constructed and opened at the SLCIA. As a result of the new runway, air traffic flow into the Salt Lake area has changed. The Air Force is proposing to implement new departure routes at Hill AFB to accommodate the new runway and to increase the safety buffer zone between military aircraft and the SLCIA aircraft. In addition, reducing conflicts with the SLCIA traffic will allow Hill AFB to obtain more frequent automatic departure releases for aircraft, resulting in reduced Air Traffic Controller workload.

The new departure routes at Hill AFB would reduce transit time to the Utah Test and Training Range (UTTR) located in western Utah, thereby making better use of flying time and fuel allocations. It would also provide additional departure route flexibility, which would increase training options, thus improving military readiness.

1.4 Applicable Requirements

There are several regulatory environmental programs that apply to the proposed action. These program requirements are described below.

1.4.1 National Environmental Policy Act Requirements for Air Force Actions

The National Environmental Policy Act of 1969 requires federal agencies to analyze the potential environmental impacts of a proposed action and to evaluate reasonable alternative actions. The results of the analyses are used to make decisions or recommendations on whether and how to proceed with those actions. AFI 32-7061 describes the process of preparing an EA for proposed actions on Air Force property. Based on the EA, either a Finding of no Significant Impact (FONSI) or an Environmental Impact Statement (EIS) is prepared. This EA looks at the environmental impacts of the proposed action and the

no-action alternative. Both the AFI 32-7061 guidance and the implementing regulations of NEPA (40 *Code of Federal Regulations* [CFR] 1500) were followed in preparing this EA.

1.4.2 Noise Emission Requirements

Noise pollution is regulated by the Noise Control Act of 1972 (NCA). The NCA requires federal facilities to implement measures to reduce noise emissions. Generally, federal agencies whose activities result in increased environmental noise in the surrounding community are responsible for compliance with state and local environmental noise requirements. The state of Utah has no noise control regulations, although Utah Code 10-8-16 gives cities the authority to develop noise control regulations or standards.

1.4.3 Health and Safety Requirements

Air Force Instruction 91-202, *The US Air Force Mishap Prevention Program*, implements Air Force Policy Directive 91-2, *Safety Programs*, by establishing mishap prevention program requirements, assigning responsibilities for program elements, and providing program management information (U.S. Air Force, 1998a). The safety programs provide safe healthful environments by identifying and controlling hazards and preventing mishaps.

1.4.4 Air Installation Compatible Use Zone Program

The Air Installation Compatible Use Zone (AICUZ) Program is a Department of Defense (DoD) planning program which was developed in response to growing incompatible urban development around military airfields. Several documents make up the regulatory basis of the AICUZ program (U.S. Air Force, 1999, Whipple, 2000). They are as follows:

- Department of Defense Instruction 4165.57 establishes and requires military departments to develop, implement, and maintain an AICUZ program for installations with flying operations;
- The General Services Administration, Federal Management Circular 75-2 entitled “Compatible Land Uses at Federal Airfields” requires federal agencies that operate airfields to work with local, regional, state, and other federal officials on compatible land use planning;
- Air Force Instruction 32-7063, “Air Installation Compatible Use Zone (AICUZ) Program” identifies the policy, responsibilities, and requirements of the program;
- Air Force Manual 32-1123(I), “Airfield and Heliport Planning and Design” provides standardized criteria for planning and developing the layout of runways, taxiways, aprons, and related facilities for airfields and heliports;
- Air Force Manual 32-7067, “Planning in the Noise Environment” discusses noise characteristics, noise sources, effects of noise, noise monitoring, tools for noise analysis and reducing noise conflicts; and
- Air Force Instruction 13-201, “Air Force Airspace Management” establishes practices to decrease disturbances from flight operations that might cause adverse public reaction, and provides flying unit commanders with general guidance for dealing with local problems.

The land use compatibility of areas affected by the proposed action and alternatives presented in this EA are assessed in accordance with the above regulations.

1.5 Scope and Organization of This Document

The remainder of this document is organized as follows:

Section 2 provides a description of the selection criteria, the proposed action, and the alternatives, including the no-action alternative;

Section 3 describes the existing environmental conditions at Hill AFB;

Section 4 identifies the potential environmental consequences associated with implementing the proposed action and alternatives;

Section 5 presents a list of the preparers of this report;

Section 6 contains a list of offices, agencies, and persons contacted for information used in the report;

Section 7 includes a list of references;

Appendix A contains the AICUZ land use compatibility guidelines for a wide range of land uses; and

Appendix B contains background information on environmental acoustics.

Appendix C contains the historic flight paths and noise contours for Hill AFB;

Section 2

DESCRIPTION OF PROPOSED ACTION AND ALTERNATIVES

This section presents the criteria for selecting reasonable alternatives for departure route changes at Hill AFB. The proposed action and the alternative actions are identified, summarized, and evaluated against these criteria.

2.1 Selection Criteria

To be considered as an alternative, the departure route must:

- Not conflict with established general aviation traffic in established visual flight rules (VFR) corridors;
- Allow for efficient management of potential increases to military and/or commercial air traffic;
- Meet all Federal Aviation Administration (FAA) requirements for safe flight conduct and separation of aircraft;
- Meet all Air Force requirements for safe flight conduct and separation of aircraft;
- Maintain or improve current air force training capability and flight track flexibility by making better use of the Utah Test and Training Range (UTTR); and
- Ensure consistency with approved instrument flying and radar trail departure procedures.

The proposed action and each alternative adhere to the above listed selection criteria.

2.2 Proposed Action: Modify Devlin Departure and Add Wasatch Departure

The departure routes for the proposed action are shown in Figure 2-1. The proposed action would consist of modifying the current Devlin Departure route and adding the southbound Wasatch Departure route. Changing from the current Devlin Departure route to the modified Devlin Departure route results in changes to Runway 14 departure routes. The modified Devlin Departure route would continue to allow aircraft to initiate departure turns at 0.8 NM DME from the TACAN on Runway 14 and at 1.6 NM DME from the TACAN on Runway 32, as is allowed under the current Devlin Departure. However, the proposed action would eliminate the existing 30-degree maximum angle of bank for departing aircraft, resulting in fewer flights over any one area while maintaining acceptable noise levels for all underlying land use. In addition, the modified Devlin Departure would allow for automatic releases from Hill AFB by creating procedural separation between the air traffic associated with the SLCIA West runway and Hill AFB air traffic. The quicker turn would also reduce time and distance flown when a pilot is flying to and from the UTTR. The Wasatch Departure would allow eastbound aircraft to fly south and then turn directly east (Hawley, 2000). Currently, eastbound departures must go due west nearly 20 miles before they are allowed to turn east. Additionally, the Wasatch Departure would allow aircraft to go directly to the south end of the UTTR to enter the airspace from the south and fly north, simulating crossing a boundary dividing friendly territory in the south and enemy territory in the north. Also, the Wasatch Departure would allow aircraft to avoid flying over the Great Salt Lake during winter months when the water temperature can drop below freezing.

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND

- Departure Route
- Runway and Airfield Pavement

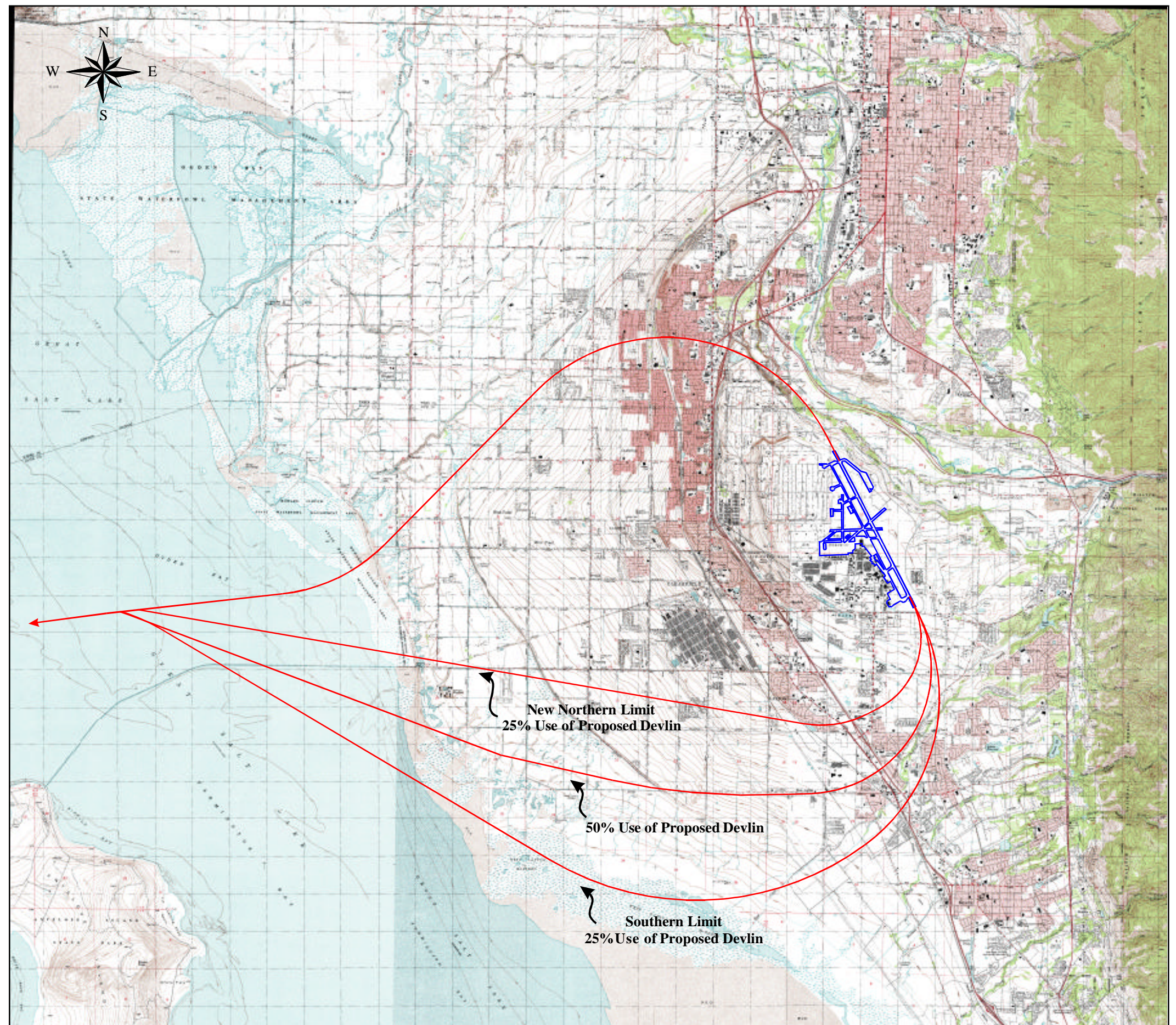
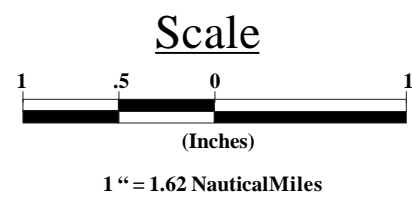


Figure 2-2. Alternative 1 - Departure Routes

The proposed action optimizes military readiness by reducing transit time and adding departure route flexibility. The proposed action also optimizes separation between military and commercial aircraft thereby expediting releases, reducing air traffic controller workload, and increasing SLCIA and military aircraft capacity. The proposed routes meet all FAA and Air Force requirements for safe flight conduct and separation of aircraft, and do not conflict with established general aviation traffic in established VFR corridors.

2.3 Alternative 1: Modify Devlin Departure

The departure routes for Alternative 1 are shown in Figure 2-2. Alternative 1 consists of modifying the current Devlin Departure route as in the proposed action, but not adding the Wasatch Departure route. This alternative would reduce flight time to UTTR. It would also allow for automatic releases from Hill AFB by creating procedural separation between the air traffic associated with the SLCIA West runway and Hill AFB air traffic. However, the additional flight track flexibility associated with the Wasatch Departure route would not occur as a result of this alternative. Therefore, Alternative 1 would not be as effective as the proposed action at improving training capabilities at Hill AFB.



2.4 Alternative 2: Maintain Current Devlin Departure and Add Wasatch Departure

The departure routes for Alternative 2 are shown in Figure 2-3. Alternative 2 consists of maintaining the current Devlin Departure route, and adding the Wasatch Departure route. Eastbound aircraft would benefit from the Wasatch Departure, as would aircraft wishing to enter the southern airspace of the UTTR or to avoid flying over the Great Salt Lake. However, reduced flying time and distances to the UTTR would not occur as a result of this alternative, and the air traffic separation would not increase as much as in the proposed action. Therefore, Alternative 2 would not be as effective as the proposed action in improving training capabilities or in obtaining automatic releases from Hill AFB.

2.5 No-Action Alternative: Maintain Current Devlin Departure

The departure routes for the No-Action Alternative are shown in Figure 2-4. Under the No-Action Alternative, the current Devlin Departure route would not be modified and the Wasatch Departure route would not be added. This alternative would not allow for westbound turns at the departure end of the runway, quicker eastbound turns, direct flights to the south end of the UTTR, or automatic releases from Hill AFB. Thus, the No-Action Alternative would not improve military readiness nor would it allow for the efficient management of potential increases to commercial or military air traffic.

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND	
	Flight Line
	Runway

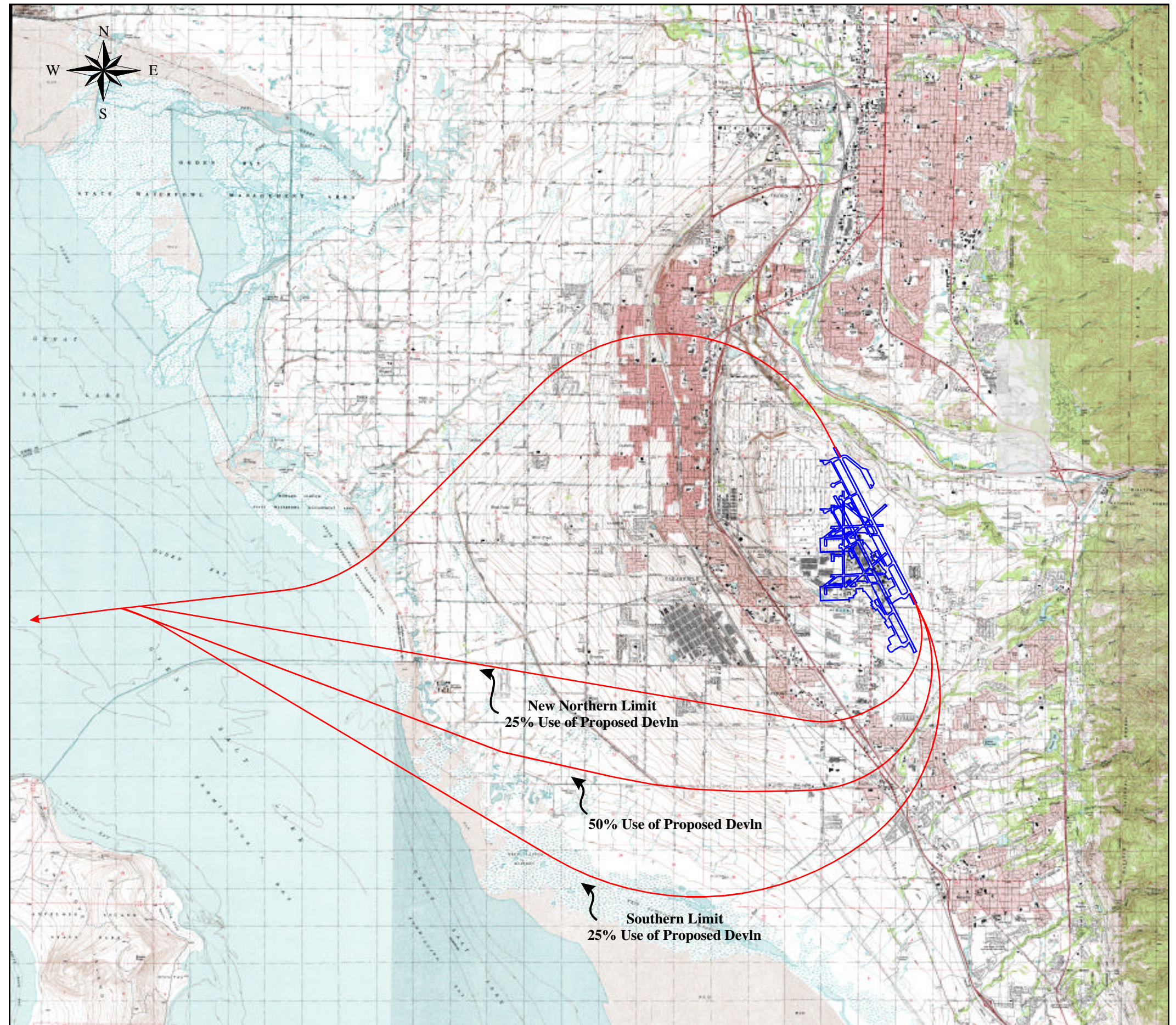
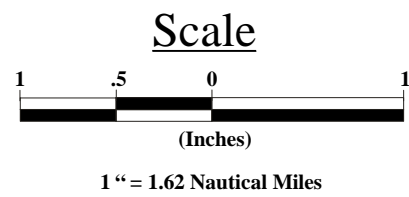





Figure 2-2. Alternative 1 - Departure Routes

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND	
	Departure Route
	Runway and Airfield Pavement

Scale



(Inches)

1" = 1.62 Nautical Miles

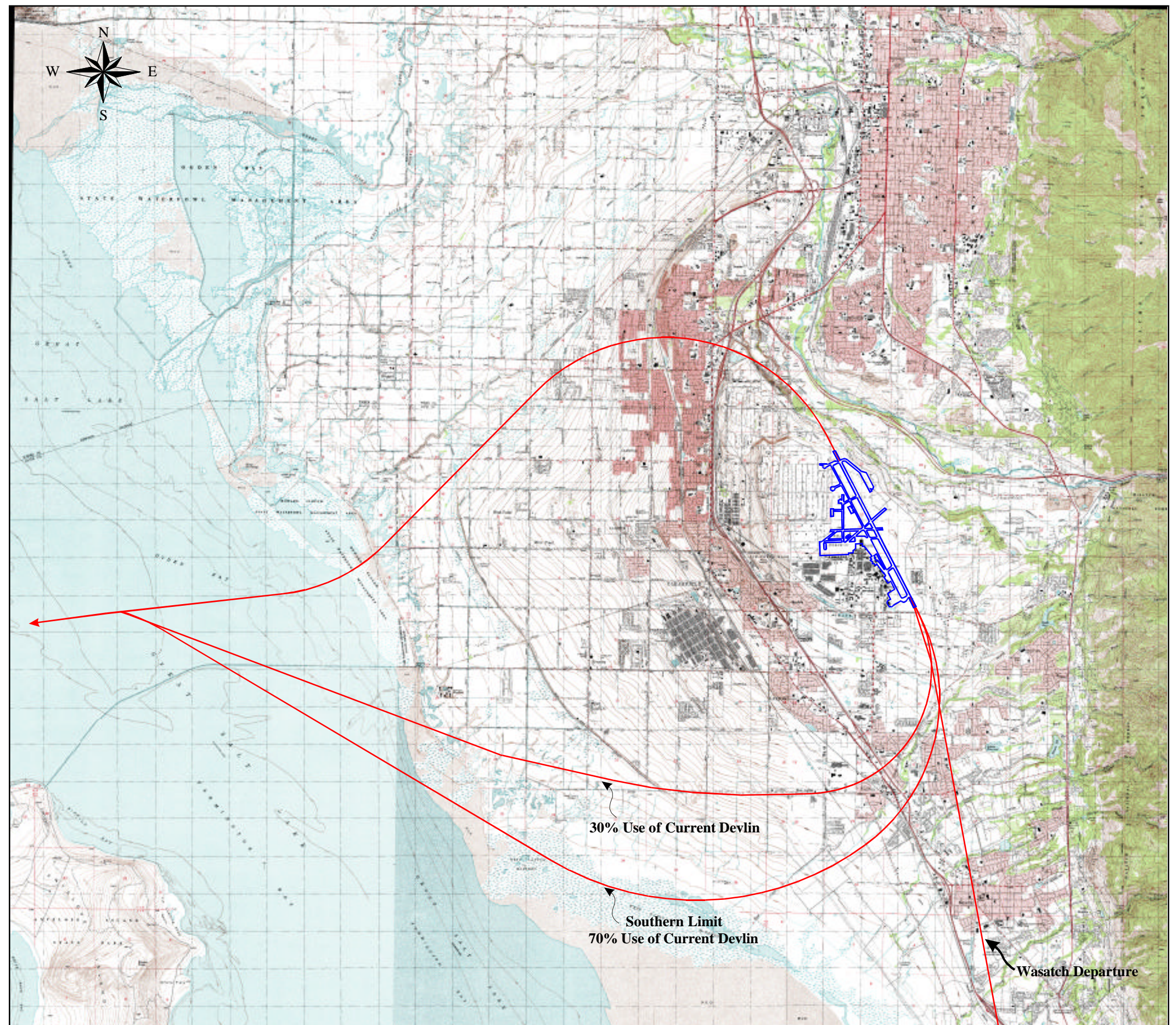


Figure 2-3. Alternative 2 - Departure Routes

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND

- Departure Route
- Runway and Airfield Pavement

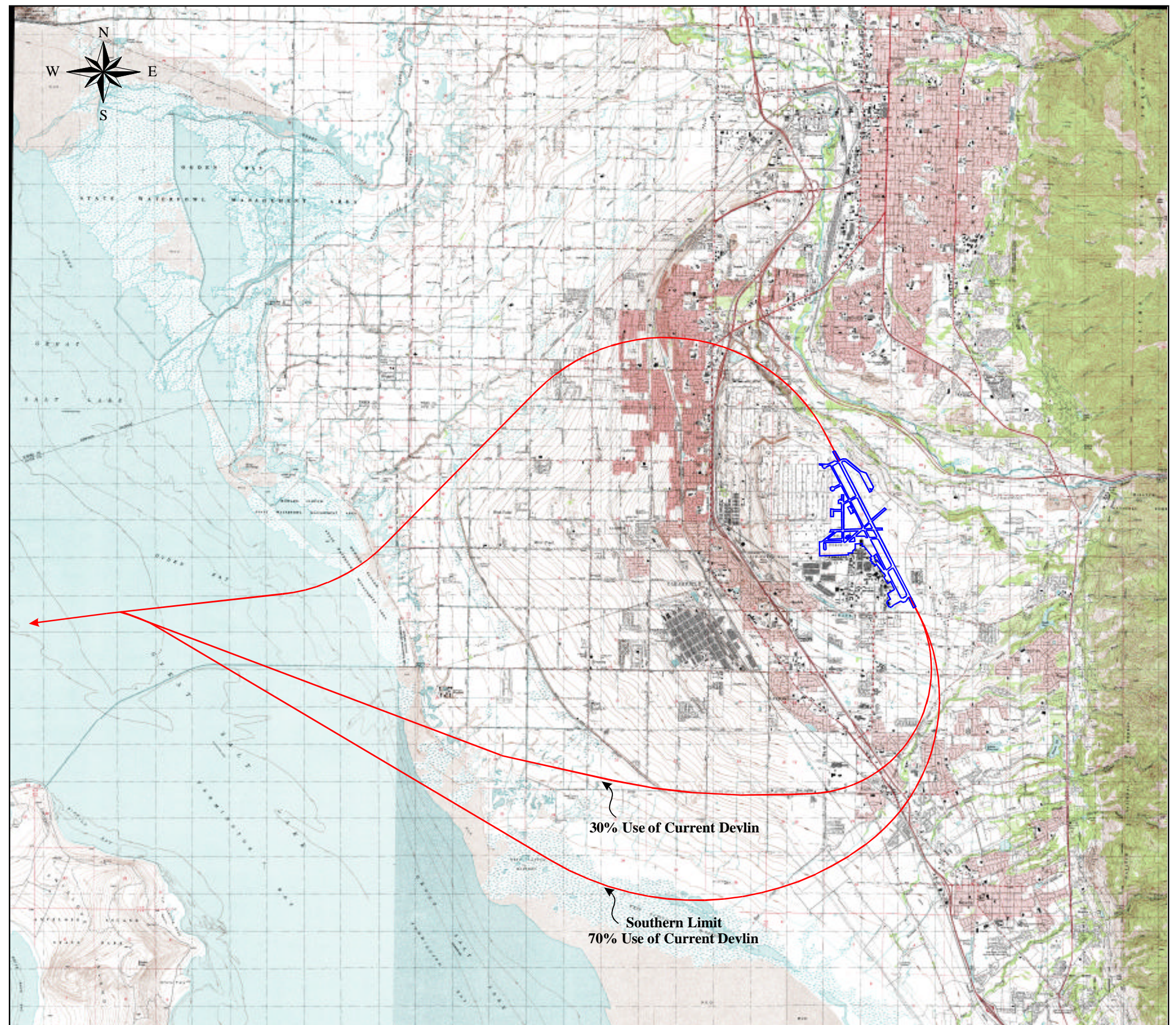
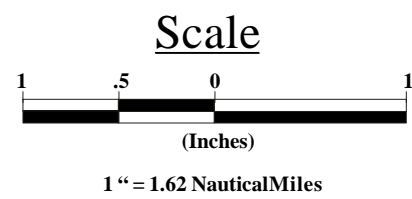


Figure 2-4. No Action Alternative - Departure Routes

Section 3

DESCRIPTION OF EXISTING ENVIRONMENT

This section describes the existing environmental conditions at Hill AFB and surrounding affected areas.

3.1 Surface Water

There are no streams or rivers located within the boundaries of Hill AFB. The Davis-Weber Canal, a privately owned irrigation canal, is located approximately 0.3 miles northeast of the end of runway 32. The canal typically contains water from April to October, and follows the boundary of the Base. The Weber River, located approximately one mile northeast of the end of runway 32, parallels Interstate 84

3.2 Groundwater

Hill AFB is part of the Weber Delta subdistrict. Water can be obtained from two main aquifers, the Sunset and the Delta, which occur approximately 250 to 400 feet and 500 to 700 feet below the ground surface, respectively (Montgomery Watson, 1998). Perched water tables, which occur in clay layers at shallow depths, slow down the downward movement of water, causing the water to pool or move close to the surface. Consequently, perched water tables should not be carelessly changed or eliminated (U.S. Air Force, 1989). Recharge to the shallow aquifers occurs by seepage from streams and canals, and by infiltration from precipitation and irrigation.

Numerous areas of groundwater contamination exist on the Base, and significant efforts are being taken to reduce contaminant levels and their associated potential risks to the environment (Montgomery Watson, 1998). Areas of groundwater contamination and active remedial actions include operable units 1 through 9, Sites ST061, ST068, and ST086.

3.3 Geology and Soils

Geology

Hill AFB, at an elevation of 4,600 to 4,850 feet above sea level, is located in the southwest part of the Weber Delta District, which encompasses approximately 40 square miles in Weber and Davis Counties. It is the largest of the Pleistocene deltas associated with Prehistoric Lake Bonneville (U.S. Air Force, 1989). The Weber Delta formed as mountain waters flowed into the lake. The Provo formation is the formation found over 90 % of Hill AFB and consists of gravel and sand.

Soils

Surface soils are composed primarily of sand, gravel, silts, and clays typical of the Weber Delta district. The soils are mostly well-drained (moderate to extreme permeability) and have a slight to moderate erosion susceptibility. The surface layers are 7 to 17 inches thick and are generally alkaline, with an average pH of 7.8. Silty-sand is present to approximately 600 feet deep, with some isolated clay layers 5 to 30 feet below the surface (U.S. Air Force, 1989). Numerous areas of soil contamination also exist across the Base, and efforts are being taken to reduce any potential risks to the environment (Montgomery Watson, 1998).

3.4 Vegetation

Hill AFB vegetation is dominated by Big Sagebrush and various grasses, a category known as the Sagebrush Zone (U.S. Air Force, 1989). The well-drained soils on Base cause the vegetation to dry out

faster than would be expected based on the rate of precipitation. Currently, no endangered floral species have been identified at Hill AFB.

The Base currently out-leases 29 acres in the south clear zone for grazing in order to remove and utilize plant growth (U.S. Air Force, 1989). The leased grazing is limited to use by cattle, for a maximum grazing capacity of 29 Animal Unit Months during each lease year.

3.5 Wetlands

Seventeen wetland areas exist at Hill AFB. Six of the areas are manmade drainage ponds, and eleven are natural marsh areas (U.S. Air Force, 1989). Most of the drainage ponds are located in the southern portion of the Base for control of surface water runoff. The natural wetland areas are located in the northern and western portions of the Base. The natural marsh areas usually remain wet throughout the year.

3.6 Air Quality

Hill AFB is located within both Davis County and Weber County. Davis County is designated by the U.S. Environmental Protection Agency (EPA) as a maintenance area for ozone and an attainment area for all other National Ambient Air Quality Standards (NAAQS). Weber County is designated as an attainment area for all NAAQS. Air pollutant emission sources at Hill AFB include aircraft operations and maintenance, vehicular activities, and various industrial activities. Emissions from these sources include particulate matter smaller than ten microns (PM₁₀), sulfur oxides (SO_x), nitrogen oxides (NO_x), volatile organic compounds (VOCs), carbon monoxide (CO), and hazardous air pollutants (HAPs).

The *Utah Administrative Code* Rule 307 (UAC R307) requires stationary sources of regulated air pollutants to operate under an approval order (AO) issued by the Utah Division of Air Quality (UDAQ). AOs stipulate conditions necessary for a stationary source to achieve compliance with state and federal air quality regulations. In addition, AOs provide a means of achieving compliance with the NAAQS. Hill AFB operates under numerous AOs that address various industrial activities on the Base and is currently in compliance with all AOs issued by the UDAQ.

3.7 Wildlife

Forty-eight species of mammals are known to exist on Hill AFB. No known threatened, endangered, declining, or limited wildlife species inhabit the Base (U.S. Air Force, 1989). Two endangered species, the peregrine falcon and the bald eagle, hunt rabbits and rodents on and near the Base. Due to potential vehicle and aircraft hazards, the Base does not attempt to attract wildlife.

3.8 Archaeological and Historical Resources

Cultural resource management work at Hill AFB has periodically taken place since the late 1960s (Cultural Resource Management, 1999). Numerous cultural resource inventories have been conducted since the late 1980s under the authority of National Historic Preservation Act. These inventories have primarily been completed in the area of historic building resources. Approximately 25 percent of Hill AFB's lands have been inventoried for archaeological resources.

3.9 Land Use

The Air Force AICUZ program policy promotes compatible land use through participation in local, regional, state and federal land use planning control and coordination processes (U.S. Air Force, 1999). The AICUZ areas of influence include the following (U.S. Air Force, 1998):

- land areas on which certain uses may obstruct the airspace or otherwise be hazardous to aircraft operations;

- land areas exposed to aircraft operations that affect public health, safety, or welfare, defined as being within the A-Weighted, Day-Night Average Sound Level (DNL) 65 decibel (dB) noise contour; and
- land areas within clear zones and accident potential zones (APZ) of an Air Force base with active runways.

The area immediately beyond the end of a runway is designated as the clear zone. This area has a high potential for accidents and traditionally has been acquired by the Government in fee and kept clear of obstructions to flight (Department of Defense, 1977b). The Air Force owns all of the property, excluding the publicly owned roadways, within the clear zones at Hill AFB (Wasatch Front Regional Council, 1995). The north clear zone at Hill AFB is the recommended size of 3000 feet wide by 3000 feet long. The south clear zone is 3000 feet wide by approximately 3400 feet long; the southern boundary is not linear.

Accident Potential Zone I (APZI) is the area beyond the clear zone which possesses a significant potential for accidents. Accident Potential Zone II (APZII) is an area beyond APZI having a measurable potential for accidents (Department of Defense, 1977b). DoD guidance recommends that APZI be 5000 feet long and 3000 feet wide; and APZII be 7000 feet long and 3000 feet wide but this may be modified based on site-specific conditions (Department of Defense, 1977a). To appropriately fit local operation and land use considerations, the northern APZI at Hill AFB is 8000 feet long and 3000 feet wide; the northern APZII is 3000 feet square (Hill AFB, 1974). The southern APZs at Hill AFB have been modified due to the hazard presented by the mountains east of Hill AFB. The southern APZI is not the typical rectangular shape and is somewhat wider than usual (Hill AFB, 1974, 1982). The southern APZI is an average of 5200 feet wide by 5000 feet long. The southern APZI configuration is retained along the extended runway centerline. The southern APZII has been omitted because departing traffic from Runway 14 initiates a right turn within 2 nautical miles of the TACAN system, prior to the south boundary of APZI (Wasatch Front Regional Council, 1995).

Prior to the noise analysis conducted as part of this EA, the most recent AICUZ study for Hill AFB was completed in 1982 (Hill AFB, 1982). A compatible land use study that includes aspects of a traditional AICUZ study was completed in 1995 (Wasatch Front Regional Council, 1995). In 1976, the Utah legislature set aside \$1,000,000 for the acquisition of use easements for land in the southern APZ. In 1994, the Utah legislature set aside \$10,000,000 for the acquisition of use easements in the APZs and their immediate vicinity, and in areas located within the 75 dB DNL contour (Wasatch Front Regional Council, 1995). These easements were based on the existing APZs and on noise contours completed in 1993 and incorporated in the 1995 compatible land use study.

Appendix A shows the compatible land uses for clear zones, APZs, and DNLs between 65 and 85 dB as provided in the Air Force Handbook 32-7084, *AICUZ Program Manager's Guide* (AICUZ Guide). The AICUZ Guide provides guidance and procedures necessary to implement the AICUZ program.

3.10 Noise

The DNL is the noise metric used by the U.S. Air Force to assess land use compatibility (see Appendix A). DNL values are calculated from one-hour average sound level values, with the values for the nighttime period (10 p.m. to 7 a.m.) increased by 10 dB to reflect the greater disturbance potential from nighttime noises. Attachment 5 of the AICUZ Guide states that nearly all studies on residential aircraft noise compatibility recommend no residential uses in noise zones above DNL 75 dB. It further states that no restrictions on residential uses are recommended below noise zone DNL 65 dB and that for noise levels between DNL 65 and 75 dB there is currently no consensus. Background information on

environmental acoustics, including definition of noise terminology, information on typical sound levels, and guidelines used to interpret noise, is provided in Appendix B.

3.10.1. Noise-Sensitive Land Uses

Housing areas are the primary noise-sensitive land uses on the base. The largest housing area is located in the southwestern corner of the Base. Additional smaller housing areas, including dormitories, are located on the western and southern sides of the Base. The on-base medical clinic is also a noise-sensitive use. Off-base adjacent land uses include residential, agricultural, commercial, and industrial uses. Adjacent off-base land uses also include schools, churches, daycare centers, and medical clinics. Table 3-1 indicates the general locations of noise-sensitive residential uses in the communities surrounding the Base.

Table 3-1. Communities Surrounding Hill AFB

Community	Location Relative to Hill AFB
Clearfield	Southwest
West Point	West
Clinton	West
Sunset	West
Roy	Northwest
Riverdale	North
Washington Terrace	North
South Ogden	Northwest
South Weber	East
Layton	South

3.10.2. Sources of Noise

Primary sources of noise at Hill AFB include aircraft operations and vehicle traffic. The most recently available data on aircraft operations indicate that maximum mission is approximately 127,000 annual operations at Hill AFB (Mabie, e-mail, 2000a). Aircraft type stationed at Hill AFB include the F-16. Transient aircraft include EA-6, A-10, B-1, C-5, C-9, C-12, C-130, C-141, E-8, F-15, F-16, F-18, KC-10, KC-135E, KC-135R, T-33, T-38, Tornado, Lear Jet, 1-eng. piston fixed-wing aircraft, and UH-1 helicopters (Mabie, e-mail, 2000b). Maintenance operations are provided for approximately 280 F-16 aircraft, 60 C-130 aircraft, and 45 A-10 aircraft per year. The maintenance workload includes aircraft defueling, disassembly, repair, paint removal, painting, and inspection/flight testing. Sources of aircraft noise associated with these operations include flights and engine testing. Typical flight patterns at the facility include aircraft landings, departures, and touch-and-go patterns. The facility's runway is 13,529 feet long. It is oriented northwest to southeast and is located in the southeastern corner of the installation.

Noise impacts from aircraft can be determined using a computer-based modeling program called NOISEMAP. Aircraft parameters used as input to the model include aircraft types, numbers of operations, time of day of operations, landing and departure flight paths, altitudes, speeds, and power settings. Technical staff at the Air Force Center for Environmental Excellence (AFCEE) used the most recently available aircraft flight and maintenance operational data and engine test stand data to develop aircraft noise contours for historical and current operations and for each of the proposed action alternatives at Hill AFB.

The most current version of NOISEMAP is Version 6.5. The most recent published noise contours for Hill AFB (Wasatch Front Regional Council, 1995) presented the noise impacts for the historic departure routes using NOISEMAP Version 6.0, which contained an incorrect database for F-16

aircraft (McKinley, 2000). The updated F-16 database contained in Version 6.5 reduced noise levels estimated by NOISEMAP and consequently changed the noise contours modeled for Hill AFB. The noise contours for historic conditions (i.e., the Island Departure route and other flight tracks) are shown in Appendix C. The contours are shown using both NOISEMAP Version 6.0 and NOISEMAP Version 6.5.

Figure 3-1 depicts noise contours for current conditions at Hill AFB (i.e. the No-Action alternative), using NOISEMAP Version 6.5. The modeling results indicate that 10,778 acres are currently located within the DNL 65 dB contour. By comparison, under historic conditions, the noise modeling analysis indicated that 11,549 acres (using NOISEMAP Version 6.0) or 9008 acres (using NOISEMAP Version 6.5) were located within the DNL 65 dB contour.





In addition to the contour analysis, a spot analysis of noise levels was conducted by AFCEE. In this analysis 20 locations in the project area considered to be representative of noise sensitive uses were evaluated. Table 3-2 summarizes DNL values for historic and current conditions. The noise sensitive areas are also illustrated in Figure 3-1, identified by the associated acronyms.

Table 3-2. Summary of Noise Sensitive Areas

Location Description	Associated Acronym	Historic Conditions DNL (dB)	Current Conditions DNL (dB)
DAVIS HIGH SCHOOL	DHS	48.5	53.1
DORMITORY (on-base)	DORM	73.0	73.0
FAIRFIELD JR HIGH SCHOOL	FRJR	54.4	57.3
HOOPER ELEM. SCHOOL	HOPS	40.1	45.9
NORTH DAVIS HOSPITAL	HOS2	57.7	58.7
	HOS3	62.8	
MEDICAL CLINIC (on-base)	HOSP		70.8
BASE HOUSING AREA (on-base)		65.0	65.3
	KNGS	64.9	
LAYTON HIGH SCHOOL	LAHS		66.0
NORTHRIDGE HIGH SCHOOL		69.5	69.3
	SADS	59.9	
SANDRIDGE HIGH SCHOOL	SRHS		57.3
SUNSET JR HIGH SCHOOL		56.0	61.3
	SWBS	66.1	
SYRACUSE ELEM. SCHOOL	SYCS		48.0
TEMPORARY LODGING FACILITY (ON-BASE)		76.0	75.8
	TPK1	70.8	
TRAILER PARK 2	TPK2		75.9
WEST POINT ELEM. SCHOOL		42.9	45.1

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND

-  Noise Contour
-  Departure Route
-  Runway and Airfield Pavement
-  Noise Sensitive Areas

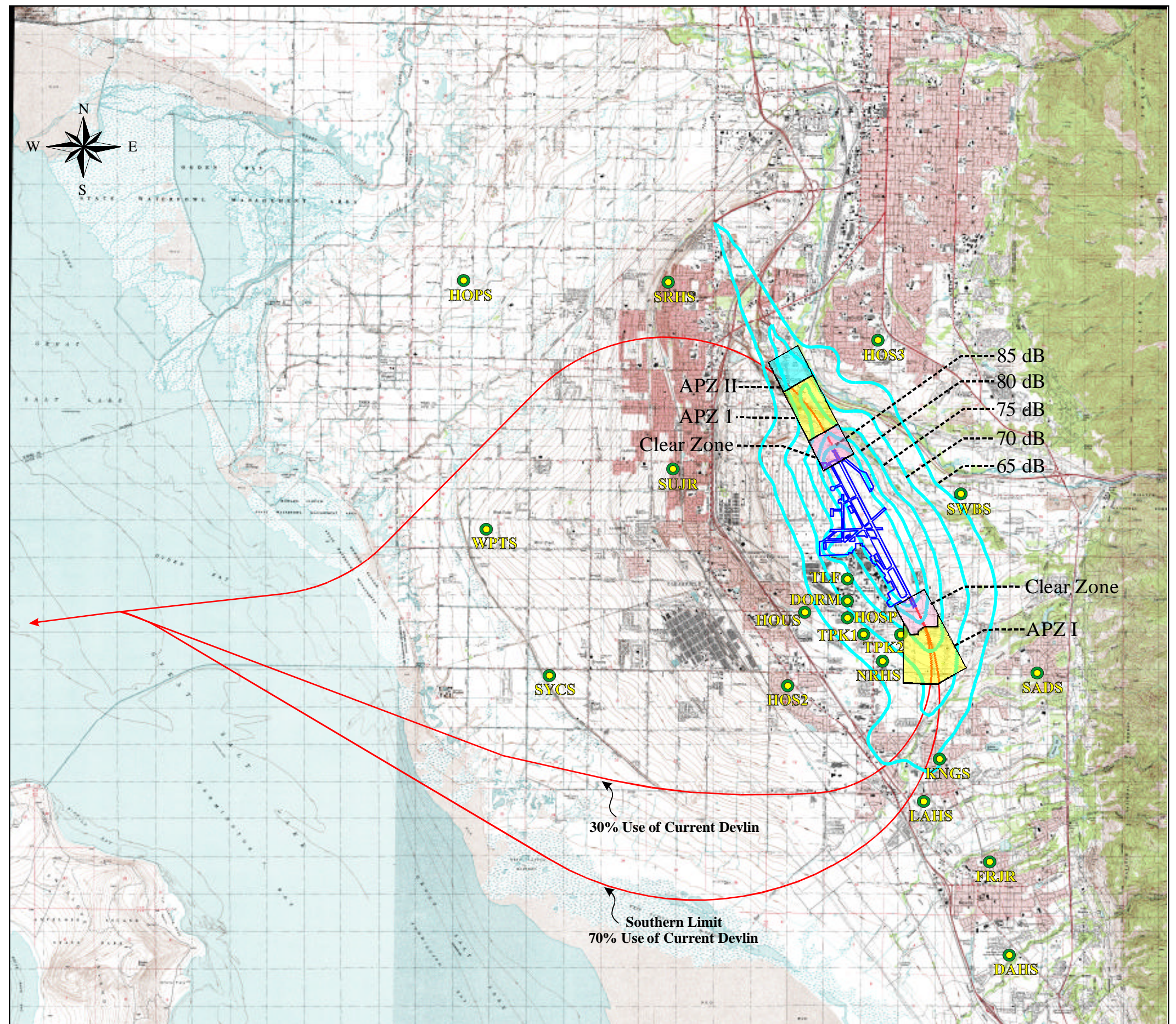
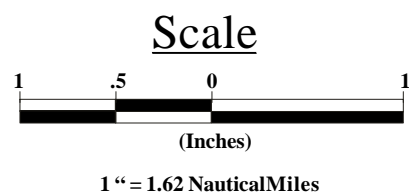


Figure 3-1. No Action Alternative - Noise Contours

Review of data in Table 3-2 and the noise contours depicted in Figure 3-1 indicate that the on-base housing areas and medical clinic are currently exposed to aircraft noise in excess of DNL 65 dB. As indicated in Figure 3-1, several residential uses located south, north, and east of the Base are currently exposed to aircraft noise in excess of DNL 65 dB. In an effort to implement compatible land use in the area surrounding Hill AFB, the State of Utah has purchased perpetual land use easements in non-Air Force owned property falling under the 75 dB and greater DNL contour. These easements prohibit new incompatible development. In addition, the easements allow existing land uses to continue, but prohibit converting existing single family residences into multiple family dwellings.

Noise from surface traffic is generated by approximately 60,000 vehicle trips per day generated by employees and staff members who work at the Base. This number of vehicle trips is based on the approximately 20,000 employees and staff members at the Base, and a nominal trip generation factor of three trips per day per employee.

3.11 Health and Safety

The Air Force is required to implement mishap prevention programs and airspace safety programs to avoid mishaps and control hazards. A reportable mishap is an unplanned event or accidental occurrence, or series of events, which results in damage to Air Force property in excess of \$2,000; disabling injury to Air Force personnel on or off duty; disabling injury to on-duty civilian personnel; occupational illness to Air Force military or civilian personnel; or damage to public and private property or injury and illness to non-DoD personnel caused by Air Force operations. The total dollar cost of damage or the degree of injury or occupational illness classifies mishaps. A Class A mishap involves property damage of \$1,000,000 or more or an injury or occupational illness, which results in death or permanent total disability. A Class B mishap involves property damage of \$200,000 or more, but less than \$1,000,000; or an injury or occupational illness which results in a permanent partial disability; or when five or more personnel are inpatient hospitalized (U.S. Air Force, 1993). A hazard is a condition, procedure, or practice, which creates a potential for producing death, injury, illness, or equipment or property damage.

As mentioned in Section 3.9, the clear zones at the end of runways have a high potential for accidents. The Air Force owns all of the property within the clear zones at Hill AFB, excluding the publicly owned roadways, and keeps these areas clear of obstructions to flight. In addition, the State of Utah has purchased protective easements on undeveloped land in the current APZs and their immediate vicinity to prevent incompatible land uses in those areas. Among other restrictions, these perpetual easements prohibit any new residential dwellings to be constructed in APZI, and prohibit any existing single family dwellings to be converted into multiple family dwellings. In APZII, no more than two residential units per acre are allowed for new construction. For both APZI and APZII, there is also a prohibition against any uses that would have an average density of more than one person per 300 square feet of building, or an overall density of greater than 10 persons per building. Uses that would produce light emissions, either direct or indirect (reflections), or electrical emissions, which could interfere with pilot vision, aircraft communication systems, or navigational equipment are also prohibited.

3.12 Transportation

Currently, the existing infrastructure and roadways are meeting the transportation needs of the Base. Although congestion is a problem during the morning and late afternoon commute times, parking in industrial areas is adequate for existing personnel.

3.13 Socioeconomics

Hill AFB, located in both Davis and Weber Counties, employs approximately 20,000 people. The 1997 combined population of Davis and Weber Counties was estimated at approximately 405,000. Consequently, Hill AFB represents a major employer in the two-county area. Approximately 53% of the workforce in Davis County and 27% of the workforce in Weber County are employed by the federal government (Montgomery Watson, 1997).

Section 4

ENVIRONMENTAL CONSEQUENCES OF THE PROPOSED ACTION AND ALTERNATIVES

This section evaluates the potential environmental impacts of the proposed action, Alternatives 1 and 2, and the No-Action alternative for flight path changes at Hill AFB.

4.1 Surface Water

Proposed Action

The proposed action would not change current ground activities at Hill AFB. Therefore, the proposed action poses no impacts to surface water.

Alternatives

Similarly, the alternative actions would not result in any impacts to surface water in the area.

4.2 Groundwater

Proposed Action

The proposed action would not change current ground activities at Hill AFB. Therefore, the proposed action poses no predictable impacts to groundwater.

Alternatives

Similarly, the alternative actions would result in no impacts to groundwater in the area.

4.3 Geology and Soils

Proposed Action

The changing of flight paths would not impact soils and geology. Therefore, the proposed action poses no impacts to geology or soils.

Alternatives

The alternative actions would not result in any impacts to geology and soils in the area.

4.4 Vegetation

Proposed Action

There are no impacts to vegetation expected as a result of implementing the proposed action. No known endangered or threatened plant species exist at Hill AFB

No-Action Alternative

The alternative actions would not result in any impacts to vegetation in the area.

4.5 Wetlands

Proposed Action

The proposed action would not change current impacts on wetland areas. Therefore, no adverse environmental impacts to wetlands are expected.

Alternatives

The alternative actions would have no adverse impact on wetlands.

4.6 Air Quality

Proposed Action

The proposed action is based on the current maximum mission scenario of approximately 127,000 annual aircraft operations at Hill AFB. Therefore, air emissions at the Base will not change as a result of the proposed action. Consequently, no adverse impacts to air quality are anticipated from the proposed action.

Alternatives

The alternative actions are also based on the current maximum mission scenario at Hill AFB. Therefore, air emissions will not change, and no adverse impacts are expected from the alternative actions.

4.7 Wildlife

Proposed Action

Due to the lack of protected species or habitat on Base, there are no expected significant impacts on wildlife from the proposed action.

Alternatives

The alternative actions would have no impact on wildlife.

4.8 Archaeological and Historical Resources

Proposed Action

Changing of flight activities would not impact archaeological or historical resources at Hill AFB. Therefore, the proposed action would have no adverse impacts on archaeological or historical resources.

Alternatives

The alternative actions would have no impacts on archaeological or historical resources.

4.9 Land Use

Proposed Action

Noise levels and APZs can define land use on and adjacent to Hill AFB. Aircraft noise modeling performed in conjunction with this EA indicate that noise contours for air traffic at Hill AFB would change only slightly within the 65 dB noise contour at the south end of the runway as a result of the proposed action. Therefore, noise levels from the proposed action are not expected to result in any significant adverse impact to land use.

Although aircraft could take a sharper turn during takeoff at the south end of the runway as a result of the proposed action, AFCEE has determined that the southern APZ areas will not require modification (U.S. Air Force, 2000). An Air Force study conducted in 1973 was used to establish standard APZ dimensions based on where Class A (e.g. damage greater than \$1 million or loss of life) aircraft accidents occurred within a ten nautical mile radius of Air Force installations. These APZs were established independently of the aircraft flight tracks. Therefore, in accordance with AFCEE's determination, changes to the Hill AFB APZs due to departure route modifications are not necessary, and there will be no associated impact to land use.

Alternative 1

Similar to the proposed action, noise level changes are not expected to adversely impact land use adjacent to Hill AFB. In addition, the APZs will not change as a result of Alternative 1, and therefore, will not impact land use adjacent to the existing APZs.

Alternative 2

Under Alternative 2 changes to the noise contours are negligible. As with the previous alternatives, no changes to APZs would be required. Therefore, Alternative 2 would not result in any adverse impacts on land use.

No-Action Alternative

The No-Action Alternative would not require changes to the noise contours or the APZ areas at Hill AFB. Therefore, the No-Action Alternative would not adversely impact land use at Hill AFB or the surrounding community.

4.10 Noise

Potential noise impacts associated with implementing the proposed action and alternative actions have been evaluated by comparing projected noise conditions that would result from the proposed action (or alternatives) with current conditions and with noise compatibility criteria used by the Air Force.

Section 5.22 of the AICUZ Guide outlines the procedure for evaluating noise impacts. A primary outcome of the evaluation is a judgement as to whether or not the noise impact of the project is “significant.” Factors that are used in judging whether a noise impact is significant include the change in the noise level and the absolute noise level relative to the compatibility criteria. DNL 65 dB is considered to be the compatibility criteria for noise sensitive uses. The AICUZ Guide does not specify a specific threshold for a change which would constitute a significant impact but rather states that when the change is “substantial”, the noise impact becomes significant. Section 2.2.2. of the AICUZ Guide states that the threshold for AICUZ updating actions is a change in the DNL of 2 dB or more; Section 2.4.2.1.1 of the AICUZ Guide states that the environmental impact analysis process determines if there is a significant impact on the AICUZ which would necessitate an AICUZ update. From this it can be concluded that a change of 2 dB or more is a reasonable threshold for a substantial change.

A request was made by citizens at a public open house on the proposed action in January 2000 to provide information on single event sound levels. As a result of this request, information on maximum overflight sound levels (Lmax) is included in this EA. Lmax values can be used to assess the potential effects of aircraft overflights on speech interference and noise induced sleep interference. For normal conditions of voice effort and hearing ability at listener-speaker distances of about three feet, the following guidelines are conservative predictors of interference with conversation:

- Speech interference may occur outdoors when the sound level is 60 dBA or higher (EPA 1974);
- Speech interference may occur indoors with windows open when the outdoor sound level is 70 to 75 dBA or higher (von Gierke et al 1993); and
- Speech interference may occur indoors with windows closed when the outdoor sound level is 75 to 80 dBA or higher (von Gierke et al 1993).

Noise-induced sleep interference has been studied but the results are somewhat ambiguous. If sleep data collected on people in their homes are used, awakening may occur for two percent of the population when the outdoor sound level associated with single events exceeds:

- 70 to 75 dBA, Lmax (with windows open); or
- 80 to 85 dBA, Lmax (with windows closed) (von Gierke 1993).

The modeling output from NOISEMAP Version 6.5 lists the top 18 contributors to the overall DNL for each location evaluated. The sound exposure level (SEL) for each of those contributors is also listed. The maximum SEL value from the top 18 DNL contributors can be identified and is usually the contributor with highest SEL value for all contributors evaluated. There may be some instances where the operation with the highest SEL value is not listed in the top 18 DNL contributors.

Lmax values are not directly reported in the NOISEMAP output. However, aircraft Lmax values are typically 7 to 12 dB less than SEL values. For the purposes of this data presentation, Lmax values are taken to be 10 dB less than maximum SEL values identified from the top 18 DNL contributors.

For this assessment, a noise impact is considered significant if the predicted noise level at a noise sensitive use is DNL 65 dB or greater *and* the change in noise level from current conditions is 2 dB or greater. The proposed action and alternatives involve changes in aircraft operations and would not involve construction of new facilities or changes in staffing at the Base. Accordingly, no noise impacts related to construction activity or traffic generation would occur. The assessment of noise impacts therefore focuses on aircraft noise impacts.

Noise impacts associated with the proposed action and three alternatives to the proposed action (including the no-action alternative) have been evaluated. All evaluations considered the maximum mission scenario, i.e., maximum aircraft operations of 127,000 and all available parking spaces at Hill AFB are being utilized. By doing this, the worst-case noise impacts that would occur at Hill AFB are presented.

4.10.1 Proposed Action

Under the proposed action, the modified Devlin Departure route and the Wasatch Departure route would occur at Hill AFB. Figure 4-1 shows the noise contours and the spot analysis locations for the proposed action. A comparison of Figure 4-1 to Figure 3-1 indicates virtually no change in the aircraft noise contour. Table 4-1 compares the DNL spot analysis for the proposed project to current conditions.





Table 4-2 compares estimated Lmax values from the spot analysis for the proposed project to current conditions. In reviewing the data in Table 4-2 it is important to recognize that none of the identified maximum noise events listed occur during nighttime hours or more than once a day on average.

Table 4-3 compares the areas within various noise zones for the proposed project and current conditions.

The aircraft noise impact of the proposed action is not considered significant because aircraft noise levels are not predicted to increase by 2 dB or more at any location where the predicted noise levels is DNL 65 dB or greater. In addition no increases in maximum noise levels are anticipated and the area exposed to aircraft noise in excess of DNL 65 dB is predicted to decrease slightly.

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND

-  Noise Contour
-  Departure Route
-  Runway and Airfield Pavement
-  Noise Sensitive Areas

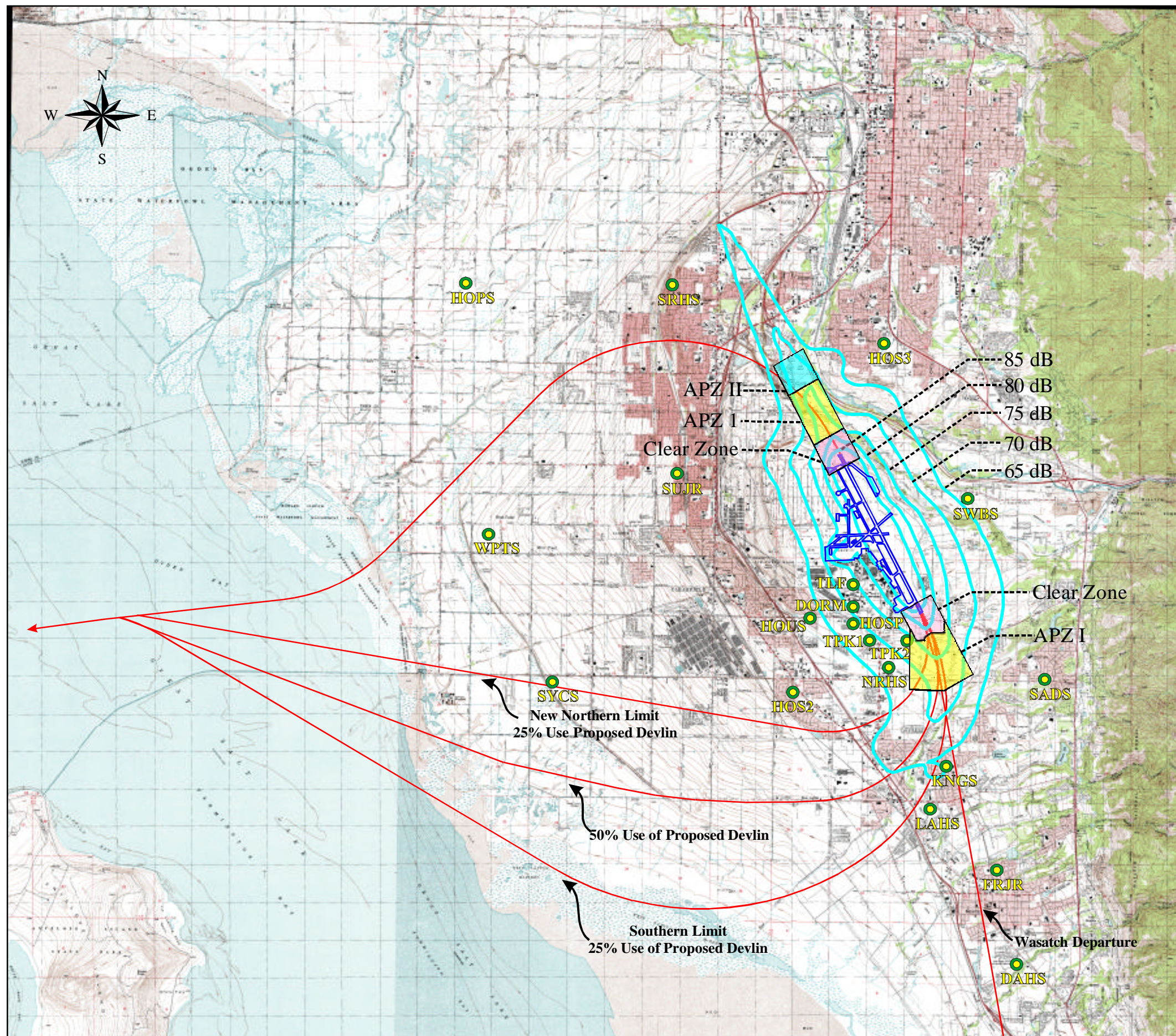
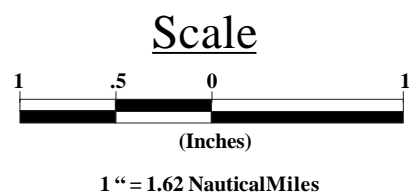


Figure 4-1. Proposed Action - Noise Contours

**Table 4-1.
Summary of DNL Noise Sensitive Areas for the Proposed Action and Current Conditions**

Location Description	Associated Acronym	Current Conditions DNL (dB)	Proposed Action DNL (dB)	Change with the Proposed Action (dB)
DAVIS HIGH SCHOOL	DHS	53.1	54.7	+1.6
DORMITORY (on-Base)	DORM	73.0	73.0	0.0
FAIRFIELD JR HIGH SCHOOL	FRJR	57.3	58.5	+1.2
HOOPER ELEM. SCHOOL	HOPS	45.9	45.9	+0.0
NORTH DAVIS HOSPITAL	HOS2	58.7	58.8	+0.1
SAINT BENEDICT'S HOSPITAL	HOS3	63.0	62.9	-0.1
MEDICAL CLINIC (on-Base)	HOSP	70.8	70.8	+0.0
BASE HOUSING AREA (on-Base)	HOUS	65.3	65.3	+0.0
KING ELEM. SCHOOL	KNGS	67.8	67.5	-0.3
LAYTON HIGH SCHOOL	LAHS	66.0	65.4	-0.6
NORTHRIDGE HIGH SCHOOL	NRHS	69.3	69.4	+0.1
SAMUEL ADAMS SCHOOL	SADS	60.5	60.5	+0.0
SANDRIDGE HIGH SCHOOL	SRHS	57.3	57.3	+0.0
SUNSET JR HIGH SCHOOL	SUJR	61.3	61.3	+0.0
SOUTH WEBER ELEM. SCHOOL	SWBS	65.6	65.6	+0.0
SYRACUSE ELEM. SCHOOL	SYCS	48.0	50.0	+2
TEMPORARY LODGING FACILITY (on-Base)	TLF	75.8	75.8	+0.0
TRAILER PARK 1	TPK1	70.8	70.8	+0.0
TRAILER PARK 2	TPK2	75.9	75.9	+0.0
WEST POINT ELEM. SCHOOL	WPTS	45.1	45.2	+0.1

Table 4-2.
Summary of Lmax Noise Sensitive Areas for the Proposed Action and Current Conditions

Location Description	Associated Acronym	Current Conditions		Proposed Action	
		Aircraft Type	Estimated Lmax (dB)	Aircraft Type	Estimated Lmax (dB)
DAVIS HIGH SCHOOL	DHS	EA-6B	93	EA-6B	93
DORMITORY (on-Base)	DORM	F-18	97	F-18	97
FAIRFIELD JR HIGH SCHOOL	FRJR	C-5A	96	C-5A	96
HOOPER ELEM. SCHOOL	HOPS	F-18	83	F-18	83
NORTH DAVIS HOSPITAL	HOS2	B-1	95	B-1	94
SAINT BENEDICT'S HOSPITAL	HOS3	F-18	85	F-16	83
MEDICAL CLINIC (on-Base)	HOSP	F-18	95	F-18	95
BASE HOUSING AREA (on-Base)	HOUS	F-18	89	F-18	89
KING ELEM. SCHOOL	KNGS	B-1	107	B-1	107
LAYTON HIGH SCHOOL	LAHS	B-1	112	B-1	112
NORTHRIDGE HIGH SCHOOL	NRHS	B-1	100	B-1	100
SAMUEL ADAMS SCHOOL	SADS	B-1	93	B-1	93
SANDRIDGE HIGH SCHOOL	SRHS	B-1	101	B-1	101
SUNSET JR HIGH SCHOOL	SUJR	B-1	106	B-1	106
SOUTH WEBER ELEM. SCHOOL	SWBS	B-1	94	F-18	89
SYRACUSE ELEM. SCHOOL	SYCS	F-16	86	F-18	86
TEMPORARY LODGING FACILITY (on-Base)	TLF	F-18	99	F-18	99
TRAILER PARK 1	TPK1	B-1	99	F-18	95
TRAILER PARK 2	TPK2	B-1	107	B-1	107
WEST POINT ELEM. SCHOOL	WPTS	F-18	85	F-18	85

**Table 4-3.
Areas within Various Noise Zones for the Proposed Action and Current Conditions**

Noise Zone	Area under Current Conditions (Acres)	Area under Proposed Action Conditions (Acres)	Change with Proposed Action (Acres)	Percent Change with Proposed Action
65 dB or less	10778.43	10754.28	-24.15	0.00%
70 dB or less	5642.89	5640.72	-2.17	0.00%
75 dB or less	3068.46	3068.47	0.01	0.00%
80 dB or less	1711.58	1710.38	-1.2	0.00%
85 dB or less	944.14	943.31	-0.83	0.00%

4.10.2 Alternative 1

Under Alternative 1 the modified Devlin Departure route only would be implemented. Figure 4-2 shows the noise contours and the spot analysis locations for Alternative 1. A comparison of Figure 4-2 to Figure 3-1 indicates virtually no change in the aircraft noise contour. Table 4-4 compares the DNL spot analysis for Alternative 1 to current conditions.

Table 4-5 compares estimated Lmax values from the spot analysis for Alternative 1 to current conditions. In reviewing the data in Table 4-5 it is important to recognize that none of the identified maximum noise events listed occur during nighttime hours or more than once a day on average. Table 4-6 compares the areas within various noise zones for Alternative 1 and current conditions.

The aircraft noise impact of Alternative 1 is not considered significant because aircraft noise levels are not predicted to increase by 2 dB or more at any location where the predicted noise levels is DNL 65 dB or greater. In addition no increases in maximum noise levels are anticipated and the area exposed to aircraft noise in excess of DNL 65 dB is not predicted to change.

4.10.3 Alternative 2

Under Alternative 2 the current Devlin Departure route would continue to be used and the Wasatch Departure route would be added to operations at Hill AFB. Figure 4-3 shows the noise contours and the spot analysis locations for Alternative 2. A comparison of Figure 4-3 to Figure 3-1 indicates virtually no change in the aircraft noise contour. Table 4-7 compares the DNL spot analysis for Alternative 2 to current conditions.

Table 4-8 compares estimated Lmax values from the spot analysis for Alternative 2 to current conditions. In reviewing the data in Table 4-8 it is important to recognize that none of the identified maximum noise events listed occur during nighttime hours or more than once a day on average. Table 4-9 compares the areas within various noise zones for Alternative 2 and current conditions.

The aircraft noise impact of Alternative 2 is not considered significant because aircraft noise levels are not predicted to increase by 2 dB or more at any location where the predicted noise levels is DNL 65 dB or greater. In addition no increases in maximum noise levels are anticipated and the area exposed to aircraft noise in excess of DNL 65 dB is predicted to decrease slightly.

**EA for Proposed
Departure Route Changes
Hill AFB**

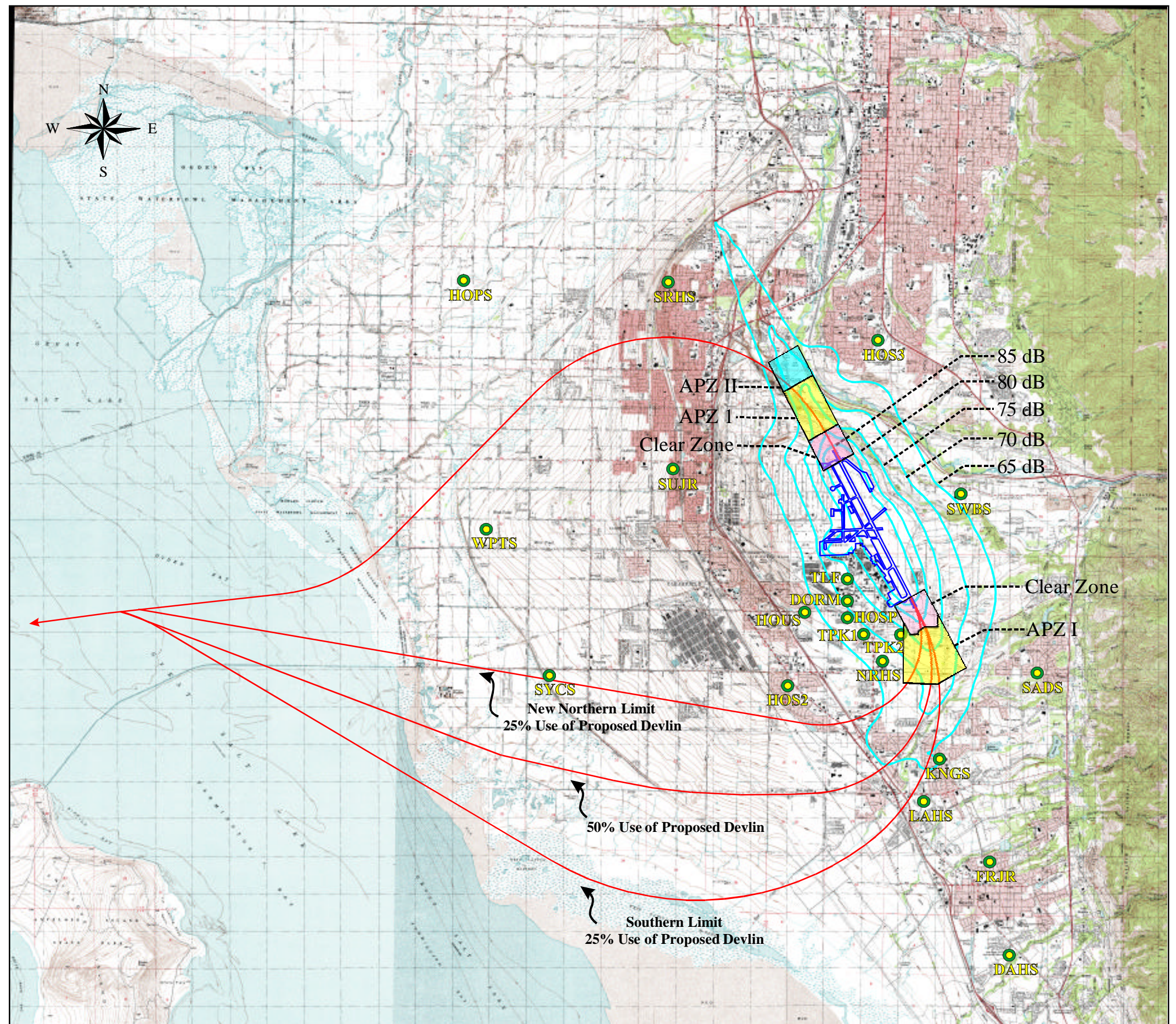
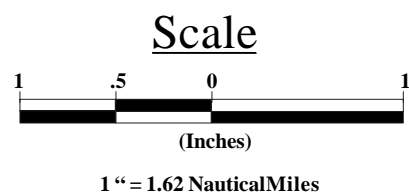
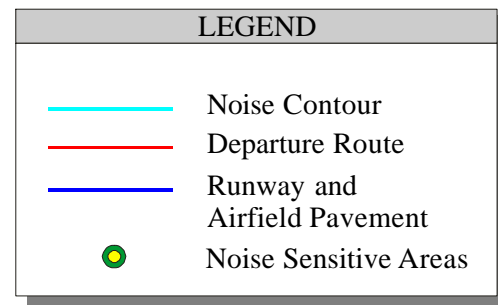


Figure 4-2. Alternative 1 - Noise Contours

**Table 4-4.
Summary of DNL Noise Sensitive Areas for the Alternative 1 and Current Conditions**

Location Description	Associated Acronym	Current Conditions DNL (dB)	Alternative 1 DNL (dB)	Change with the Alternative 1 (dB)
DAVIS HIGH SCHOOL	DHS	53.1	53.1	0.0
DORMITORY (on-Base)	DORM	73.0	73.0	0.0
FAIRFIELD JR HIGH SCHOOL	FRJR	57.3	57.2	-0.1
HOOPER ELEM. SCHOOL	HOPS	45.9	45.9	+0.0
NORTH DAVIS HOSPITAL	HOS2	58.7	58.9	+0.2
SAINT BENEDICT'S HOSPITAL	HOS3	63.0	63.0	0.0
MEDICAL CLINIC (on-Base)	HOSP	70.8	70.8	+0.0
BASE HOUSING AREA (on-Base)	HOUS	65.3	65.3	+0.0
KING ELEM. SCHOOL	KNGS	67.8	67.5	-0.3
LAYTON HIGH SCHOOL	LAHS	66.0	65.5	-0.5
NORTHRIDGE HIGH SCHOOL	NRHS	69.3	69.4	+0.1
SAMUEL ADAMS SCHOOL	SADS	60.5	60.5	+0.0
SANDRIDGE HIGH SCHOOL	SRHS	57.3	57.3	+0.0
SUNSET JR HIGH SCHOOL	SUJR	61.3	61.3	+0.0
SOUTH WEBER ELEM. SCHOOL	SWBS	65.6	65.6	+0.0
SYRACUSE ELEM. SCHOOL	SYCS	48.0	50.3	+2.3
TEMPORARY LODGING FACILITY (on-Base)	TLF	75.8	75.8	+0.0
TRAILER PARK 1	TPK1	70.8	70.8	+0.0
TRAILER PARK 2	TPK2	75.9	75.9	+0.0
WEST POINT ELEM. SCHOOL	WPTS	45.1	45.2	+0.1





Table 4-5.
Summary of Lmax Noise Sensitive Areas for Alternative 1 and Current Conditions

Location Description	Associated Acronym	Current Conditions		Alternative 1	
		Aircraft Type	Estimated Lmax (dB)	Aircraft Type	Estimated Lmax (dB)
DAVIS HIGH SCHOOL	DHS	EA-6B	93	EA-6B	93
DORMITORY (on-Base)	DORM	F-18	97	F-18	97
FAIRFIELD JR HIGH SCHOOL	FRJR	C-5A	96	EA-6B	95
HOOPER ELEM. SCHOOL	HOPS	F-18	83	F-18	83
NORTH DAVIS HOSPITAL	HOS2	B-1	95	B-1	94
SAINT BENEDICT'S HOSPITAL	HOS3	F-18	85	F-16	82
MEDICAL CLINIC (on-Base)	HOSP	F-18	95	F-18	95
BASE HOUSING AREA (on-Base)	HOUS	F-18	89	F-18	89
KING ELEM. SCHOOL	KNGS	B-1	107	B-1	107
LAYTON HIGH SCHOOL	LAHS	B-1	112	B-1	112
NORTHRIDGE HIGH SCHOOL	NRHS	B-1	100	B-1	100
SAMUEL ADAMS SCHOOL	SADS	B-1	93	B-1	93
SANDRIDGE HIGH SCHOOL	SRHS	B-1	101	B-1	101
SUNSET JR HIGH SCHOOL	SUJR	B-1	106	B-1	106
SOUTH WEBER ELEM. SCHOOL	SWBS	B-1	94	F-18	89
SYRACUSE ELEM. SCHOOL	SYCS	F-16	86	F-18	86
TEMPORARY LODGING FACILITY (on-Base)	TLF	F-18	99	F-18	99
TRAILER PARK 1	TPK1	B-1	99	F-18	95
TRAILER PARK 2	TPK2	B-1	107	B-1	107
WEST POINT ELEM. SCHOOL	WPTS	F-18	85	F-18	85

Table 4-6.
Areas within Various Noise Zones for Alternative 1 and Current Conditions

Noise Zone	Area under Current Conditions (Acres)	Area under Proposed Action Conditions (Acres)	Change with Alternative 1 (Acres)	Percent Change with Alternative 1
65 dB or less	10778.43	10775.99	-2.44	0.00%
70 dB or less	5642.89	5647.74	4.85	0.00%
75 dB or less	3068.46	3069.82	1.36	0.00%
80 dB or less	1711.58	1711.58	0.0	0.00%
85 dB or less	944.14	944.14	0.0	0.00%

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND	
	Noise Contour
	Departure Route
	Runway and Airfield Pavement
	Noise Sensitive Areas

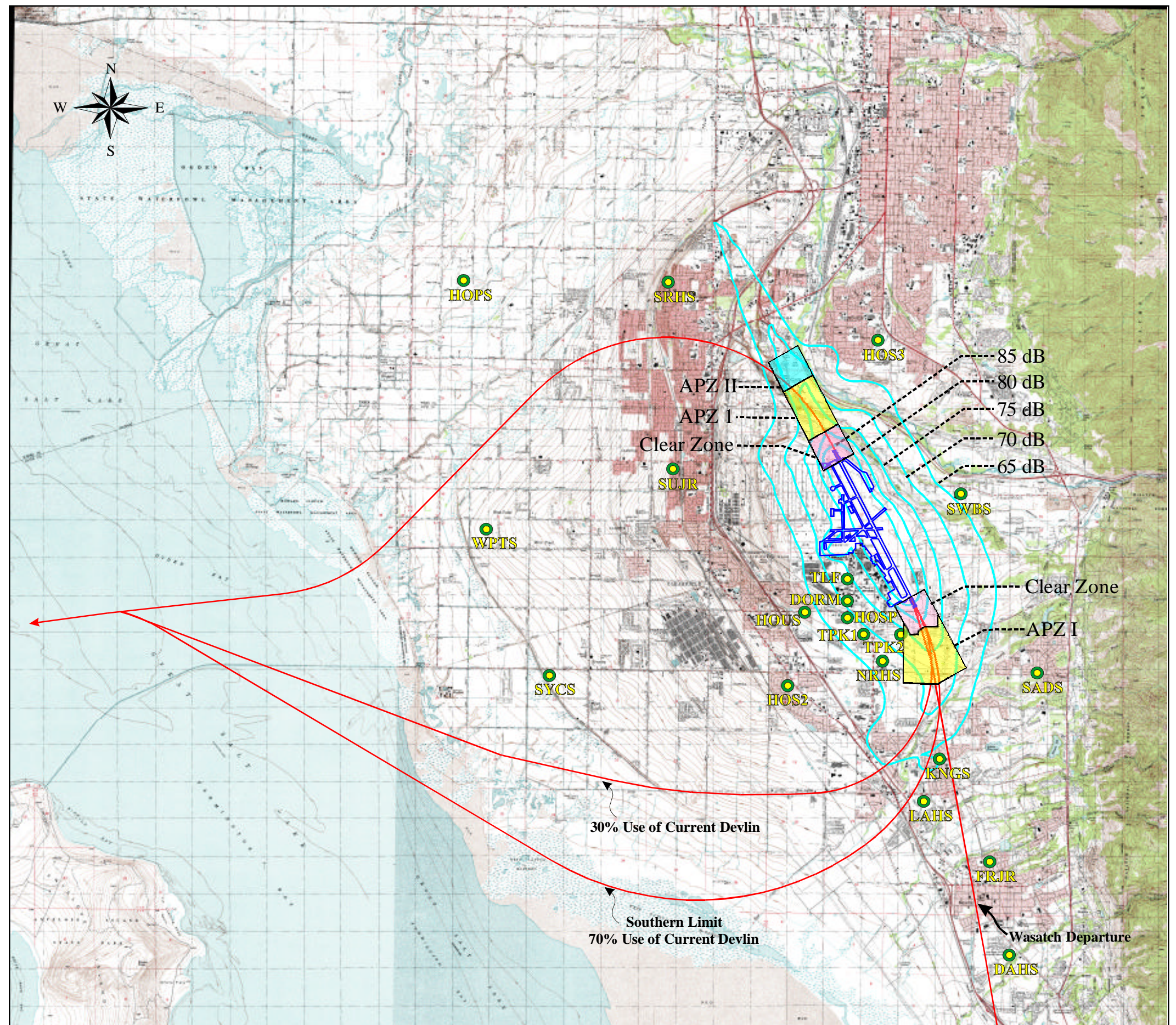
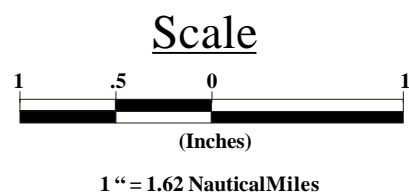


Figure 4-3. Alternative 2 - Noise Contours

**Table 4-7.
Summary of DNL Noise Sensitive Areas for the Alternative 2 and Current Conditions**

Location Description	Associated Acronym	Current Conditions DNL (dB)	Alternative 2 DNL (dB)	Change with the Proposed Action (dB)
DAVIS HIGH SCHOOL	DHS	53.1	54.8	+1.7
DORMITORY (on-Base)	DORM	73.0	73.0	0.0
FAIRFIELD JR HIGH SCHOOL	FRJR	57.3	58.5	+1.2
HOOPER ELEM. SCHOOL	HOPS	45.9	45.9	+0.0
NORTH DAVIS HOSPITAL	HOS2	58.7	58.7	+0.0
SAINT BENEDICT'S HOSPITAL	HOS3	63.0	62.9	-0.1
MEDICAL CLINIC (on-Base)	HOSP	70.8	70.8	+0.0
BASE HOUSING AREA (on-Base)	HOUS	65.3	65.3	+0.0
KING ELEM. SCHOOL	KNGS	67.8	67.7	-0.1
LAYTON HIGH SCHOOL	LAHS	66.0	65.8	-0.2
NORTHRIDGE HIGH SCHOOL	NRHS	69.3	69.3	+0.0
SAMUEL ADAMS SCHOOL	SADS	60.5	60.5	+0.0
SANDRIDGE HIGH SCHOOL	SRHS	57.3	57.3	+0.0
SUNSET JR HIGH SCHOOL	SUJR	61.3	61.3	+0.0
SOUTH WEBER ELEM. SCHOOL	SWBS	65.6	65.6	+0.0
SYRACUSE ELEM. SCHOOL	SYCS	48.0	48.0	+0.0
TEMPORARY LODGING FACILITY (on-Base)	TLF	75.8	75.8	+0.0
TRAILER PARK 1	TPK1	70.8	70.8	+0.0
TRAILER PARK 2	TPK2	75.9	75.9	+0.0
WEST POINT ELEM. SCHOOL	WPTS	45.1	45.1	+0.0

**Table 4-8.
Summary of Lmax Noise Sensitive Areas for Alternative 2 and Current Conditions**

Location Description	Associated Acronym	Current Conditions		Alternative 2	
		Aircraft Type	Estimated Lmax (dB)	Aircraft Type	Estimated Lmax (dB)
DAVIS HIGH SCHOOL	DHS	EA-6B	93	EA-6B	93
DORMITORY (on-Base)	DORM	F-18	97	F-18	97
FAIRFIELD JR HIGH SCHOOL	FRJR	C-5A	96	EA-6B	95
HOOPER ELEM. SCHOOL	HOPS	F-18	83	F-15A	83
NORTH DAVIS HOSPITAL	HOS2	B-1	95	B-1	94
SAINT BENEDICT'S HOSPITAL	HOS3	F-18	85	F-18	83
MEDICAL CLINIC (on-Base)	HOSP	F-18	95	F-18	95
BASE HOUSING AREA (on-Base)	HOUS	F-18	89	F-18	89
KING ELEM. SCHOOL	KNGS	B-1	107	B-1	107
LAYTON HIGH SCHOOL	LAHS	B-1	112	B-1	112
NORTHRIDGE HIGH SCHOOL	NRHS	B-1	100	B-1	100
SAMUEL ADAMS SCHOOL	SADS	B-1	93	B-1	93
SANDRIDGE HIGH SCHOOL	SRHS	B-1	101	B-1	101
SUNSET JR HIGH SCHOOL	SUJR	B-1	106	B-1	106
SOUTH WEBER ELEM. SCHOOL	SWBS	B-1	94	F-18	89
SYRACUSE ELEM. SCHOOL	SYCS	F-16	86	F-18	86
TEMPORARY LODGING FACILITY (on-Base)	TLF	F-18	99	F-18	99
TRAILER PARK 1	TPK1	B-1	99	F-18	95
TRAILER PARK 2	TPK2	B-1	107	B-1	107
WEST POINT ELEM. SCHOOL	WPTS	F-18	85	F-18	85

**Table 4-9.
Areas within Various Noise Zones for Alternative 2 and Current Conditions**

Noise Zone	Area under Current Conditions (Acres)	Area under Alternative 2 Conditions (Acres)	Change with Alternative 2 (Acres)	Percent Change with Alternative 2
65 dB or less	10778.43	10768.02	-10.41	0.00%
70 dB or less	5642.89	5643.05	0.16	0.00%
75 dB or less	3068.46	3067.53	-0.93	0.00%
80 dB or less	1711.58	1710.37	-1.21	0.00%
85 dB or less	944.14	943.30	-0.84	0.00%

4.10.4 No-Action Alternative

Under the no-action alternative, no change in aircraft operations would occur. Accordingly, no significant noise impacts would occur.

4.11 Health and Safety

Proposed Action

Although a sharper aircraft turn during takeoff at the south end of the runway may occur as a result of the proposed action, the southern APZ areas will not require modification as discussed in Section 4.9. Consequently, no impacts to health and safety would occur as a result of the proposed departure route changes.

Alternative 1

Similar to the proposed action, although a sharper aircraft turn during takeoff at the south end of the runway may occur as a result of Alternative 1, the southern APZ areas will not require modification. Consequently, no impacts to health and safety would occur as a result of implementing Alternative 1.

Alternative 2

Alternative 2 would not increase the separation between military and commercial aircraft, thus inhibiting expedited releases from Hill AFB due to safety concerns.

No-Action Alternative

The No-Action Alternative would not increase the separation between military and commercial aircraft, thus inhibiting expedited releases from Hill AFB due to safety concerns.

4.12 Transportation

Proposed Action

The proposed action is not expected to increase the number of employees at Hill AFB. Consequently, the proposed action should not impact traffic. In addition, the number of flight operations would not change as a result of the proposed action. Therefore, the potential for a mishap on public roadways would not change.

Alternatives

Similarly, the alternative actions would not result in any impacts to traffic on or off-Base.

4.13 Socioeconomics

Proposed Action

The proposed action is not expected to increase the number of employees at Hill AFB. However, the increased training capability would assist Hill AFB in maintaining a leading role in the nation's military defense and, thus, reduce the likelihood of downsizing of the Base.

Alternatives 1 and 2

The alternative actions are not expected to increase the number of employees at Hill AFB. However, the increased training capability would assist Hill AFB in maintaining a leading role in the nation's military defense and, thus, reduce the likelihood of downsizing of the Base.

No-Action Alternative

The no-action alternative will not increase the number of employees at Hill AFB, and it would not increase training capability at Hill AFB.

4.14 Environmental Justice

Environmental justice analyses for NEPA documents attempt to determine whether a proposed action disproportionately impacts minority and poor populations. However, because the Base is not located adjacent to such groups, and because the proposed actions do not result in significant environmental adverse impacts, no such analysis was conducted.

4.15 Cumulative Impacts

The impacts from the proposed flight paths are summarized in Table 4-1. The proposed action and alternatives are not expected to have any significant adverse impacts on the environment. Changes to noise levels are not expected to adversely impact land use or health and safety.

The no-action alternative would not result in a significant adverse environmental impact. However, if downsizing were to occur at Hill AFB, the impact on the local economy would be significant. Both Davis and Weber Counties rely heavily on Hill AFB for employment and associated economic benefits.

Table 4-10. Anticipated Environmental Consequences

Environmental Issues	Impacts from Proposed Action	Impacts from Alternative 1	Impacts from Alternative 2	Impacts from No-Action Alternative
Surface Water	No impact.	No impact.	No impact.	No impact.
Groundwater	No impact.	No impact.	No impact.	No impact.
Geology and Soils	No impact.	No impact.	No impact.	No impact.
Vegetation	No impact.	No impact.	No impact.	No impact.
Wetlands	No impact.	No impact.	No impact.	No impact.
Air Quality	No impact.	No impact.	No impact.	No impact.
Wildlife	No impact.	No impact.	No impact.	No impact.
Cultural Resources	No impact.	No impact.	No impact.	No impact.
Land Use	No significant impact.	No significant impact.	No significant impact.	No impact.
Noise	No significant impact.	No significant impact.	No significant impact.	No impact.
Health and Safety	No impact.	No impact.	There would be no increase to military and commercial aircraft separation, thus expedited releases from Hill AFB would be inhibited based on safety concerns.	There would be no increase to military and commercial aircraft separation, thus expedited releases from Hill AFB would be inhibited based on safety concerns.
Transportation	No impact.	No impact.	No impact.	No impact.
Socioeconomics	No adverse impact. The training capabilities at the Base would increase consequently increasing the value of Hill AFB to the DoD.	No adverse impact. The training capabilities at the Base would increase consequently increasing the value of Hill AFB to the DoD.	No adverse impact. The training capabilities at the Base would increase consequently increasing the value of Hill AFB to the DoD.	No impact.
Environmental Justice	No anticipated impact.	No anticipated impact.	No anticipated impact.	No anticipated impact.

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Section 7

REFERENCES

Cultural Resource Management. Environmental Directorate. Hill Air Force Base. *Initial Draft Hill Air Force Base Cultural Resources Management Plan*. May 1999.

Department of Defense, 1977a. *Air Installation Compatible Use Zones*. DoD Instruction 4165.57. November 8, 1977.

Department of Defense, 1977b. *Air Installation Compatible Use Zones*. DoD Instruction 4165.57, Appendix J. November 8, 1977.

Hawley, Alfred D. LtCol, 2000. E-mail RE: Departure Route EA Comments. December 19, 2000.

Hill AFB, 1974. *Air Installation Compatible Use Zone (AICUZ) Hill Air Force Base, Utah*. September 1974.

Hill AFB, 1982. *Air Installation Compatible Use Zone Report*. Amended April 1982.

Hill AFB, 1998a. Request for Environmental Impact Analysis, Form 813, RCS 98-142. May 1998.

Hill AFB, 1998b. Request for Environmental Impact Analysis, Form 813, RCS 98-503. September 1998.

Hill AFB, 1999. Request for Environmental Impact Analysis, Form 813, RCS 99-157. January 1999.

Hill AFB, 2000a. Hill Air Force Base Web Page, www.hill.af.mil. February 2000.

Mabie, Nancy, 2000a. E-mail, RE: NOISEMAP Changes. April 27, 2000.

Mabie, Nancy, 2000b. E-mail, Revised Transient Operations Summary. April 28, 2000.

McKinley, Bob, 2000. Telephone communication. May 3, 2000.

Montgomery Watson, 1998. *Environmental Restoration Management Action Plan for Hill Air Force Base, Utah*. May 1998.

Radian International, 1998. *Environmental Assessment for the Proposed SM-ALC Workload Transfer*. March 1998.

U.S. Air Force, 1989. *Hill Air Force Base Comprehensive Plan*. August 1989.

U.S. Air Force, 1993. *Safety Programs*. Air Force Policy Directive 91-2. September 28, 1993.

U.S. Air Force, 1998a. *The US Air Force Mishap Prevention Program*. Air Force Instruction 91-202. August 1, 1998.

U.S. Air Force, 1998b. *Air Installation Compatible Use Zone Program*. Air Force Instruction 32-7063. October 1, 1998.

U.S. Air Force, 1999. *AICUZ Program Manager's Guide*. Air Force Handbook 32-7084. March 1, 1999.

U.S. Air Force, 2000. Memorandum for HQ AFCEE/CE. Accident Potential Zone (APZ) Assistance. October 3, 2000.

U.S. Environmental Protection Agency. 1974. Information on levels of environmental noise requisite to protect public health and welfare with an adequate margin of safety. (EPA 550/9-74-004.) U.S. Government Printing Office. Washington, DC. 175 pp.

Von Gierke, H.E. and McKeldred, K. June 1993. Noise/News International. "Effects of Noise on People."

Wasatch Front Regional Council, 1995. *Hill AFB Compatible Land Use Study Final Report*. November 1995.

Whipple, Albert, 2000. E-mail, RE: Departure Route EA Comments. December 19, 2000.

APPENDIX A

AICUZ Land Use Compatibility

LAND USE COMPATIBILITY WITH RESPECT TO NOISE AND ACCIDENT POTENTIAL

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
10	Residential							
11	Household units							
11.11	Single units; detached	N	N	Y ¹	A ¹¹	B ¹¹	N	N
11.12	Single units; semidetached	N	N	N	A ¹¹	B ¹¹	N	N
11.13	Single units; attached row	N	N	N	A ¹¹	B ¹¹	N	N
11.21	Two units; side-by-side	N	N	N	A ¹¹	B ¹¹	N	N
11.22	Two units; one above the other	N	N	N	A ¹¹	B ¹¹	N	N
11.31	Apartments; walk up	N	N	N	A ¹¹	B ¹¹	N	N
11.32	Apartments; elevator	N	N	N	A ¹¹	B ¹¹	N	N
12	Group quarters	N	N	N	A ¹¹	B ¹¹	N	N
13	Residential hotels	N	N	N	A ¹¹	B ¹¹	N	N
14	Mobile home parks or courts	N	N	N	N	N	N	N
15	Transient lodgings	N	N	N	A ¹¹	B ¹¹	C ¹¹	N
16	Other residential	N	N	N ¹	A ¹¹	B ¹¹	N	N
20	Manufacturing							
21	Food & kindred products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
22	Textile mill products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
23	Apparel and other finished products made from fabrics, leather, and similar materials; manufacturing	N	N	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
24	Lumber and wood products (except furniture); manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
25	Furniture and fixtures manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
26	Paper & allied products; manufacturing	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
27	Printing, publishing, and allied industries	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
28	Chemicals and allied products; manufacturing	N	N	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
29	Petroleum refining and related industries	N	N	N	Y	Y ¹²	Y ¹³	Y ¹⁴
30	Manufacturing							
31	Rubber and misc. plastic products, manufacturing	N	N ²	N ²	Y	Y ¹²	Y ¹³	Y ¹⁴
32	Stone, clay and glass products manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
33	Primary metal industries	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
34	Fabricated metal products; manufacturing	N	N ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
35	Professional, scientific, and controlling instruments; photographic and optical goods; watches and clocks manufacturing	N	N	N ²	Y	A	B	N
39	Miscellaneous Manufacturing	N	Y ²	Y ²	Y	Y ¹²	Y ¹³	Y ¹⁴

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
40	Transportation, Communications and utilities							
41	Railroad, rapid rail transit	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
42	And street railroad							
43	Motor Vehicle transportation	N ³	Y	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
44	Aircraft transportation	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
45	Marine craft transportation	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
46	Highway & street right-of-way	N ³	Y	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
47	Automobile parking	N ³	Y ⁴	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
48	Communications	N ³	Y ⁴	Y	Y	A ¹⁵	B ¹⁵	N
49	Utilities	N ³	Y ⁴	Y	Y	Y	Y ¹²	Y ¹³
49	Other transportation communications and utilities	N ³	Y ⁴	Y	Y	A ¹⁵	B ¹⁵	N
50	Trade							
51	Wholesale trade	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
52	Retail trade-building materials, hardware and farm equipment	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
53	Retail trade-general merchandise	N	N ²	Y ²	Y	A	B	N
54	Retail trade-food	N	N ²	Y ²	Y	A	B	N
55	Retail trade-automotive, marine craft, aircraft and accessories	N	Y ²	Y ²	Y	A	B	N
56	Retail trade-apparel and accessories	N	N ²	Y ²	Y	A	B	N
57	Retail trade-furniture, home furnishings and equipment	N	N ²	Y ²	Y	A	B	N
58	Retail trade-eating and drinking establishments	N	N	N ²	Y	A	B	N
59	Other retail trade	N	N ²	Y ²	Y	A	B	N
60	Services							
61	Finance, insurance and real estate services	N	N	Y ⁶	Y	A	B	N
62	Personal services	N	N	Y ⁶	Y	A	B	N
62.4	Cemeteries	N	Y ⁷	Y ⁷	Y	Y ¹²	Y ¹³	Y ^{14,21}
63	Business services	N	Y ⁸	Y ⁸	Y	A	B	N
64	Repair services	N	Y ²	Y	Y	Y ¹²	Y ¹³	Y ¹⁴
65	Professional services	N	N	Y ⁶	Y	A	B	N
65.1	Hospitals, nursing homes	N	N	N	A*	B*	N	N
65.1	Other medical facilities	N	N	N	Y	A	B	N
66	Contract construction services	N	Y ⁶	Y	Y	A	B	N
67	Governmental services	N	N	Y ⁶	Y*	A*	B*	N
68	Educational services	N	N	N	A*	B*	N	N
69	Miscellaneous services	N	N ²	Y ²	Y	A	B	N
70	Cultural, entertainment and recreational							
71	Cultural activities (including churches)	N	N	N ²	A*	B*	N	N
71.2	Nature exhibits	N	Y ²	Y	Y*	N	N	N
72	Public assembly	N	N	N	Y	N	N	N
72.1	Auditoriums, concert halls	N	N	N	A	B	N	N

LAND USE		ACCIDENT POTENTIAL ZONES			NOISE ZONES			
SLUCM NO.	NAME	CLEAR ZONE	APZ I	APZ II	65-69 dB	70-74 dB	75-79 dB	80+ dB
72.11	Outdoor music shell, Amphitheaters	N	N	N	N	N	N	N
72.2	Outdoor sports arenas, Spectator sports	N	N	N	Y ¹⁷	Y ¹⁷	N	N
73	Amusements	N	N	Y ⁸	Y	Y	N	N
74	Recreational activities (including golf courses, riding stables, water recreation)	N	Y ^{8,9,10}	Y	Y*	A*	B*	N
75	Resorts and group camps	N	N	N	Y*	Y*	N	N
76	Parks	N	Y ⁸	Y ⁸	Y*	Y*	N	N
79	Other cultural, entertainment and recreation	N	Y ⁹	Y ⁹	Y*	Y*	N	N
80	Resources production and extraction							
81	Agriculture (except livestock)	Y ¹⁶	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
81.5 to 81.7	Livestock farming and animal breeding	N	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
82	Agriculture related activities	N	Y ⁵	Y	Y ¹⁸	Y ¹⁹	N	N
83	Forestry activities and related services	N ⁵	Y	Y	Y ¹⁸	Y ¹⁹	Y ²⁰	Y ^{20,21}
84	Fishing activities and related services	N ⁵	Y ⁵	Y	Y	Y	Y	Y
85	Mining activities and related services	N	Y ⁵	Y	Y	Y	Y	Y
89	Other resources production and extraction	N	Y ⁵	Y	Y	Y	Y	Y

Source: Air Force Handbook 32-7084, *AICUZ Program Manager's Guide*, Table A4.1.

LEGEND

SLUCM – Standard Land Coding Manual, U.S. Department of Transportation.

Y – (Yes) – Land use related structures are compatible without restriction.

N – (No) – Land use and related structures are not compatible and should be prohibited

Y^X – (Yes with restrictions) – Land use and related structures generally compatible; see notes indicated by superscript.

N^X – (No with exceptions) – See notes indicated by the superscript.

NLR – (Noise Level Reduction) – NLR (outdoor to indoor) to be achieved through incorporation of noise attenuation measures into the design and construction of the structures.

A, B, or C – Land use and related structures generally compatible; measures to achieve NLR for A(DNL/CNEL 65-69), B(DNL/CNEL 70-74), C(DNL/CNEL 75-79), need to be incorporated into the design and construction of structures.

A*, B*, and C* - Land use generally compatible with NLR. However, measures to achieve an overall NLR do not necessarily solve noise difficulties and additional evaluation is warranted. See appropriate footnotes.

* - The designation of these uses as “compatible” in this zone reflects individual federal agencies’ and program considerations of general cost and feasibility factors, as well as past community experiences and program objectives. Localities, when evaluating the application of these guidelines to specific situations, may have different concerns or goals to consider.

NOTES

1. Suggested maximum density of 1-2 dwelling units per acre, possibly increased under a Planned Unit Development (PUD) where maximum lot coverage is less than 20 percent.
2. Within each land use category, uses exist where further deliberating by local authorities may be needed due to the variation of densities in people and structures. Shopping malls and shopping centers are considered incompatible use in any accident potential zone. (CZ, APZ, or APZ II).
3. The placing of structures, buildings, or above-ground utility lines in the clear zone is subject to severe restrictions. In a majority of the clear zones these items are prohibited. See AFI 32-7060 (formerly AFR 19-9) and AFJM 32-8008 (formerly AFM 86-14) for specific guidance.
4. No passenger terminals and no major above-ground transmission lines in APZ I.

5. Factors to be considered: labor intensity, structural coverage, explosive characteristics, and air pollution.
6. Low-intensity office use only. Meeting places, auditoriums, etc., are not recommended.
7. Excludes chapels.
8. Facilities must be low-intensity.
9. Clubhouse not recommended.
10. Areas for gathering of people are not recommended.
11.
 - A. Although local conditions may require residential use, it is discouraged in DNL/CNEL 65-69 dB and strongly Discouraged in DNL/CNEL 70-74 dB. The absence of viable alternative development options should be determined and an evaluation indicating a demonstrated community need for residential use would not be met if development were prohibited in these zones should be conducted prior to approvals.
 - B. Where the community determines the residential uses must be allowed, measures to achieve outdoor to indoor Noise Level Reduction (NLR) for DNL/CNEL 65-69 dB and DNL/CNEL 70-74 dB should be incorporated into building codes and considered in individual approvals.
 - C. NLR criteria will not eliminate outdoor noise problems. However, building location and site planning, and design and use of berms and barriers can help mitigate outdoor exposure, particularly from near ground level sources. Measures that reduce outdoor noise should be used whenever practical in preference to measures which only protect interior spaces.
12. Measures to achieve the same NLR as required for facilities in DNL/CNEL 65-69 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
13. Measures to achieve the same NLR as required for facilities in DNL/CNEL 70-74 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
14. Measures to achieve the same NLR as required for facilities in DNL/CNEL 75-79 dB range must be incorporated into the design and construction of portions of these buildings where the public is received, office areas, noise sensitive areas or where the normal noise level is low.
15. If noise level sensitive, use indicated NLR; if not, the use is compatible.
16. No buildings.
17. Land use is compatible provided special sound reinforcement systems are installed.
18. Residential buildings require the same NLR as required for facilities in DNL/CNEL 65-69 dB range.
19. Residential buildings require the same NLR as required for facilities in DNL/CNEL 70-74 dB range.
20. Residential buildings are not permitted.
21. Land use is not recommended. If the community decides the use is necessary, hearing protection devices should be worn by personnel.

APPENDIX B

Environmental Acoustics

Aircraft Noise Fundamentals

1. NOISE METRICS

Sound refers to sound pressure variations audible to the ear. The audibility of a sound depends on the amplitude and frequency of the sound and the individual's capability to hear the sound. Whether the sound is judged as noise depends largely on the listener's current activity and attitude toward the sound source and also the amplitude and frequency of the sound. The range in sound pressures that the human ear can comfortably detect encompasses a wide range of amplitudes, typically a factor larger than 1 million. To obtain convenient measurements and sensitivities at extremely low and high sound pressures, sound is measured in units of dB, a dimensionless unit related to the logarithm of the ratio of the measured level to a reference level.

Because of the logarithmic nature of the decibel unit, sound levels cannot be added or subtracted directly. However, the following shortcut method can be used to combine sound levels:

<u>Difference between two dB values</u>	<u>Add the following to the higher level</u>
0 to 1	3
2 to 3	2
4 to 9	1
10 or more	0

The ear is not equally sensitive at all frequencies of sound. At low frequencies, characterized as a rumble or roar, the ear is not very sensitive; it becomes more sensitive as the frequency increases and is most sensitive at high frequencies, characterized as a screech or a whine. The A-weighted level was developed to measure and report sound levels in a way that would more closely approach how people perceive the sound. Table 1 summarizes typical A-weighted sound levels.

Table 1 - Typical Sound Levels

Common Outdoor Activities	Sound Level (dBA)	Common Indoor Activities
Jet Fly-over at 300 m (1000 ft)	---110---	Rock Band
Gas Lawn Mower at 1 m (3 ft)	---100---	
Diesel Truck at 15 m (50 ft), at 80 km/hr (50 mph)	---90---	Food Blender at 1 m (3 ft)
Noisy Urban Area, Daytime	---80---	Garbage Disposal at 1 m (3 ft)
Gas Lawn Mower, 30 m (100 ft)	---70---	Vacuum Cleaner at 3 m (10 ft)
Commercial Area	---60---	Normal Speech at 1 m (3 ft)
Heavy Traffic at 90 m (300 ft)	---50---	Large Business Office
Quiet Urban Daytime	---40---	Dishwasher Next Room
Quiet Urban Nighttime	---30---	Theater, Large Conference Room (Background)
Quiet Suburban Nighttime	---20---	Library
Quiet Rural Nighttime	---10---	Bedroom at Night, Concert Hall (Background)
	---	Broadcast/Recording Studio
Lowest Threshold of Human Hearing	---0---	Lowest Threshold of Human Hearing

Source: California Department of Transportation 1998

2. NOISE DESCRIPTORS

Noise in our daily environment fluctuates over time. Some of the fluctuations are minor, some are substantial; some occur in regular patterns, others are random. Some noise levels fluctuate rapidly, others slowly. Some noise levels vary widely, others are relatively constant. Various noise descriptors have been developed to describe time-varying noise levels. The following is a discussion of the noise descriptors most commonly used in traffic noise analysis.

Environmental sound levels typically vary with time. This is especially true for areas near airports where noise levels increase substantially as aircraft pass overhead and afterwards diminish to typical community levels. Both the Department of Defense and the FAA have specified the three noise metrics listed below to describe aviation noise.

Day-Night Average Sound Level (DNL) is the 24-hour energy average A-weighted sound level with a 10-dB weighting added to those levels occurring between 10 p.m. and 7 a.m. The 10 dB weighting is a penalty representing the added intrusiveness of noise during normal sleeping hours. DNL is used to determine land use compatibility with noise from aircraft and surface traffic. The expression L_{dn} is often used in equations to designate day-night average sound level.

Maximum Sound Level (L_{max}) is the highest instantaneous sound level observed during a single noise event regardless of how long the sound may persist.

Sound Exposure Level (SEL) value represents the A-weighted sound level integrated over the duration of the event and referenced to a duration of 1 second, thus normalizing the event to a 1-second event. Typically, most events (aircraft flyover) last longer than 1 second, and the SEL value will be higher than the maximum sound level of the event.

3. NOISE MODELS

3.1 AIR TRAFFIC

The FAA-approved Noise Exposure Model (NOISEMAP) is used to predict aircraft noise levels. Since the early 1970s, the Department of Defense has been actively developing and refining the NOISEMAP program and its associated database. The NOISEMAP computer program is a comprehensive set of computer routines for calculating noise contours from aircraft flight and ground run-up operations, using aircraft-unique noise data for both fixed- and rotary-wing aircraft. The program requires specific input data, including runway layout, aircraft types, number of operations, flight tracks, and noise performance data, to compute a grid of DNL values at uniform intervals. The grid is then processed by a contouring program that draws the contours at selected intervals.

3.2 SURFACE TRAFFIC

The Federal Highway Administration (FHWA) Highway Traffic Noise Prediction Noise Model (FHWA-RD-77-108) was used to predict surface traffic noise. The model uses traffic volumes, vehicular mix, traffic speed, traffic distribution, and roadway length to estimate traffic noise levels.

FHWA has recently released a new traffic noise prediction model called Traffic Noise Model (TNM) which will be implemented in early 2000.

4. ASSESSMENT CRITERIA

Criteria for assessing the effects of noise include annoyance, speech interference, sleep disturbance, noise-induced hearing loss, possible nonauditory health effects, reaction by animals, and land use compatibility. Effects related to annoyance and land use compatibility are discussed below.

4.1 ANNOYANCE RESULTING FROM SUBSONIC AIRCRAFT NOISE

Noise-induced annoyance is an attitude or mental process with both acoustic and nonacoustic determinants (Fidell, et al. 1988). Noise-induced annoyance is perhaps most often defined as a generalized adverse attitude toward noise exposure and is affected by many factors, including sleep and speech interference and task interruption. The level of annoyance may also be affected by many nonacoustic factors.

In communities where the prevalence of annoyance is affected primarily by noise, reduction in exposure will likely lead to reduction in the prevalence of annoyance. In communities where the prevalence of annoyance is controlled by nonacoustic factors, such as odor and traffic congestion, reduction in exposure may not result in reduction in annoyance. The intensity of community response to noise exposure may be independent of physical exposure. Concerning community response to actions, such as airport siting or scheduling of supersonic transport aircraft, vigorous reaction has been encountered at the mere threat of exposure or minor increases in exposure.

Attitudinal survey is the standard method used to determine the prevalence of annoyance in noise-exposed communities. Surveys generally solicit self-reports of annoyance through questions such as "How bothered or annoyed have you been by the noise of (noise source) over the last (time period)?" Respondents are then typically asked in structured interviews to select one of several response alternatives, such as "Not at All Annoyed," "Slightly Annoyed," "Moderately Annoyed," "Very Annoyed," or "Extremely Annoyed." Other methods are sometimes used to infer the prevalence of annoyance from survey data (for example, by interpretation of responses to activity interference questions or by construction of elaborate composite indices), with varying degrees of face validity and success.

Predictions of the prevalence of annoyance in a community can be made by extrapolation from an empirical dosage-effect relationship. Based on the results of several sound surveys, Schultz (1978) developed a relationship between percent highly annoyed and DNL. The relationship should not be evaluated outside the range of DNL = 45 to 90 dB. Predictions indicate that less than 15% to 20% of the population would be annoyed by DNL values less than 65 dBA, whereas more than 37% of the population would be annoyed from DNL values greater than 75 dBA. The relationship developed by Schultz was presented in the Guidelines for Preparing Environmental Impact Statements on Noise (NAS, 1977).

These results were reviewed (Fidell, et al. 1989) and the original findings updated with results of more recent social surveys, bringing the number of data points used in defining the relationship to more than 400. The findings of the new study differ only slightly from those of the original study.

4.2 LAND USE COMPATIBILITY GUIDELINES

Widespread concern about the noise impacts of aircraft noise began in the 1950s, when high-power jet aircraft were introduced into military service on a widespread basis. The concern about noise impacts in the communities around and within airbases led the Air Force to conduct major investigations into the noise properties of jets, methods of noise control for test operations, and the effects of noise from aircraft operations on communities surrounding airbases. These studies established an operational framework of investigation and identified the basic parameters affecting community response to noise. These studies also resulted in the first detailed procedures for estimating community response to aircraft noise (Stevens and Pietrasanta, 1957).

Although most attention was given to establishing methods of estimating residential community response to noise (and establishing the conditions of noise "acceptability" for residential use), community development involves a variety of land uses with varying sensitivity to noise. Thus, land planning with respect to noise requires the establishment of noise criteria for different land uses. This need was met with the initial development of aircraft noise compatibility guidelines for varied land uses in the mid-1960s (Bishop, 1964).

In residential areas, noise intrusions generate feelings of annoyance on the part of individuals. Increasing degrees of annoyance lead to the increasing potential for complaints and community actions (most typically, threats of legal actions, drafting of noise ordinances, etc.). Annoyance is based largely upon noise interference with speech communication, listening to radio and television, and sleep. Annoyance in the home may also be based upon dislike of "outside" intrusions of noise even though no specific task is interrupted.

Residential land use guidelines have developed from consideration of two related factors:

- (a) Accumulated case history experience of noise complaints and community actions near civil and military airports, and
- (b) Relationships between environmental noise levels and degrees of annoyance (largely derived from social surveys in a number of communities).

In the establishment of land use guidelines for other land uses, the prime consideration is task interference. For many land uses, this translates into the degree of speech interference, after taking into consideration the importance of speech communication and the presence of nonaircraft noise sources related directly to the specific land use considered. For some noise-sensitive land uses where any detectable noise signals that rise above the ambient noise are unwanted (such as music halls), noise detection—rather than speech interference—may be the main criterion used.

A final factor to be considered in all land uses involving indoor activities is the degree of noise insulation provided by the building structures. The land use guideline limits for unrestricted development within a specific land use assume noise insulation properties provided by typical commercial building construction. The detailed land use guidelines may also define a range of higher noise exposure where construction or development can be undertaken, provided a specified amount of noise insulation is included in the buildings. Special noise studies undertaken by architectural or engineering specialists may be needed to define the special noise insulation requirements for construction in these guideline ranges.

Estimates of total noise exposure resulting from aircraft operations, as expressed in DNL values, can be interpreted in terms of the probable effect on land uses. Suggested compatibility guidelines for evaluating land uses in aircraft noise exposure areas were originally developed by the FAA as presented in Section 3.4.4, Noise. Part 150 of the FAA regulations prescribes the procedures, standards, and methodology governing the development, submission, and review of airport noise exposure maps and airport noise compatibility programs. It prescribes the use of yearly DNL in the evaluation of airport noise environments. It also identifies those land use types that are normally compatible with various levels of noise exposure. Compatible or incompatible land use is determined by comparing the predicted or measured DNL level at a site with the values given in the table. The guidelines reflect the statistical variability of the responses of large groups of people to noise. Therefore, any particular level might not accurately assess an individual's perception of an actual noise environment.

While the FAA guidelines specifically apply to aircraft noise, it should be noted that DNL is also used to describe noise that results from other community noise sources, including motor vehicles and railroads. The use of DNL is endorsed by the scientific community to assess land use compatibility as it pertains to noise (American National Standards Institute, 1990). Hence, the land use guidelines presented by the FAA can also be used to assess the noise impact from community noise sources other than aircraft.

The Air Force has established land use compatibility noise zones based on DNL values. The compatibility zones are summarized in Appendix B of this EA.

REFERENCES

American National Standards Institute, 1990. Sound level descriptors for determination of compatible land use. ANSI S12.40-1990.

Bishop, D. E., 1964. Development of aircraft noise compatibility for varied land uses. (FAA SRDS Report RD-64-148, II.)

California Department of Transportation, 1998. Traffic noise analysis protocol. Sacramento, CA.

Fidell, S., D. Barker, and T. Schultz, 1989. Updating a dosage-effect relationship for the prevalence of annoyance due to general transportation noise. In Noise and Sonic Boom Impact Technology. (HSD-TR-89-009). Human Systems Division, Air Force Systems Command. Brooks Air Force Base, Texas.

Fidell, S., T. J. Schultz, and D. M. Green, 1988. A theoretical interpretation of the prevalence rate of noise-induced annoyance in residential populations. Journal of the Acoustical Society of America 84(6).

National Academy of Sciences, 1977. Guidelines for Preparing Environmental Impact Statements on Noise. Report of Working Group on the Committee on Hearing, Bioacoustics, and Biomechanics. National Research Council, Washington, D.C.






Schultz, T. J., 1978. Synthesis of social surveys on noise annoyance. Journal of the Acoustical Society of America 64(2):377-405.

Stevens, K. N., and A. C. Pietrasanta, 1957. Procedures for Estimating Noise Exposure and Resulting Community Reactions from Air Base Operations. (WADC TN-57-10.) Wright Air Development Center. Wright-Patterson Air Force Base, Ohio.

APPENDIX C

Historic Departure Routes and Noise Contours

**EA for Proposed
Departure Route Changes
Hill AFB**

LEGEND	
	Noise Contour (Old Model)
	Noise Contour (New Model)
	Flight Line
	Runway and Airfield Pavement
	Noise Sensitive Areas

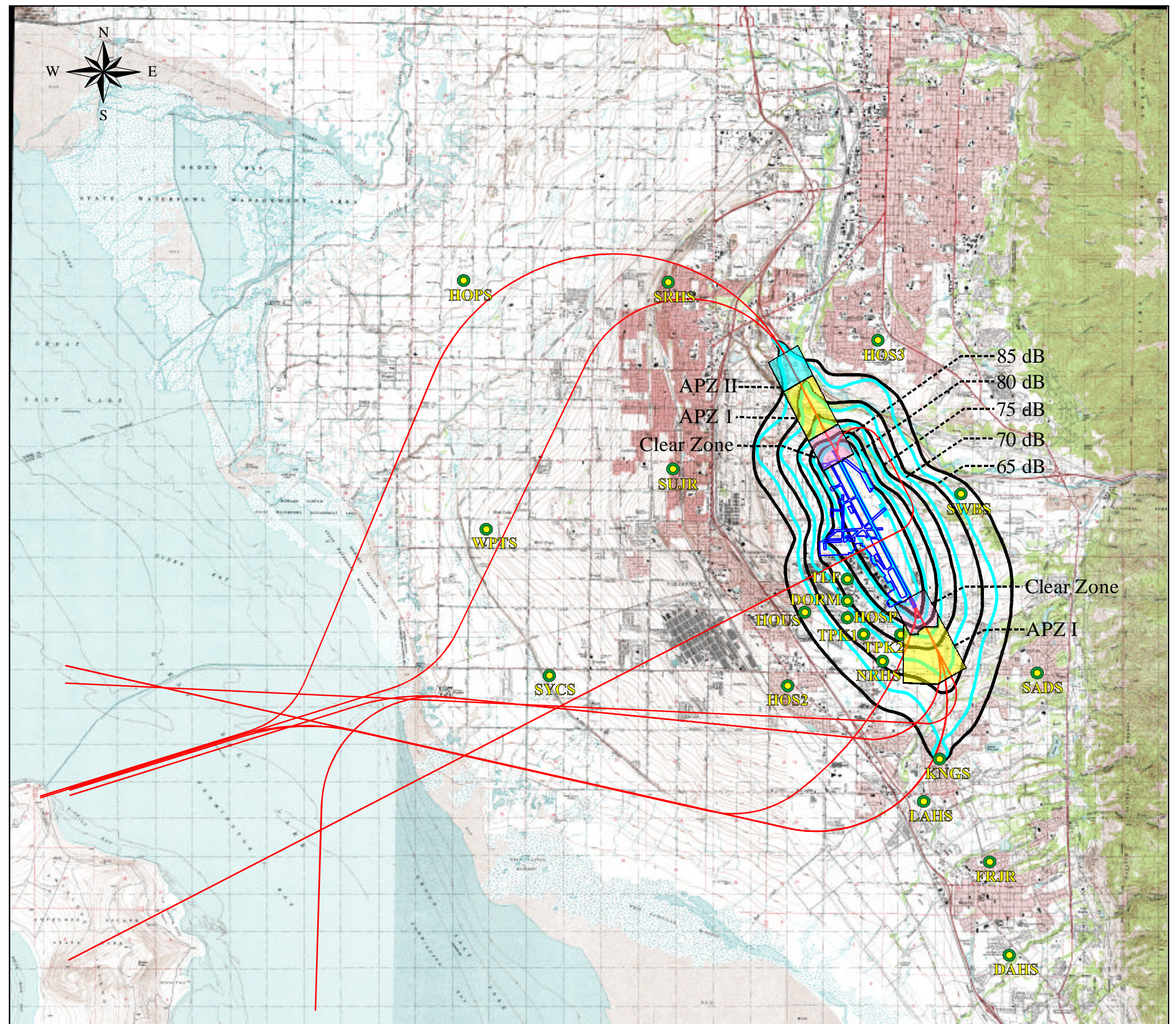
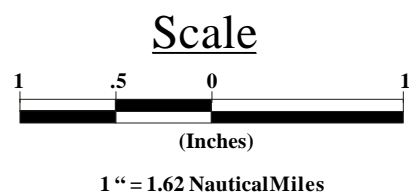


Figure C-1. Historic Departure Routes and Noise Contours Using Noise Map 6.0 & 6.5
February 2001
C-1
Hill Air Force Base
Environmental Assessment
Proposed Final