Final Environmental Impact Statement for Salt Lake City International Airport Expansion, Salt Lake City, Utah

United States Department of Transportation Federal Aviation Administration

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FINAL ENVIRONMENTAL IMPACT STATEMENT
FOR
SALT LAKE CITY INTERNATIONAL AIRPORT
EXPANSION
SALT LAKE CITY, UTAH

Lead Agency:
U.S. DEPARTMENT OF TRANSPORTATION
FEDERAL AVIATION ADMINISTRATION
In cooperation with:
U.S. ARMY CORPS OF ENGINEERS
JUNE 1992

This statement addresses the environmental impacts anticipated by the construction of a new runway at Salt Lake City International Airport and associated Federal actions and is submitted for review pursuant to the following public law requirements:
(a) Section 102(2)(c) of the National Environmental Policy Act of 1969.
(b) Section 509(b)(5) of the Airport and Airway Improvement Act of 1982, as amended.

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Preparation of this Final Environmental Impact Statement is in compliance with Federal Aviation Administration Airport Environmental Handbook (FAA Order 5050.4A). In addition, compliance with the following relevant Federal environmental statutes, executive orders, regulations, and guidelines is ongoing and consistent with the status of this proposed airport improvement action. Ongoing compliance means that some actions pertaining to these requirements remain to be met but are independent of the proposed action.

- National Environmental Policy Act (NEPA)
- Regulations of the President’s Council on Environmental Quality (CEQ)
- Endangered Species Act
- Archaeological Resources Protection Act of 1979
- National Historic Preservation Act
- Federal Water Pollution control Act, as amended by the Clean Water Act
- Resource Conservation and Recovery Act (RCRA) of 1976
- Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act (SARA)
- Toxic Substance Control Act (TSCA)
- Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA)
- Executive Order 12372: "Intergovernmental Review of Federal Programs"
- Executive Order 11990,"Protection of Wetlands"
- Executive Order 11988,"Floodplain Management"
- Executive Order 12088,"Federal Compliance with Pollution Control Standards"
- Noise Control Act of 1972, as amended
- The Clean Air Act, as amended
- The Solid Waste Disposal Act
- Airport and Airways Capacity Enhancement Act

**SUMMARY**

**Project Description**

The Salt Lake City Airport Authority proposes to construct a third air carrier runway, taxiway, aprons, terminal, and support facilities to accommodate existing and future operations at the airport. The purpose and need for the project, detailed in the following section explains the proposed projects purpose of reducing aviation operational delays.

Various options for reducing operational delays have been analyzed in the 1988 Master Plan Update and a 1991 Airport Capacity and Enhancement Plan. Although numerous minor airfield improvements would add capacity, all would fail short of accommodating demand. Only one option, construction of a new runway, was determined to be practical on the basis of logistical, economic, and engineering criteria. The original alternative was construction of a new 12,000 foot transport category runway and access taxiways parallel to and about 6300 feet west of existing Runway 16R/34L. The environmental assessment process undertaken over the past three years by the Salt Lake City Airport Authority influenced the revision of the original alternative to a 6155' separation to avoid wetland impacts to the extent practical. Construction of a new runway would be paralleled with expansion of landside and airfield facilities such as terminals, concourses, hangars, parking and service aprons.

**Project History**

The 1981 and 1988 Salt Lake City International Airport Master Plan updates identified the need for expanded facilities. In 1988 the Salt Lake City Airport Authority (SLCAA) began an environmental assessment (EA) process to assess impacts associated with the proposed development. After completing a draft EA the Airport Authority recognized the complexity of several issues associated with environmental impacts and thus prepared an Expanded Environmental Assessment (EXEA) which analyzed impacts, particularly wetland and cultural resource impacts, in more detail.

**Public Process**

The environmental assessment and expanded environmental assessment have been in the process of preparation since 1988. During that time, many state and federal agencies have been invited to actively participate. Prior to the preparation of the draft EA and EXEA, a Master Plan update was prepared which included a public participation process.

A public hearing on the EXEA was held December 2, 1991 in Salt Lake City. The hearing was published several times in local newspapers.
beginning November 1, 1991. Written comments on the EXEA were accepted until December 9, 1991. A detailed response to comments on the EXEA was provided in the final EXEA dated January of 1992.

The FAA published notice in the Federal Register January 15, 1992, of its intent to prepare an Environmental Impact Statement (EIS), and that written scoping comments would be accepted through February 14, 1992. In addition, direct notice was sent to approximately 90 individuals and organizations as well as local notice supplied in the Salt lake City Tribune and Deseret News.

A preliminary Draft DEIS was supplied to the Corps of Engineers, the United States Fish and Wildlife Service, and Environmental Protection Agency on February 21, 1992, for comments with particular emphasis on the draft 404 permit application.

The DEIS notice of availability was published in local newspapers, the Federal Register, and directly sent to approximately 90 individuals and organizations.

The Draft Environmental Impact Statement (DEIS) consists of the primary document in one volume and a referenced expanded Environmental Assessment EXEA in two separate volumes included in the transmittal of the DEIS.

A public hearing on the DEIS was held May 11, 1992 in Salt Lake City. The hearing was published several times in local newspapers. Written comments on the DEIS were accepted until May 27, 1992. The public process on the 404 permit took place from April 1 through April 30, 1992. A detailed response to all comments (both DEIS and 404) is included in this Final Environmental Impact Statement (FEIS).

Lead and Cooperating Agencies

The lead agency for this action is the Federal Aviation Administration (FAA). The Army Corps of Engineers is a cooperating agency. The responsible office for the action is the Denver Airports District Office.

FAA Participation in SLCAA Planning and Environmental Process

Planning for the proposed new runway and associated improvement has been the subject of two major planning efforts undertaken by SLCAA over the past 12 years. The Federal Aviation Administration has provided guidance and advice as well as financial support, during the course of these planning efforts.

Included in the planning process has been the analysis by the FAA of the methods and procedures used by SLCAA in determining the need and potential impact of the proposed new runway, as well as an analysis by the FAA of the preferred siting of the proposed new runway, and the impact it would have on the safe and efficient use of airspace by aircraft. FAA guidance and advice has been provided through participation in various technical committees associated with the planning and environmental process as well as through direct consultation with SLCAA project managers and their consultants.

Subject matter discussed has included airport planning standards, lighting and navigational and considerations, air traffic management concepts, environmental issues including noise and wetland mitigation procedures, Part 139 certification issues related to Airport Safety, and many other subjects.

In March of 1991 the Federal Aviation Administration, in partnership with the Salt Lake City Airport Authority and the Airlines serving Salt Lake International, produced the Airport Capacity Enhancement Plan which documented a detailed analysis of options to reduce delays at the Airport.

During the past four years the FAA has worked closely with the SLCAA project manager in funding, reviewing, coordinating, and preparing the environmental assessment referenced in this FEIS.

An FAA review of the documents resulted in a determination to proceed with the preparation of this FEIS including additional noise and wetland impact analysis.

The Federal Aviation Administration has provided an independent evaluation of the Expanded Environmental Assessment (EXEA) produced by the SLCAA and has been involved in joint agency meetings and site visits with and without SLCAA representatives. This FEIS incorporates the EXEA by reference and DEIS by process.

Areas of Controversy

On January 15, 1992, the FAA published in the Federal Register a notice of its intent to prepare an EIS and of its plans to accept written scoping comments through February 14, 1992. In addition, notice was published in local papers and directly mailed to approximately ninety persons and agencies. Several scoping comments were received. The scoping comments are contained in the Appendix of the DEIS. The scoping comments and the EXEA indicate that noise, wetlands and potential impacts to area duck clubs are controversial.

Issues to be Resolved

Issues to be resolved include whether the environmental impacts resulting from the proposed construction and operation of the new runway and associated improvements are so adverse as to preclude actions by the FAA in furtherance of the project. In addition, findings associated with wetlands impacts, such as whether or not there exists a practical alternative, must be made. Finally, the necessity of mitigation associated with the proposed action needs to be resolved in this environmental process.
Alternatives

In selecting the Preferred Alternative, eleven options were considered. Six of these alternatives included construction of a new runway at the current airport site, four were regional alternatives involving no on-site expansion of SLCIA, and one was the No-Action alternative. The detailed descriptions and analyses of each of these alternatives are included in Section 3.0 of the EXEA, and are summarized in Section 3.0 of this FEIS.

An extensive process of evaluating alternative runway site locations, taxiway configuration and terminal area development has been undertaken by the Salt Lake City Airport Authority over the Alternatives Section of this project as well as the EXEA. The final analysis in the environmental process as well. In fact, the preferred alternative parallel runway separation of 6155 feet identified in this FEIS is a result of reducing the separation distance to the extent practical to reduce wetland impacts.

This FEIS and its companion document (the EXEA) environmentally evaluated three alternatives, the No-Project Alternative, the Close-in Alternative, and the Preferred Alternative. The preferred existing air carrier runway with additional support and terminal facilities. The Close-in Alternatives would be similar to the Preferred Alternative except the new runway would be 5800 feet west development would be constrained due to less area available for preserved to grow until facilities are saturated at an important point at the EXEA preferred alternatives are the same. The EXEA preferred alternative is a new runway 6300 feet from the existing main runway. The FEIS preferred alternative is for a new runway 6155 feet from the main runway. The change is due to an attempt to reduce wetland impacts to the extent practical. The change is large enough so that the impacts of the new runway in the EXEA is valid unless otherwise so interrelated they could not be clearly separated. An example of this would be the Biotic Community impacts which include biological impacts. In some categories there were clearly no environmental impacts. In other categories the impacts range from insignificant to significant. The following summarizes the impacts of each category.

Noise

This FEIS replaces the noise analysis in the EXEA. The reason for this is that the forecasts and the fleet mix data that were used in the calculation of the cumulative noise exposure using the FAA Integrated Noise Model 3.9 in the EXEA were out of date. The new forecasts and fleet mix represent the airport use in 1991 extended to 2006 and incorporates practical noise abatement practices as well as the implementation of FAR Part 91 and FAR Part 161 changes. The newly modeled noise contours also include computer modeling changes that will be a part of the new INM Version 4.0 which incorporates the effects of altitude on climb gradients.

The noise contours presented in this FEIS have been independently evaluated by the FAA and were produced in consultation with the FAA. The noise contours in this FEIS are different from the noise contours in the EXEA. There are several residences in the 65 Ldn and 70 Ldn contours with the implementation of the Preferred alternative. There are also residences impacted by noise under the no-project and close-in alternatives. Actions to mitigate these impacts have been identified and are included both in the EXEA and the PA (ref page 2-79) and the Summary of Mitigation Measures section of this FEIS (ref section 5.23).

Land Use

There will be a slight shift in the area encompassed by the noise contours under the no-project, close-in, and preferred alternatives. The existing land use incompatibility consists of 54 homes within the 65 Ldn and 6 homes within the 70 Ldn contours. Using the project land use incompatibility criterion, the no-project alternative forecast to consist of 28 homes within the 65 Ldn and 3 homes within the 70 Ldn contour for the year 1996. This decrease in the number of affected homes is due to the phase-out of Stage II aircraft and the phase-in of quieter Stage III aircraft as required by Federal Aviation Regulation (FAR) Part 91. Under the preferred and close-in alternatives, the land use incompatibility will consist of 3 homes within the 65 Ldn and no homes within the 70 Ldn contour for the year 2006. Under the preferred alternative with mitigation thers is forecast to be no incompatible land uses within the 65 Ldn or 70 Ldn contours in the year 2006. Section 5.2 of this FEIS describes the anticipated land use impacts in more detail.
Social Impacts

There will be significant impacts to some residences. Those areas of impacts are identified in greater detail in this FEIS. Homes impacted will be acquired in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act or sound insulated.

Socioeconomic Impacts

The proposed development will not significantly shift patterns of population movement, public service demands, or result in significant influence to economic development.

Air Quality

An air quality analysis of the alternatives indicated that no state, local, or federal air quality standards will be violated as a result of surface access to the proposed terminal areas or by operation of the proposed new runway.

Methods of reducing emissions are described in Section 5.5 of this FEIS.

Water Quality

Any of the construction alternatives will have a significant adverse impact on surface or groundwater quality.

Mitigation methods to be implemented will include: settling ponds equipped with vector-skimming devices and grease traps, erosion control such as covering fill material, stormwater pre-treatment facility, and the capping of an artesian well.

Public Lands - DOT Section 4(f)

None of the alternatives will significantly impact 4(f) lands.

Historic/Cultural/Archaeologic Resources

None of the alternatives would significantly impact historic, cultural or archaeological resources. The areas of proposed project disturbance have been intensively surveyed for cultural resources.

Wetlands and Biotic Communities

The preferred alternative would have a significant impact on wetlands and biotic communities as would the close-in alternative. The no-project alternative would not significantly impact wetlands or biotic communities. These two categories of impact have been combined to provide a more comprehensive analysis and representation of the impacts of the project in the EXEA and FEIS.

Impacts to Threatened and Endangered Species were also included in the Biotic Communities category. In this FEIS, impacts to endangered and threatened species have been separated out to clearly focus the analysis of the impact to those species.

This FEIS provides a comprehensive analysis of the mitigation measures needed to offset the impacts associated with constructing the preferred alternative. Included with the DEIS and this FEIS is a copy of the 404 Permit Application which was submitted to the Corps of Engineers simultaneous with the notice of availability for the DEIS.

The wetland impacts under the preferred and close-in alternatives can be summarized as impacts to 339 acres of wetlands.

The effects of this project will result in the loss of wildlife habitat and/or quality, increased noise to habitat areas, human intrusion, and fragmentation of habitat.

Section 5.9 of this FEIS describes the wetland impacts and proposed mitigation in more detail.

Threatened and Endangered Species

All of the alternatives have some impact to the Endangered Bald Eagle and the Peregrine Falcon in that aircraft currently and will in the future, fly over food foraging areas for these species. The preferred alternative would have an added impact in that a peregrine falcon aerie would be relocated in order to accommodate the runway construction.

Based on the analysis of impacts and proposed mitigation, and in consultation with the United States Fish and Wildlife Service (USFWS), it has been determined that none of the alternatives will jeopardize the continued existence of any threatened or endangered species.

The impacts and proposed mitigation can be found in FEIS Section 5.10 and the EXEA Section 4.10.

Floodplains

The EXEA identifies Salt Lake City International Airport and environment as a floodplain area. However, more recent information indicates that the construction area is not within a special flood hazard area and that there is no significant impact to floodplains and no further analysis is required (see page IX-2, EXEA Appendix).

Coastal Zone Management Area and Coastal Barriers

These categories of impacts are not applicable to the project area.
Wild and Scenic Rivers

There are no rivers designated as wild and scenic in the proximity of the Salt Lake International Airport.

Farmlands

The project area contains no prime or unique farmlands or farmlands of state interest.

Energy Supply and Natural Resources

None of the impacts will significantly impact energy supplies or natural resources.

Light Emissions

None of the alternatives will produce light emissions of such intensity to cause significant impacts.

Solid Waste Impacts

None of the alternatives will result in a significant impact to solid waste disposal.

Transportation Impacts

The transportation system accessing the airport will not significantly change.

Construction Impacts

The preferred alternative involves a significant construction effort. There will be no significant long term impacts related to construction. The short term impacts, which include air, water, and transportation impacts, can be mitigated below a level of significance.

Design, Art, Architecture

None of the alternatives will result in a significant impact under this category.

Geology and Seismology

All of the alternatives could be impacted by geological and seismic activity. A complete discussion of impacts and proposed mitigation can be found in this FEIS and Section 5.23 of the ESEA.

APPROVAL DECLARATION

After careful and thorough consideration of the facts contained herein and following consideration of the views of those Federal agencies having jurisdiction by law or special expertise with respect to the environmental impacts described, the undersigned finds that the proposed Federal actions are consistent with the existing national environmental policies and objectives as set forth in Section 101(a) of the National Environmental Policy Act of 1969.

Edward G. Tatum, Manager
Airports Division
Northwest Mountain Region
Date: 6-27-92
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SECTION 1.0
PURPOSE AND NEED
SECTION 1.0 - PURPOSE AND NEED

Introduction

Expansion of the Salt Lake City International Airport is proposed to meet the existing and future travel demands of the public and air carriers using the airport. Specifically, it is proposed to increase the safety and efficiency of the airport by reducing congestion and delays. The expansion of the airport has been planned for over 12 years including two Master Planning efforts, a FAR Part 150 document (an airport noise compatibility planning study), a Capacity Task Force Document, and the Draft Environmental Assessment and Expanded Environmental Assessment efforts in addition to numerous smaller studies and documents.

The FAA adopts EXEA Section 2.0 which fully describes the Purpose and Need for the project, its contents are summarized below.

Safety and Efficiency of Aircraft Operations

Salt Lake City International Airport (SLCIA) is the major commercial service air carrier airport in the State of Utah. Commercial Carriers, general aviation, and military aircraft all use SLCIA. It is the only public use airport in Utah that can accommodate the entire fleet of certificated aircraft. SLCIA serves over 1 percent of all commercial airline passengers in the United States. In 1999 Salt Lake City International Airport was the 25th busiest air carrier airport in the United States with a total of 950,113 operations (an operation is one take-off or landing) and experiences significant delay problems. The level of operation is forecasted to increase to 415,000 operations in 2006 as reported by the Airport Authority in its 1991 forecast update. The table below summarizes the forecast operations.

| TABLE 1.1 - SUMMARY OF FORECAST OPERATIONS |
| YEAR | AIR CAPRIER | COMMUTER | AIR TAXI | GENERAL | MILITARY | TOTAL |
| 1991 | 156,700 | 61,310 | 81,050 | 5,000 | 304,000 |
| 1996 | 180,600 | 66,900 | 85,100 | 5,200 | 336,900 |
| 2006 | 239,100 | 76,600 | 94,100 | 5,200 | 415,000 |

Should demand increase as forecasted, the total number of annual operations at SLCIA would approach 324,000 by the forecast opening year of the runway (1995). This level of operations approaches the Annual Service Volume (ASV) of 327,500 for the Airport in its existing configuration. The ASV is an estimated capacity for the airport based on available facilities. This descriptor indicates that increased airfield capacity is needed by 1995.

In March of 1991, the FAA completed an Airport Capacity Enhancement Plan for SLCIA. The study indicates that for the baseline conditions, which correspond to the 1986 activity level, total annual delay was estimated to be 14,900 hours at an annual cost of $16,200,000. Under the no-project alternative, the Capacity Enhancement Plan projects the total annual delay will reach 104,000 hours by 2006, at an annual cost of $113,300,000. The average delay at that time would be 13.3 minutes per airplane.

In the Airport Capacity Enhancement Plan study, aircraft delays for the no project and preferred alternative were calculated using the Runway Delay Simulation Model (RDSIM) and the Airport and Airspace Simulation Model (SINMOD). An average direct operating cost of $18.16 per minute was used to calculate the cost attributable to delays. This cost represents only the actual airline expense and does not include lost passenger time, disruption of airline schedules, added personnel costs or other factors. The delays of the preferred alternative and the no project alternative were compared with one another to determine the benefit of the proposed action.

In addition to the need to accommodate the annual and peak hour operations at the airport, there is a more significant need at SLCIA to accommodate airport operations during Instrument Flight Rules (IFR) weather conditions. At present, the available airport facilities at SLCIA provide an instrument capacity of approximately 50 operations per hour. Current demand levels during periods of (IFR) weather are about 78 operations per hour, resulting in nearly 28 hourly operations not being accommodated. This demand/capacity imbalance results in airfield delay. The level of delay is estimated at between 60 and 120 minutes per aircraft during extreme weather conditions and between 5 to 14 minutes during marginal weather conditions.

The preferred alternative would allow simultaneous independent IFR approaches from either direction and would permit Category III Instrument Landing System (ILS) approaches on at least one runway at all times. In addition, the proposed action would provide direct access between the runways and terminals without delays associated with crossing an active runway. During the first ten years of the runways operation, delays would be reduced by approximately 30,000 hours a year at a savings of over 31 million a year. After the first ten years of operations the runway is estimated to reduce delay over 61,000 hours/year at a savings of $61 million/year.

To provide the required future airfield capacity needed to accommodate forecasted growth, an additional runway with Instrument Landing System (ILS) that allows for simultaneous independent operations (i.e., operations on more than one runway at the same time) during IFR conditions is needed.
SECTION 2.0 - PROPOSED FEDERAL ACTIONS

Federal Aviation Administration Actions

Introduction

The Salt Lake City Airport Authority proposes to construct and operate a new air carrier runway at Salt Lake City International Airport. The Federal Aviation Administration is the lead agency for the project. The key actions that the FAA would have to take for the project to be implemented involve the development of air traffic control and airspace management procedures designed to effect the safe and efficient movement of air traffic to and from this new runway (ref 49 U.S.C. 1348).

Several actions would be necessary to facilitate the design, development, and establishment of air traffic control and flight operating procedures for use in conjunction with the proposed runway, including the installation of various ground based air navigation facilities located at the airport. In addition, within the limits of available appropriations in any particular fiscal year, and subject to other demands for funds, the FAA would make federal grant monies available to the Salt Lake City Corporation for eligible Airport development projects (ref 49 U.S.C. App. 2201 at. app.). Examples of the kind of development which is eligible for grant-in-aid support include land acquisition and construction of runways, taxiways, apron areas, and mitigation actions.

Air Traffic Control

The key FAA actions related to air traffic control involve the design, development, and establishment of air traffic control and flight-operating procedures. The existing terminal airspace would encompass the approach and departure phases of landings and takeoffs from the proposed runway.

The current air traffic control system would continue to operate with little change. Control of aircraft using this new runway would continue to be exchanged between the Salt Lake Air Route Traffic Control Center and the Salt Lake International Airport Traffic Control Tower. Radar handoffs between these two air traffic control facilities would be affected routinely. The specific aircraft routing for arrival or departure is dependent on many factors, including weather conditions and the arrival or departure direction of air traffic.

There is a fundamental difference between approach/landing procedures and departure/takeoff procedures. The former require aircraft to be sequenced while at the same time being separated from each other in relatively narrow airspace in order for the aircraft to effect a landing on a designated runway. On the other hand, departure or takeoff procedures are not so limited since,
through the use of lateral, longitudinal, or horizontal separation which can be affected by the use of radar vectors or other procedural techniques, aircraft can be spread out in the available airspace during normal phases of takeoff.

**Flight Procedures**

The close-in terminal air traffic and airspace environment used for the final phases of landing and initial phases of take-off would be unaffected except for, perhaps, a slight offset because of the change in takeoff or landing location at the proposed runway.

a. **Approach Procedures**

In conjunction with the operation of the proposed runway, the FAA would design and establish a different set of instrument approaches and departures for each end of the runway. These procedures would be based on precision criteria for avoiding obstructions to air navigation. Each procedure would be designed to take an aircraft from the airport operating environment through the approach phase to landing, and departing aircraft into the enroute environment. These procedures would enable flight crews to move safely and efficiently throughout the national airspace system.

b. **Departure Procedures**

FAA would develop and design operational departure procedures for the proposed runway to effect the safe movement of air traffic from lift-off through climb-out to its juncture with the enroute airway structure. These departure procedures would be consistent with established flight-safety criteria, including obstacle clearance, and aircraft flight performance envelopes (e.g., aircraft speed, rate of climb, altitude below which turns are not to be made, and degree of bank). Departure procedures are divided into distinct segments. In the first phase, from the start of takeoff to an altitude of 35 feet, the aircraft establishes a positive rate of climb. Following this point, the aircraft climbs as rapidly as practical to at least 400 feet. During this initial climb phase, no reduction from takeoff power is authorized. No turns may be made during this initial phase because any bank or turn results in some loss of lift. After the aircraft reaches an altitude of 400 feet, power can be reduced from takeoff power to climb power. When the aircraft flap settings are reconfigured for continued climb, some turns can be made. Standard-rate turns of three degrees per second generally involve a bank angle of between 23 and 27 degrees. The actual bank angle applied can vary among aircraft types, depending on avionic equipment and pilot technique which, in turn, affects the aircraft's position relative to the ground.

All flight maneuvering during the initial phases of take-off occurs within a relatively limited geographic area around the Airport. Density-Altitude conditions permitting, turbojet-powered air carrier aircraft generally lift off the runway at approximately 140 knots and accelerate to approximately 200 knots in terminal-area airspace. Applying a minimum climb gradient criteria, which reflects engine climb-out performance of at least 150 to 200 feet per nautical mile on takeoff with speed averaged at 180 knots or three miles per minute, turbojet-powered aircraft reach an altitude of 400 feet two miles from the end of the runway, usually about 45 seconds after liftoff. Applying typical climb-performance criteria, however, turbojet-powered aircraft usually have a 10% climb gradient. This gradient produces a climb of 600 feet per nautical mile (density-altitude conditions permitting), or an altitude of 1,200 feet or more at two miles from the end of the runway.

**Airways Facilities**

In support of these various air traffic and airspace operational actions, the FAA would design, install, and operate a wide range of ground-based air traffic control; air navigation and related facilities, including radar; very-high-frequency, omnidirectional, range-with-distance measuring equipment; approach lighting systems; a new air traffic control tower; additional low level windshear alert system sensors; and instrument landing systems including glide slope, localizer, and marker beacons. For example, in conjunction with the establishment of an IFR runway, not only would there be a full ILS and approach lighting system, but provision would be made for the location of a middle marker, between 2000 and 6000 feet from the approach end of the runway, and an inner marker, which generally marks the decision point for Category III approaches, to be located on airport property. In addition, an outer marker would be installed several miles from the runway end.

**Airport Actions**

In addition to making federal grant-in-aid funds available to the Salt Lake City Airport Authority for eligible airport development projects, the FAA would take several other airport-specific actions. These would include a certification inspection of the proposed runway prior to its use (see 49 U.S.C. App. 1432, 14 CFR Part 139), final approval of a revised airport layout plan (see P.L. 100-223, Sec. 109(f); 49 U.S.C. App. 2210(f), and environmental approval (see 42 U.S.C. 4321-4347 and 40 CFR 1500-1508).
Flight Standards

The FAA has the responsibility and authority to approve airline operations to a new runway under the provisions of FAR Part 121 "Certification and Operations, Domestic, Flag, and Supplemental Air Carriers and Commercial Operations of Large Aircraft." FAA's approval of amended operating specifications would be required for any air carrier intending to operate on the proposed runway. Operating specifications address the airports to and from which an air carrier may operate, the approved routes over which they may operate (stopovers and connections), the kinds of operations authorized, and the types of airplanes authorized for use.

Other Federal Agency Actions

Due to the significant wetland impacts associated with the preferred alternative, the U.S. Army Corps of Engineers is requested to approve the 404 permit application associated with the proposed action. The U.S. Environmental Protection Agency is also responsible for reviewing the 404 permit application as well as the Environmental Impact Statement. The United States Fish and Wildlife Service has the responsibility during the environmental process for review and comment on the wetland impacts, associated biotic community impacts, and Section 7 responsibilities related to Endangered and Threatened Species.
This section describes the alternative development scenarios that were considered in the process leading to the proposal to construct a new air carrier runway at Salt Lake City International Airport (SLCIA). It is based on analyses performed as part of the Salt Lake City International Airport Master Plan Update, completed in 1988, the Capacity and Enhancement Task Force Study, and the Expanded Environmental Assessment.

During the development of the Master Plan, a technical coordination and public involvement program was conducted that regularly presented study findings and sought technical input in decisions. As part of this process, the alternatives were presented to the general public at two open public meetings. Furthermore, a series of briefings were held with technical representatives of private and governmental agencies to disseminate information and receive comment regarding the choices being considered. In all, the public and agency involvement in the process of developing, evaluating, and selecting the preferred runway development alternative was extensive. Two public and at least three technical coordination meetings were held. The Preferred Alternative was chosen, in part, as a result of commentary received during this process, and the ensuing environmental process.

**ALTERNATIVES CONSIDERED**

In selecting the Preferred Alternative, eleven options were considered. Six of these alternatives included construction of a new runway at the current airport site, four were regional alternatives rather than site-specific, and one was the No-Action alternative. The detailed descriptions and analyses of each of these alternatives are included in Section 3.0 of the EXEA, and are summarized below.

The preferred alternative identified in this FEIS incorporates all planned SLCIA airport development within the planning period (i.e. cargo, terminal, runway, taxiway facilities) as cumulative impacts. The no project alternative includes development projects which are categorically excluded from environmental analysis under FAA Order 5050.4a.

**REGIONAL ALTERNATIVES**

**Regional Alternative 1: Shift General Aviation Traffic to Other Regional Airports**

Under this alternative, all general aviation activity at SLCIA would be transferred to other regional airports. The total airport capacity would then be available to serve commercial air carriers.

Although this alternative would increase the air carriers’ ability to operate under Visual Meteorological Conditions (VMC), the Instrument Meteorological Conditions (IMC) capacity would not increase, because the lack of sufficient runway separation and runway convergence does not allow simultaneous arrivals and departures. In addition, General Aviation activity is an insignificant component of the IMC demand. Removal of this small component will not cause a measurable benefit.

**Regional Alternative 2: Shift Air Carrier Growth to Other Existing Regional Airports**

This alternative is based on the assumption that a gap can be placed on air carrier activity at SLCIA and all future air carrier activity growth can be directed to use other regional airports. Although this is being studied as an alternative, the airport operator cannot legally deny access to any aircraft, so implementation of this alternative would be difficult and would rely on cooperation rather than force.

**Regional Alternative 3: Build A New Airport to Serve as an Air Carrier Hub**

Regional Alternative 3 is predicated on the assumption that both the current IFR capacity shortage and the long-range VFR shortage could be solved through construction of a new airport in the Salt Lake City area to function as the air carrier hub. SLCIA would continue under this scenario as the origination/destination airport serving all local passengers. However, even with only origin destination traffic remaining at SLCIA, IFR capacity would be insufficient to meet current demand levels. This situation would further deteriorate as time progressed. It is also unlikely that any carrier would voluntarily split its origin and destination and connecting operations and relocate a portion to a remote airport.

**Regional Alternative 4: Construct A New Airport**

Regional Alternative 4 is based on the premise that a new airport could be built on an alternative site, to take the place of SLCIA. Under this alternative, all traffic would move to the new airport and SLCIA would be closed. It is uncertain whether a suitably large airport exists close enough to the population centers to be feasible. In fact, preliminary analyses indicate that it is extremely doubtful that a site could be found.

**ON-SITE ALTERNATIVES**

**On-Site Alternative 0: No-Action**

In the No-Action Alternative, no new runway would be constructed, but operating conditions on Runway 16R-34L would be upgraded by placement of high-speed exit taxiways and improved instrumentation. Terminal expansion,
additional parking facilities, and expansion of other support facilities would proceed as under the Preferred Alternative. Aircraft parking positions would increase from the existing forty-nine positions to an ultimate of over 110. New aircraft hangars, cargo buildings, flight kitchens and aviation related development would be necessary to support the increased operations. Additional landside facilities including a parking structure, road improvements, and hotel would be developed. Total operations would continue to increase until saturation was reached. This Alternative is illustrated in Exhibit 3-6-A of the EXEA.

On-Site Alternative 1 (The Preferred Alternative): East Parallel Runway with 6,155-Foot Separation

Under the Preferred Alternative, a third parallel runway and taxiway system would be built to the west of the existing Runway 16R-34L at a separation distance of 6,155 feet. This alternative is the same in every respect as Alternative 1 as analyzed in the EXEA, with the exception that the separation was decreased to 6,155 feet from 6,300 feet. This change in separation was a result of the environmental process, which showed this alternative would reduce the impact on wetlands. This runway would be 12,000 feet long and 150 feet wide. This alternative would allow simultaneous IFR operations on the new runway and Runway 16R-34L, and continued development of the existing passenger terminal area. The 6,155-foot separation would allow sufficient space for long-term, integrated terminal development. The proposed development would include new terminals, concourses, aircraft parking, hangars, cargo buildings, fuel storage, air traffic control tower, flight kitchens and related facilities. Aircraft gates would increase from the existing forty-nine positions to an ultimate of over 110. Exhibit 3.1 of this FEIS illustrates this alternative.

On-Site Alternative 1A (The Close-In Alternative): East Parallel Runway with 5,800-Foot Separation

This alternative would achieve the same objectives as Alternative 1 relative to delay reduction, but not total airport expansion. The primary difference between Alternative 1 and this alternative is that, under this alternative, the separation distance between the new runway and existing Runway 16R-34L would be reduced to 5,800 feet to reduce the project’s impacts on wetlands. Development would be smaller than under Alternative 1 because less area would be available for expansion. Aircraft gates would be increased from the current forty-nine positions to approximately 86. While limited expansion of facilities would be accomplished under this alternative, sufficient space would not be available for the long term terminal development needs. Congestion in the area of the terminals and support areas would occur in the long term. This Alternative is illustrated in Exhibit 3-6-C of the EXEA. This Alternative would result in 24 fewer aircraft gates than the Preferred Alternative. Aircraft without available parking positions would need to wait for a position to become available resulting in greater delays and apron congestion.
ON-SITE ALTERNATIVE 2: CROSSWIND RUNWAY 12-30
This alternative would involve a crosswind, non-intersecting runway with a 12-30 (120° - 300°) alignment. This runway configuration would allow for maximum capacity and efficiency. Runway dimensions would be similar to those of Alternative 1. Alternative 2 would coincide with the Victor Airway V-484 leading to the Twin Falls VORTAC, the northeastern gate in the Salt Lake Terminal airspace area. Crosswind runways historically have been used to increase airfield efficiency and capacity. However, it was shown that such a runway could not be operated safely due to terrain characteristics that violate the TERPS criteria. This Alternative is illustrated in Exhibit 3-6-D of the EXEA. Note, Victor Airways, VORTAC, and TERPS, involve signals provided to aircraft avionics and pilots to enable navigation in terminal and en route areas, and assist pilots in landing procedures at airports.

ON-SITE ALTERNATIVE 3: CLOSE-IN CROSSWIND RUNWAY
This alternative is a variant of the crosswind alignment. Its position is determined, in part, by clear zone placement within 2200 West Street and, in part, by facilitation of takeoffs on both this alternative and intersecting Runway 16R-34L. As with Alternative 2, this runway also could not be operated safely due to terrain characteristics that violate TERPS criteria. This Alternative is illustrated in Exhibit 3-6-E of the EXEA.

ON-SITE ALTERNATIVE 4: REALIGN RUNWAY 16L-34R
This alternative would re-align Runway 16L-34R to create a truly parallel configuration that would be more efficient. This configuration and the 12,000-foot runway length would allow for expanded use by large aircraft. The 1,100-foot separation between them would not permit simultaneous IFR operations on both Runway 16R-34L and the new runway, under current or future operational criteria. Aircraft would not have immediate independent access to both runways and would need to wait to cross the active runway. This Alternative is illustrated in Exhibit 3-6-F of the EXEA.

ON-SITE ALTERNATIVE 5: RELOCATE RUNWAY 16L-34R TO THE NORTH
This alternative would be placed to the north of existing Runways 16R-34L and parallel to existing air carrier Runway 16R-34L to meet the requirements for simultaneous IFR operations on Runway 16R-34L. Approach and departure paths would clear existing leased parcels. This alternative would not require closure of the general aviation Runway 16L-34R, but would place severe restrictions on its operation. The runways would be totally dependent and could not be used for simultaneous IFR operations. This Alternative is illustrated in Exhibit 3-6-G of the EXEA.

SUMMARY OF EVALUATION OF ALTERNATIVES
As has been shown, none of the four regional alternatives identified above represents practicable solutions to the short-term IFR and landing capability deficiency. Even considering the long-term VFR capacity deficiencies, these alternatives fail to solve the problem satisfactorily.

The analysis of the seven on-site alternatives is summarized in Exhibit 3-7 of the EXEA. As this exhibit shows, only two of the alternatives proved to be practicable. On-Site Alternatives 1 (the preferred alternative) and 1A (the Close-In Alternative) are nearly identical, so their ratings were also similar. These two Alternatives along with the No-Action Alternative were retained for assessment of environmental impacts in the EXEA and this FEIS.

TRANSMISSION LINE RETROFIT ALTERNATIVES
Development of an additional runway at SLCIA under the Preferred Alternative or the Close-In Alternative would require relocation of an existing overhead transmission line corridor that crosses the proposed airport expansion area (see Exhibit 2.2 of the EXEA). Seven alternatives were considered for relocation of the transmission line corridor.

Alternative A
Alternative A (see Exhibit 3-9-A of the EXEA) would relocate the transmission line corridor to the west of the expansion area outside of the approach surface to the north. This Alternative would require realigning about 5.9 miles of the corridor. Approval of this Alternative would require an Environmental Impact Statement (EIS) and a Corps of Engineers (COE) 404 Permit. Easements would need to be negotiated with existing property owners. Water control structures could be required to control surface water drainage. Alternative A would cost $17 million dollars to construct and take about 3 years to complete. Alternative A was not selected due to the extension of the line over open water.

Alternative B
Alternative B (see Exhibit 3-9-B of the EXEA) would relocate a large portion of the existing overhead lines, and construct an underground transmission cable system under the proposed runway and extending outside the navigational cones of influence on each side. Approval of this Alternative would require an EIS and COE 404 permit. The system would consist of a paper-insulated, high-pressure oil pipe-type cable system. The pipes would be housed in two tunnels under the new runway and taxiway.
intersecting the existing 138KV and 46KV lines. Approximately two miles of above ground transmission lines would continue northward, and intersect the existing 345KV and 230KV transmission lines outside the navigational signal areas. An oil-pumping plant would be located at each of the underground cable systems terminating yards. The overhead portions would be similar to existing structures, with limitations on structure heights. Measures to reduce the bird strike potential would be installed. Alternative B would cost an estimated 60 to 80 million dollars to construct in a 27 month period of time.

Alternative C

Alternative C (see Exhibit 3-9-C of the EXEA) would be similar to Alternative A, but would require realigning only about 4.5 miles of the corridor. Alternative C differs from Alternative A in that by the positioning of the lines, a glide slope of only (50:1) would be available. This Alternative also differs from Alternative A in the way it crosses the northern portion of the airport. Alternative C would not cross areas of open water, as Alternative A would. An EIS and COE 404 Permit would be required. A water-control structure would be needed to control surface drainage. This Alternative was the preferred transmission line relocation alignment prior to the FAA’s directive to move the corridor beyond the Airport’s navigational cones. To avoid interfering with the Airport’s navigational aids, the transmission line corridor must be located farther to the west. The estimated cost of this Alternative would be about $7.4 million and take approximately 36 months to design and construct.

Alternative C has been disapproved by the FAA, which cites its interference with navigational aids. Alternative C cannot be considered feasible. Alternative F was developed to replace this alternative.

Alternative D

Alternative D realignment would relocate the overhead transmission line corridor outside of Airport property entirely (see Exhibit 3-9-D of the EXEA). The proposed realignment would be 300 feet wide and extend approximately 11 miles. The new alignment would originate at Utah Power’s Terminal Substation, proceed east in the vicinity of 1300 South Street, across I-215 and roughly parallel the eastern side of I-215 until it intersected the existing transmission line corridor.

This alternative would require relocating approximately 200 homes, 101 acres of farmland, and utility facilities. This move is estimated to be $48,000,000 excluding the cost of easement acquisition and relocation.

This transmission line alignment also interferes with the Air Traffic Control Facility.

This alternative was determined to be impractical.

Alternative E

Alternative E (see Exhibit 3-9-E of the EXEA) is applicable only if On-Site Alternative 5, relocating runway 16L-34R to the north, is adopted. The overhead corridor would be moved farther to the north. An EIS and COE 404 Permit would be required. Total losses would be significant and land condemnation associated with right-of-way acquisition also would be significant. This Alternative would cost about $7.4 million and take approximately 27 months to design and construct. The northeast runway Alternative was determined to be not practicable and therefore this alternative is not considered feasible.

Alternative F - The Preferred Alternative

Alternative F (see Exhibit 3-9-F of the EXEA) would require relocating approximately 4.9 miles of transmission line corridor. Since the time original planning documents were prepared, the FAA has required that the transmission line corridor be moved farther to the west due to potential conflict with navigational aids in the runway area. This Alternative replaces Alternative C as the preferred transmission line corridor. The new westernly alignment that the FAA technically requirements has been designated as Alternative F. This moves the transmission line corridor 1500 feet farther west. Although the transmission lines would be located within a 300 foot wide right-of-way, only a maintenance road and islands would directly impact wetlands. Islands to support towers would be constructed approximately 600 feet apart and would be connected together with a 25 foot-wide maintenance road. Of the 178 acres required for the right-of-way, only 13 acres are COE jurisdictional wetlands. The cost of this alternative is approximately 10 million dollars and would take an estimated 36 months to design and construct. A variation of this alternative would place the transmission lines further west of Duchesne Lake. This variation is 2800 feet longer, requires 16 more acres of wetlands, would cost $5,600,000 more to construct, and would impact 4 more acres of wetlands than the Preferred Alternative.

Antelope Island Alternative

A concept eliminated early in the planning process was rerouting the transmission line corridor via Antelope Island. This Alternative would involve moving 39 miles of transmission lines from SLCIA north to Antelope Island and then back. This route would run from the terminal substation southwest of the Airport and run to the north and west. The corridor would continue north along the east side of the island, to the northern end, and then follow

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the road back, close to the town of Syracuse. The lines would then tie back in with the corridor which goes back to the substation. New 300 foot wide causeways would need to be built, adversely affecting wetlands. Antelope Island is Utah State Parkland and would be significantly impacted by the powerline corridor. This Alternative would conflict with existing powerlines. Construction distances and maintenance for this length of corridor would require substantial costs. The engineering involved in a line corridor of this length would also be difficult and costly. There is a technical difficulty in running the powerlines back from the island. The roadway used for this option is occasionally underwater. The roadway would only be usable when the lake is low. This concept was not further considered due to the engineering, maintenance difficulties, and cost.

Under Alternatives A, C, D, E, and F, the proposed corridor would be 300 feet wide and carry two circuits of 345 kV, two circuits of 230 kV, three circuits of 138 kV, and one circuit of 46 kV. Under all Alternatives, two miles of existing overhead distribution lines would be placed underground. Under all alternatives, tower structures would be placed upon new earthen "islands" connected by an earthen access road to allow for construction and maintenance, and would accommodate present lake and duck club water levels. "Islands" or "peninsula’s" would be 275 feet by 50 feet at an elevation of 4,212 feet and would be located every 600 feet along the right-of-way. Power line structures would be located at 600-foot spans, tower elevations would be limited to 4330 feet above sea level.
SECTION 4.0 - AFFECTED ENVIRONMENT

Salt Lake City International Airport (SLCIA) is located 5 miles west of Salt Lake City, Utah in Salt Lake County. It lies west of the Wasatch mountains, southeast of the Great Salt Lake, and Northeast of the Oquirrh mountains.

Section 4.0 of the Expanded Environmental Assessment (EXEA), provides a complete discussion of the proposed project’s affected environment including a detailed discussion related to each category of impact, and is hereby adopted in this FEIS.
SECTION 5.0 - ENVIRONMENTAL CONSEQUENCES

5.1 - NOISE

The noise section of the EXEA provided a comprehensive analysis of the regulatory context of airport related noise and the existing conditions at SLCIA. However, the noise contours generated and the analysis provided in the EXEA did not account for improved noise modeling now available nor did it account for recent changes in legislation which affect the noise environment of SLCIA. The noise analysis provided in this FEIS incorporates modeling, legislative, and operational changes which affect noise generated at SLCIA. The bulk of the noise data is provided in Appendix F of this FEIS. This Section serves to pull pertinent data from Appendix F of this FEIS and summarize it for the reader.

Existing Conditions

The computer generated noise contours for the 1991 calendar year at SLCIA are depicted in figure 3.1 of Appendix F of this FEIS. According to airport noise compatibility planning guidelines in Federal Aviation Regulation Part 150, all land uses are normally compatible with noise levels less than 65 Ldn. The total land area impacted by noise greater than the 65 Ldn in the existing condition is approximately 21977 acres, 16105 of which are off of airport property. Within this acreage, there are 48 residential acres within the 65-70 Ldn and 9 residential acres within the 70-75 Ldn. Portions of both Salt Lake City and West Valley City are significantly impacted by aircraft noise. Also, there are 13 seasonal cabins and a caretakers dwelling within the 65 Ldn on the Rudy Duck Club.

Table 5.1 - Noise Impact Summary

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<tr>
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<td>-</td>
<td>22</td>
<td>1</td>
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<tr>
<td>Preferred</td>
<td>-</td>
<td>22</td>
<td>1</td>
</tr>
</tbody>
</table>

NO-PROJECT ALTERNATIVE

The noise contours for the years 1996 and 2006 under the no project alternative can be seen in figures 3.2 and 3.3 of Appendix F of this FEIS. The total land area impacted by a 65 Ldn or greater noise contour is 14937 acres in 1996 and 5491 acres in the year 2006. In 1996 there are estimated to be 22 residential acres within the 65-70 Ldn contour and 4 residential acres within the 70-
75 Ldn contour. In the year 2006 there are estimated to be 5 residential acre within the 65-70 Ldn contour. Additional details on noise contour impacts can be found on page 44-46 of Appendix E of this FEIS.

CLOSE-IN ALTERNATIVE

The noise contours for the years 1996 and 2006 under the close-in alternative can be seen in figures 3.6 and 3.7 respectively within Appendix F of this FEIS. The total land area impacted by 65 Ldn or above is 19571 acres and 6681 acres for the years 1996 and 2006 respectively. In the year 1996 there are estimated to be 19 residential acres within the 65-70 Ldn contour and 3 residential acres within the 70-75 Ldn contour. Under the Close-in Alternative, some land not presently within the 1991 noise contours will be impacted by the 1996 contours. Noise impacts to recreational uses directly north of the existing runway configuration will be less as the noise envelope expands west. A more detailed description of noise contour impacts under this alternative is provided on pages 46-53 of Appendix F of this FEIS.

PREFERRED ALTERNATIVE

The noise contours for the preferred alternative for the years 1996 and 2006 can be seen in figures 3.4 and 3.5 respectively within Appendix F of the FEIS. The total land area impacted by the 65 Ldn or greater contour is 19744 in the year 1996, 12630 acres of which are off airport property, and 6649 in the year 2006, 1520 acres of which are off airport property. The total number of residential acres within the 65-70 Ldn contour in the year 1996 is estimated to be 19, and within the 65-70 Ldn contour in 1996 three residences are impacted. In the year 2006, 1 residential acre is within the 65-70 Ldn contour. A more detailed description of noise impacts can be found on pages 53-56 of Appendix F of this FEIS. Table 5.1 of this FEIS gives a comparison of affected residential areas between the three alternatives.

MITIGATION

Mitigation associated with significant (greater than 65 Ldn) noise impacts under the preferred alternative will consist, at a minimum, of acquisition and relocation of residences in accordance with the Uniform Relocation Act or noise insulation, reducing the impacts below the level of significance identified in the 2006 noise contours.

5.2 - COMPATIBLE LAND USE

The expanded Environmental Assessment (EXEA) describes existing land uses within the vicinity of the SLCIA. Discussed are the duck clubs to the north of the preferred alternative. See pages 84 of the EXEA for a description and map of the duck clubs. Current zoning and land use requirements of the airport zoning code limit land uses to those considered compatible with the airport. Figures 5.1 - 5.7 of this FEIS indicate current zoning as it relates to the noise contours for each of the alternatives.

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, a new runway would not be constructed. Noise contours for the No-Project Alternative would be compatible with existing noise impact zoning around SLCIA and would be compatible with proposed future developments in the Northwest Quadrant area. As with the Preferred Alternative, zoning changes would not be necessary under this alternative.

CLOSE-IN ALTERNATIVE

Under this alternative, noise impacts would be similar to those under the Preferred Alternative. Development would be limited to compatible land uses and therefore no changes in local zoning is necessary under this alternative. Existing non compatible land uses are described in detail in Appendix F of this FEIS.

PREFERRED ALTERNATIVE

The proposed runway would eliminate about 1,608 acres of agricultural land currently used for grazing, and about 900 acres of cropland. Runway construction would not eliminate agricultural lands subject to the Farmland Protection Policy Act.

The proposed runway would require relocating a power transmission line that currently crosses the proposed runway site. The preferred alternative for relocating the transmission lines would not significantly affect existing or proposed residential uses near SLCIA. Area land use plans and zoning ordinances restrict housing in the general area of the proposed transmission lines.

The preferred alternative for relocating the transmission lines (Alternative F) will directly impact three separate agricultural properties. Two of the properties operate existing duck hunting clubs. The proposed transmission line corridor will traverse one privately owned and operated duck club (Harrison Reclamation Co.), and one duck club (Blackhawk) operating on leased property, in addition to one agricultural property used for animal grazing.
Mitigation for transmission line easements and required relocation will be carried out in accordance with the Uniform Relocation Act.

The project would require relocation of one leased residence on SLCIA land in the northwestern quarter of Section 30 (Township 1N, Range 1W). Current lease arrangements for this property account for this requirement and conform with the Uniform Relocation Act. No changes in local zoning are necessary under this alternative. Existing non-compatible land uses are described in Appendix F of this FEIS.

In addition to residential use, industrial uses are preferred for those areas southwest of SLCIA and within noise impact zones “B” and “C” (See EXEA and Appendix F). On the basis of the projected noise contours, any new commercial and industrial development in those areas, given mitigation measures stipulated in the Zoning Ordinance, would be compatible with the preferred alternative. Mixed-use development that includes high-density residential development could be considered a compatible land use at certain locations within Zone “C”. However, sound attenuation would be required in design and construction of buildings.

A complete description of Land Use Compatibility impacts for all of the Alternatives is located in Section 4.3 of the EXEA and Appendix F of the FEIS.

**MITIGATION**

Mitigation for impacts to the Harrison Duck Club would consist of compensation for the powerline easement in accordance with the Uniform Relocation Act and making access available. The property owner of the land where the Blackhawk Duckclub has a lease and the powerline traverses the property will likewise be compensated. The Blackhawk Duckclub will be compensated in accordance with the Uniform Relocation Act for impacts associated with the relocation of their facilities and access would be permitted. The Rudy Duckclub has indicated concern about noise from overflights as well as water quality and other issues. These have been presented and discussed in various sections of the EXEA and FEIS. Water Quality mitigation measures are discussed in the Water Quality Section of this FEIS as well as the mitigation summary. Noise impacts to the Rudy Duckclub will decrease under the preferred alternative versus existing conditions and the no project alternative. A complete discussion of all Land Use Compatibility mitigation measures is contained in Section 4.3 of the EXEA as well as this FEIS.

**5.3 - SOCIAL IMPACTS**

This section discusses the social impacts that may be caused by any of the alternatives. The principal social impacts to be considered are those associated with relocation or other community disruption that may be caused by the project. Relocation to alleviate significant noise impacts to residences may take place as a mitigation measure. A complete description of residences impacted by noise can be found in Appendix F.

The project area consists of open space, SLCIA’s terminals, and buildings which support airport-related activities.

Current airport employment contributes substantially to the Salt Lake City and Utah economies. Total airport employment is about 5,600 FTEs, including 3,720 airline employees, 1,700 employees of facility tenants, and 200 airport authority employees. This employment generates $87 million in direct salaries annually.

**NO-PROJECT ALTERNATIVE**

Under this alternative, SLCIA would not construct a new runway or support facilities. However, employment at the airport will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. There would not be the associated temporary increase in jobs related to runway construction, terminal facilities, and support facilities.

Relocation of the residences and termination of existing leases on SLCIA land in the project area would not be required. However, 28 permanent residences would remain in the 65 ldn contour or greater in 1996 and three residences would be within the 2006 contour. This is considered a significant noise impact.

**CLOSE-IN ALTERNATIVE**

The social impacts related to this alternative will be similar to the preferred alternative. Approximately 11 residences would be adversely impacted by noise in the year 1996 and approximately 2 residences would be adversely impacted by noise in the year 2006. Mitigation would consist of land acquisition or noise insulation of those residences.
PREFERRED ALTERNATIVE

Construction of the Preferred Alternative would not require the relocation of any commercial business nor would it disrupt or divide any established community. The Preferred Alternative would require rerouting of 4000 West Street on Airport property, but this rerouting would not alter surface transportation patterns.

The preferred alternative would result in 11 residences being significantly impacted by noise in the year 1996 and 2 residences significantly impacted by noise in the year 2006.

In addition, three agricultural (grazing) leases on 1,608 acres of SLCIA land west of 4000 West Street would have to be terminated. Alternate locations are readily available in the Salt Lake City area. Mitigation would consist of relocation in accordance with the Uniform Relocation Act or noise insulation.

As with the No-Project Alternative, employment at the airport under the Preferred Alternative, will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. A temporary increase in jobs would also be created through construction of the new runway and taxiways as well as with terminal and support facilities.

The Preferred Alternative would have no significant impact to social conditions.

5.4 - INDUCED SOCIOECONOMIC IMPACTS

This section addresses the potential for induced socioeconomic impacts on adjacent communities. Described in general terms, issues include population growth, public service demands, and changes in business and economic activity to the extent influenced by Airport expansion.

The importance of the Airport to the community's economic well-being is described in the expanded EXEA on page 95.

NO-PROJECT ALTERNATIVE

Under this alternative, SLCIA would not construct a new runway or support facilities. However, employment at the airport will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. There would not be the associated temporary increase in jobs related to runway construction, terminal facilities, and support facilities.

The no-project alternative will have no significant impact on socioeconomics.

CLOSE-IN ALTERNATIVE

The impacts seen under this Close-In Alternative will be as discussed below for the Preferred Alternative.

PREFERRED ALTERNATIVE

As with the No-Project Alternative, employment at the airport under the Preferred Alternative, will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. A temporary increase in jobs would also be created through construction of the new runway and taxiways as well as with terminal and support facilities. This would have spin-off effects on employment and expenditures in the Salt Lake City area. These effects would be felt under any of the proposed alternatives.

Construction would take several years and would create local employment and demand for services over that period.

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5.4 - INDUCED SOCIOECONOMIC IMPACTS

This section addresses the potential for induced socioeconomic impacts on adjacent communities. Described in general terms, issues include population growth, public service demands, and changes in business and economic activity to the extent influenced by Airport expansion.

The importance of the Airport to the community's economic well-being is described in the expanded EXEA on page 95.

NO-PROJECT ALTERNATIVE

Under this alternative, SLCIA would not construct a new runway or support facilities. However, employment at the airport will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. There would not be the associated temporary increase in jobs related to runway construction, terminal facilities, and support facilities.

The no-project alternative will have no significant impact on socioeconomics.

CLOSE-IN ALTERNATIVE

The impacts seen under this Close-In Alternative will be as discussed below for the Preferred Alternative.

PREFERRED ALTERNATIVE

As with the No-Project Alternative, employment at the airport under the Preferred Alternative, will increase as airport operational demand increases. Air carrier and related land-side operations would increase by about 50% by 2006, with a corresponding increase in both air-side and land-side employment at SLCIA. Employment would vary by sector, and would increase most for airlines and service operations. A temporary increase in jobs would also be created through construction of the new runway and taxiways as well as with terminal and support facilities. This would have spin-off effects on employment and expenditures in the Salt Lake City area. These effects would be felt under any of the proposed alternatives.

Construction would take several years and would create local employment and demand for services over that period.

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The increase in operational demand will create the need for additional airport-related services such as hotels, rental car agencies, limousine services, and food service providers. These effects of the project would be seen under any of the proposed alternatives.

There will no significant impact to socioeconomics as a result of constructing the preferred alternative.

5.5 - AIR QUALITY

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative expansion of the terminals, concourse, support facilities, landside parking and access roads would occur similar to that of the Preferred Alternative as described below. New jobs would be created increasing traffic under the No-Project Alternative to levels similar to that of the Preferred Alternative. Aircraft operations would increase to a level of 96% of that for the Preferred Alternative, resulting in increased congestion and delays.

Emission inventories and comparisons for this Alternative are included in Section 4.6 of the EXEA. Since release of the DEIS, revisions have been made to the emission estimates shown in Section 4.6 of the EXEA. Exhibit 4.6-7 of the EXEA has been revised as follows:

<table>
<thead>
<tr>
<th></th>
<th>Aircraft</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>8.1</td>
<td>21.4</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>1.9</td>
<td>4.5</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>4.0</td>
<td>5.8</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>0.3</td>
<td>0.5</td>
</tr>
<tr>
<td>Particulates</td>
<td></td>
<td>1.5</td>
</tr>
</tbody>
</table>

The text on page 106, paragraph 3, second sentence of the EXEA has been revised to read: "A comparison of SLCIA emissions under the Preferred Alternative (Exhibit 4.6-4) SLCIA emissions under the No-Project Alternative (Exhibit 4.6-7) reveals that emissions under the Preferred Alternative would be lower than the emissions under the No-Project in 1996 and also in 2006.

These estimations indicate that the No-Action Alternative would result in higher criteria air pollutant emissions than the Preferred Alternative because of the greater anticipated aircraft delay. This could result in higher ambient air pollutant concentrations. Refer to Section 4.6 of the EXEA for a complete discussion of the consequences of this Alternative.

CLOSE-IN ALTERNATIVE

Motor vehicle traffic and aircraft operations for the Close-In Alternative would be the same as under the Preferred Alternative as described below. Because the proposed new runway would be 355 feet closer to the terminal under this alternative than under the Preferred Alternative, taxing emissions for air carrier aircraft would be less than identified for the Preferred Alternative, but insignificantly so.
PREFERRED ALTERNATIVE

Since release of the DEIS, the Annual Average NO2 Concentrations were estimated for all the alternatives using the Industrial Source Computer model (ISC). The results of this analysis shows that the Preferred Alternative conforms with the Utah Bureau of Air Quality requirements. A complete explanation of this analysis is contained in the letter from Marcia Gibbs, Project Manager. ESA to Steve Domino, SLCIAA dated May 27, 1992 contained in Appendix E of this FEIS.

Also since release of the DEIS, the CO Concentration Analysis described in Section 4.6 of the EXEA has been revised to include updated CO background concentrations and MOBILE 4.1 vehicle emission factors provided by the Utah Bureau of Air Quality. The CALINE4 Computer Model was again used described in Section 4.6.

The results of this updated analysis are included below.

Exhibit 4.6-6 (revised): Worst-case Carbon Monoxide Concentrations at SLCIA

<table>
<thead>
<tr>
<th>Location</th>
<th>CO Concentration (ppm)</th>
<th>1988</th>
<th>1996</th>
<th>2006</th>
</tr>
</thead>
<tbody>
<tr>
<td>Endpoint</td>
<td>Average Period</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Terminal 1/b/</td>
<td>1 hr.</td>
<td>26.8</td>
<td>22.0</td>
<td>20.1</td>
</tr>
<tr>
<td>(alongside Inner TLD)</td>
<td>8 hr./c/</td>
<td>14.2</td>
<td>10.1</td>
<td>9.1</td>
</tr>
<tr>
<td>Northbound Access Road</td>
<td>1 hr.</td>
<td>15.4</td>
<td>14.7</td>
<td>16.4</td>
</tr>
<tr>
<td>(at South Cross Road overpass)</td>
<td>8 hr./c/</td>
<td>7.0</td>
<td>6.4</td>
<td>7.6</td>
</tr>
</tbody>
</table>

/a/ Worst-case CO concentration estimates include the sum of worst-case estimates from motor vehicle traffic (estimated using CALINE4 with MOBILE 4.1 emission factors), from aircraft operations (estimated using (ISC), and from background sources (estimates provided by Utah Bureau of Air Quality). Background sources estimated to generate a maximum background concentration of 12.0 ppm, one-hour average, and 5.0 ppm, eight-hour average for all three analysis years.

/b/ MOBILE 4.1 emission factors used as input to CALINE4 were calculated assuming an ambient temperature of 25 degrees Fahrenheit; high altitude conditions; emissions mix of 20.6% cold start, 52.7% hot stabilized, and 27.3%; and I/H and ATP inputs.

Worst-case meteorology was assumed for the traffic CO estimates, including a wind speed of 1.0 meter per second, F stability, a standard deviation of wind bearing of 10 degrees, and a worst-case wind direction. Aircraft CO estimates made using ISC are derived from actual meteorological data taken at the Airport.

/c/ For motor vehicle-related CO, the eight-hour average concentration was derived from the peak-hour CO estimate by applying a 0.7 persistence factor.

NOTE: Underlined values represent predicted violations of the national ambient CO standard. The national Ambient standard for CO is 35 ppm, one-hour average, and 9 ppm, eight-hour average. A violation occurs where these standards would be exceeded more than once per year.


The revised Exhibit 4.6-6 of the EXEA indicates that motor vehicle traffic on the approach roads to SLCIA would cause violations of the eight-hour federal CO standard under worst-case conditions in 1996 but not by 2006 for any Alternative. Travel distances for vehicles would not increase from the existing conditions. Appendix E of this FEIS contains the letter from Marcia Gibbs, Project Manager, ESA to Steve Domino, SLCIAA dated May 27, 1992 that completely describes the updated CO Concentration Analysis.

This alternative is compatible with the Wasatch Front Regional Council forecasts of vehicle miles travelled (VMT) as indicated by letter No. 13 contained in Appendix C of this FEIS.

Included below is a summary of emissions for the Build and No Build alternatives for 1988, 1996, and 2006.

Table 5.5

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>20.6</td>
<td>19.5</td>
<td>21.4</td>
<td>22.0</td>
<td>23.4</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>4.7</td>
<td>4.1</td>
<td>4.5</td>
<td>4.2</td>
<td>4.6</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>4.0</td>
<td>5.5</td>
<td>5.8</td>
<td>7.2</td>
<td>7.4</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.4</td>
<td>0.5</td>
</tr>
<tr>
<td>Particulates</td>
<td>1.0</td>
<td>1.5</td>
<td>1.5</td>
<td>2.0</td>
<td>2.0</td>
</tr>
</tbody>
</table>

5-10
Construction of the Preferred Alternative has been approved by the Utah State Division of Air Quality (reference Appendix E of this FEIS document). It will not cause or contribute to the violation of any ambient standard for the State of Utah, will not increase the severity or frequency of existing violations, and will not delay progress in achieving ambient standards for nonattainment emissions. Construction of the Preferred Alternative will result in lower criteria air pollutant emissions than the No-Project Alternative.

AAIA Section 509(b)(7)(A) requires, prior to approval of federal funding, a certification from the Utah State Governor that there is reasonable assurance that the project will be located, designed, constructed, and operated so as to comply with applicable air [and water] quality standards. Page II-210 of the EXEA and Appendix E of this FEIS contains a letter stating this reasonable assurance from the Utah State Division of Air Quality for the Preferred Alternative.

Mitigation measures concerning Air Quality impacts are listed in the summary of mitigation section of this FEIS.

Refer to Section 4.6 of the EXEA for a complete discussion of the consequences of this Alternative.
5.6 - WATER QUALITY

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, a new runway would not be developed. However, the existing terminal and other facilities would be upgraded under this alternative. A detailed discussion of the impact of this Alternative on Water Quality, is included in Section 4.7.2 of the EXEA.

CLOSE-IN ALTERNATIVE

The Close-In Alternative would require approximately the same area of impervious surface for the new runway as the Preferred Alternative, but would require somewhat less impervious surface area for taxiways and terminal apron to link the new runway with existing and proposed terminal facilities. Under this Alternative, the general location and orientation of the new runway would be similar to that of the runway proposed under the Preferred Alternative, so the directions of runoff, and required modifications to the existing drainage system, would be similar to those described for the Preferred Alternative. Overall, the impacts of this alternative would not differ significantly from those of the Preferred Alternative.

PREFERRED ALTERNATIVE

Placement of New Facilities

Surface Waters

Large areas of impermeable surfaces required for the project would increase surface water runoff substantially, and decrease recharge into the shallow aquifer by an equivalent amount. A detailed discussion of the impact that the placement of new facilities will have on surface waters, under this Alternative, is included in Section 4.7.2 of the EXEA.

Ground Waters

At the site of the proposed SLCAA facilities, an aquifer exists within several feet of the ground surface and includes two open water ponds, two canals, and a drain, as well as areas classified as temporary and seasonal wetlands. Several artesian wells exist to the north of the northern end of the proposed runway. A detailed discussion of the impact that the placement of new facilities will have on ground waters, under this Alternative, is included in Section 4.7.2 of the EXEA.

Water Quality

Water quality will be impacted by the placement of project facilities. A detailed discussion of the impact that the placement of new facilities will have on water quality, under this Alternative, is included in Section 4.7.2 of the EXEA.

Operation of New Facilities

Water Quality

A detailed discussion of the impact that the operation of new facilities will have on water quality, under this Alternative, is included in Section 4.7.2 of the EXEA.

Cumulative Impacts

Cumulative impacts from area-wide development may degrade water quality in the Great Salt Lake and public canals and drains. The hydrology of Salt Lake Valley forms a closed system, whereby all runoff and discharges which reach public drainages ultimately end up in the Great Salt Lake. Much of this runoff is evaporated from the Lake; however, many pollutants do not evaporate and are left to accumulate in the Lake.

Additional sources and facilities may be required eventually. The expansion of the Airport and the relocation of approximately six miles of power line and gas pipeline (discussed in Section 4.3.1 of the EXEA) are not expected, by themselves, to contribute substantially to cumulative growth elsewhere in the region.

MITIGATION

The following mitigation measures are included in the project as proposed:

- The SLCAA has obtained a NPDES permit for stormwater discharge from the airport.

- Settling ponds would be installed at all points where water is discharged from airport property, including the areas northwest of the proposed runway, to reduce the discharge of sediments and pollutants. Oil water separators would be installed at all discharge points. These ponds would be maintained through a periodic dredging program to prevent their siltation. The settling ponds will be designed as dry ponds so as not to attract birds. Water would accumulate only during major storm events and would be discharged quickly.
Construction activities will be carried out to minimize erosion and sedimentation of nearby waters. Storm-water runoff from the construction area would be controlled to settle out much of the sediment. The water would be directed to the Surplus Canal.

SLCAA has installed a new stormwater pre-treatment facility to treat water contaminated with de-icing agents. Centralized de-icing and recovery facilities will be considered in runway design for any de-icing activities that are not performed within the existing collection area.

Stockpiled fill materials, as well as those in trucks, will, where possible, be wetted down or kept covered, to minimize erosion.

Clean fill material will be used for all project construction to avoid surface and subsurface contamination of water resources. Fill sources and quality will be sent to the COE and State pollution control authorities for review before placement.

Exposed soil surfaces will be wetted down as appropriate to reduce erosion and sedimentation.

Vector-skimming devices and grease traps will be installed in all settling ponds to remove floatables. A regular maintenance program for these ponds will be implemented to ensure their proper function.

Water quality will be monitored in accordance with NPDES permit requirements at existing drainage discharge points to assess the typical pollutant levels in surface runoff. Parameters of concern include flow, COD, beryllium, cadmium, chromium, copper, cyanide, lead, selenium, zinc, oil, and grease. Results would indicate whether or not further control measures are necessary. If necessary, further measures would be implemented to reduce water-soluble contaminants to below State standards.

Water quality will be monitored in accordance with NPDES permit requirements at existing drainage discharge points to assess the typical pollutant levels in surface runoff. Parameters of concern include flow, COD, beryllium, cadmium, chromium, copper, cyanide, lead, selenium, zinc, oil, and grease. Results would indicate whether or not further control measures are necessary. If necessary, further measures would be implemented to reduce water-soluble contaminants to below State standards.

Consideration will be given to capping Artesian wells in the proposed runway construction area.

See State of Utah letter concerning Water Quality in the Appendix for further details as well as the Summary of Mitigation Section in this FEIS.

5.7 - PARK/RECREATION/DOT ACT. SECTION 4(f)

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, annual operations at SLCAA would increase to about 96% of those that would be accommodated under the Preferred Alternative. Terminal units, concourses, and parking structures would be developed under this alternative. General aviation and military use would be lower with this alternative than with the Preferred Alternative. Most of the increase in operations would be on the existing Runway 16-34L. Because of changes in the mix of aircraft types, aircraft noise generally would be less in the future than at present, and the areas encompassed by the Ldn 75 dBA, 70 dBA, and 65 dBA noise contours would be less. These changes would not significantly affect Farmington Bay Waterfowl Management Area or the duck clubs northwest of SLCAA (see Section 4.10 of the SLCAA, Biological Assessment).

CLOSE-IN ALTERNATIVE

The Close-In Alternative would have the same capacity and type of facilities as proposed under the Preferred Alternative. Under this alternative, the new runway would be approximately 5,800 feet to the west of the existing runway. This alternative would not displace any recreational uses, designated parks, wildlife or historic sites and, thus, would not result in Section 4(f) impacts. The new runway could displace some wetlands, which are under the jurisdiction of the Army Corps of Engineers (see Section 4.10 of the EXEA). The displacement of wetlands and the increased aircraft activity resulting from this Alternative could affect the waterfowl and duck clubs in areas to the northwest and west of the proposed runway, as with the Preferred Alternative.

PREFERRED ALTERNATIVE

Under the Preferred Alternative, the total annual operations at SLCAA may increase by about 43% between 1988 and 2006. This additional aircraft activity would be accommodated by construction of a new runway over wetlands on the western side of SLCAA. The runway would be approximately 6,155 feet west of the existing air carrier runway, in an area partially consisting of wetlands.

Air carrier operations on the new runway would expand the area affected by aircraft noise. Under the Preferred Alternative, the increase in aircraft noise would be primarily to the west of SLCAA, where the new runway is proposed.

The project would result in no direct Section 4(f) impacts, but human and aircraft activity and noise would affect waterfowl and duck clubs to the northwest and west of SLCAA (see Section 4.10 of
the EXEA, Biological Resources). The proposed airport expansion would not significantly affect parks to the east, Farmington Bay Waterfowl Management area to the north, or Wasatch National Forest to the northeast of SLCIA.

MITIGATION

There will be no significant impact to DOT Section 4(f) lands and therefore no mitigation is required.

5.8 - HISTORIC/ARCHAEOLOGIC/CULTURAL RESOURCES

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, the airport expansion area would not be developed for a new runway, nor would there exist a need for the transmission line to be relocated. For the time being, cultural resources in these areas would not be destroyed, although they would continue to be subject to the effects of agricultural tilling and burrowing by rodents. Eventually, these lands, which are under the ultimate control of SLCIA, could be developed in a manner that degraded or eliminated the cultural sites and artifacts described herein. A detailed discussion of the impacts on these resources is contained in Section 4.0 of the EXEA.

CLOSE-IN ALTERNATIVE

The Close-In Alternative would locate the proposed runway about 5,800 feet to the west of the existing SLCIA runway and 355 feet east of the Preferred Alternative runway. Under this alternative, relocation of the transmission line would still be necessary, although it could be located farther to the east than under the Preferred Alternative. There are no recorded significant resource sites in the airport expansion area that would be developed under the Close-In Alternative. The field inventories included surveys of the areas that would be developed under the proposed Close-In Alternative. See Section 4.0 of the EXEA for a detailed discussion of these resources.

PREFERRED ALTERNATIVE

Four isolated artifacts were found within the utility corridor, and likely would be displaced or destroyed. The isolated artifacts are insignificant, and no special steps need to be taken to protect or collect them.

Sites 42SL 110, 112, and 116 probably would be totally removed as part of the cut and fill construction of the new runway. Site 42SL 154 is outside of the proposed transmission line corridor. This site was on the Kern River pipeline centerline and, during subsequent surveys, was found to be destroyed by pipeline construction. Although the new transmission line corridor has not been precisely identified, a cultural resources survey was conducted on the 4.9 mile area at an approximate width of 300 feet. No sites eligible for the National Register were found within the designated corridor. The line relocation will have no effect on the region's cultural resource data base.

See Section 4.0 of the EXEA for a detailed discussion of the impacts to these resources.
5.9 - WETLANDS AND BIOTIC COMMUNITIES

This section addresses the various biotic communities in the vicinity of Salt Lake City International Airport (SLCIA), including both wetlands and adjacent uplands. The COE, under Section 404 of the federal Clean Water Act, is responsible for permitting placement of fill in the nation's waters and wetlands, and regularly conducts a jurisdictional determination of wetland areas once a permit application has been received. The 404 permit application is contained in Appendix G of this report.

Wildlife uses of these biotic communities, particularly waterfowl resources and use of uplands, are also addressed. Because large areas of wetland would be affected by the project, the federal Fish and Wildlife Coordination Act applies. Discussions with the State Division of Wildlife Resources (DWR), the USFWS, the EPA, and the COE were conducted to identify potential impacts and mitigation measures.

NO-PROJECT ALTERNATIVE

This alternative would involve no new runway construction. Existing facilities would be upgraded and terminals and support facilities would be expanded on land adjacent to existing facilities. These changes would not significantly affect the extent or quality of upland habitat or wildlife use of the Airport area. The No-Project Alternative would include substantial fill in the terminal and support facilities areas. Drainage for these improvements would most likely need to be directed to the west into the Surplus Canal.

The No-Project Alternative would entail a steady growth in air traffic on Runway 16R-34L, with some shrinkage of current noise patterns due to the gradual introduction of quieter aircraft. These changes would occur largely over upland or agricultural areas and would have insignificant impacts on local biotic communities.

The No-Project Alternative would increase the frequency of flights departing from and arriving at the northern end of Runway 16R-34L, with some potential for increased bird-aircraft strikes in the area to the north of the runway. Impacts under the No-Action Alternative would be similar to those under the Preferred Alternative in terms of flight frequency and altitude.
This alternative would involve major construction and fill activities to expand terminal and support facilities and to relocate roads. Smaller sections of the Surplus and North Point Canals would require some relocation; however, drainage of open water wetlands to the north for runway construction would not be necessary. Small areas of wetland would be altered close to developed areas (e.g., in construction of new facilities in the north airport support and terminal areas); these activities would require COE permitting. Those affected areas are not believed to have important habitat values, and local drainage alteration along the patterns already in place would be expected. The direct impacts of the No-Project Alternative on wetlands would, therefore, be less than the Preferred Alternative.

CLOSE-IN ALTERNATIVE

The Close-In Alternative is very similar to the Preferred Alternative. The Close-In Alternative would eliminate approximately the same amounts and types of biotic communities as would the Preferred Alternative for construction of the proposed runway. However, because the land between the proposed new runway and existing facilities would essentially be committed to development regardless of immediate plans and this alternative would be approximately 355 feet closer to the existing runway than under the Preferred Alternative, this alternative would convert approximately 138 acres less open space to development than would the Preferred Alternative. Because the proposed runway would be closer to the existing runway under this alternative than under the Preferred Alternative, it would not expand the potential area of bird-aircraft strike hazard as far to the west as would the Preferred Alternative.

PREFERRED ALTERNATIVE

Construction of New Facilities

This alternative would include construction of Airport facilities on up to 1,284 acres of land, with long-term modifications such as drainage and paving. Construction of these facilities would alter the nature and extent of biotic communities on and adjacent to the project site. Depending upon the classification system used, the acres of wetland vary. For this project, the COE methodology was utilized to determine that approximately 275 acres of COE jurisdictional wetlands would be directly affected by the project.

Land would also be lost directly to runway construction and transmission line relocation, safety zones, and "indirect" losses in the immediate area of the development. Indirect losses are more difficult to identify and quantify than direct losses, but generally consist of lands whose wildlife value is substantially diminished through: increased human activity; noise, lights, or other disturbances; removal of cover or other habitat elements; wildlife management practices; division of the remaining habitat into small fragments, each with insufficient resources; and other subtle effects. The COE jurisdictional wetland indirect losses are estimated to be 63 acres.

Exhibit 4.10-5 A,B,C of the EXEA along with the numerous exhibits in Appendices G and H, show the area included in the project "envelope," the immediate runway and infrastructure areas (I), and the area of ancillary project activities (II). Area II is composed of the safety zone and the acres of wetlands indirectly impacted by the project. The acres of wetland lost in the immediate area of the runway and transmission line corridor are shown in Exhibit 4.10-6 of the EXEA. However, Appendices G and H of this FEIS include a more detailed evaluation of acreage impacts.

Uplands

About 517 to 745 acres of uplands, largely agricultural lands, saline plains, and "developed areas," would be altered by the project. Impacts on agricultural lands and developed areas are not considered significant from a biotic community point of view. Saline plains constitute the predominant habitat type in the Airport area; however, the saline plains west of SLCIA are interspersed with wetlands that increase their biological value. Some areas of saline plain, for example, may also support the snowy plover (a bird of state concern) as well as hunting or wintering raptors, including at least two federally listed endangered species. Losses of some of these habitat areas would be significant. Appendices G and H of this FEIS contain detailed analysis and mapping.

Wetlands

As determined by the COE Wetlands Delineation, construction of the new runway and powerline relocation as proposed, would directly affect about 275 acres of wetlands through placement of fill, drainage improvements, and facility construction. The amounts of habitat types directly affected by construction are estimated in Appendices G and H of this DEIS. The data are based on the assumption that wetlands within the general project area would be dewatered during facility construction and would be subject to drainage improvements following construction. Within this larger "envelope," areas of wetland habitat types were measured on both County and USFWS habitat maps shown in Appendices G and H.
The wetlands determination using Army Corps of Engineers (COE) jurisdictional criteria was conducted in 1988; the results of this determination are reported in Exhibit 4.10-6 of the EXEA, and updated in Appendices G and H of this DEIS. (USFWS and COE criteria for determining wetlands differ somewhat; COE criteria are more narrowly defined, and are required for the federal permitting process. It is on the COE determination that mitigation is required to preserve the federal policy of "no net loss" of wetland acreage. Areas outside of COE jurisdiction could still be considered by USFWS to be important wetlands.

In addition to those wetlands affected directly by the construction of the proposed runway and other facilities, other adjacent wetland areas would be affected. Runway construction and navigational hazards require relocation of an existing overhead transmission line corridor. The Preferred Alternative would relocate the line corridor west of the runway, outside the 50:1 approach surface. Exhibit 4.10-6 of the EXEA identifies the acreages of each habitat type affected by the transmission line corridor, but these acreages have been updated and are included in Appendices G and H of this FEIS.

Modification of wetlands could be required to discourage waterfowl use in flight path areas north of the new runway. Other areas adjacent to the new facilities would lose some of their habitat values. Drainage facilities, other adjacent wetland areas, and two percent of that in the County. Indirect habitat losses could add another 63 acres to these figures. Such losses would be a significant impact of the Preferred Alternative.

Other impacts on those wetlands from facility placement are also possible. Construction would require rerouting of the North Point Consolidated and Surplus Canals and the Goggin Drain to points west of their existing locations. Those drains supply fresh water to large wetland areas (Exhibit 4.7-1 of the EXEA). Project plans call for reconnecting these channels with their existing downstream drainage areas. Consequently, fresh surface water supplies to wetlands downstream of the project area would not be altered and impacts on wetlands would be minimal in areas such as Bailey's Lake and Sections 13 and 24 (Township 1N, Range 2W).

Project construction would alter surface water runoff in the area of the proposed runway and taxiways. Those waters would be collected by the Airport drainage system and transported toward adjacent wetlands. Similarly, runway placement and surcharging would alter groundwater flows into the area to the west of the proposed runway, perhaps reducing flows toward wetland areas.

The Surplus Canal channel and flows are not expected to change except for a small section to be relocated. Hydrological impacts of the project, including those from changes in flood and storm hazards, are discussed in Sections 4.7 and 4.11 of the EXEA.

Placement of fill and diversion of existing drainage channels would cause some sedimentation in wetlands adjacent to construction areas. These effects would be short-term and restricted to the period of construction. They would probably not be significant. Construction-related impacts are discussed in Section 4.21 of the EXEA and this FEIS.

Waterfowl

Concomitant with the permanent alteration of wetlands would be a loss of habitat for waterfowl and a regional decline in waterfowl productivity. Based on the extent of wetlands affected, these impacts would be significant. This significance is highlighted by recent regional losses of waterfowl production from rising lake levels. During the period 1984-1988, record high water levels of the Great Salt Lake inundated much of the wetland areas and marshes between the Airport and the Lake. Since the summer of 1989, the water level of the Great Salt Lake has declined and most of the marsh areas have recovered. The pumps installed to control the high water levels of the Lake should help to maintain the marshes in their historical condition.

Relocation of Utah Power and Light's transmission lines would be required in the project area. Since lines will be relocated in wetland areas, some increase over existing potential for bird strikes could occur, particularly in foggy weather.

Facility Operation

Aircraft arrive and depart from SLCIA in both northward and southward directions. Under the best flight conditions, known as Visual Meteorological Conditions (VMC), 60% of landings and departures are from the north. Under either Marginal or Instrument Meteorological Conditions (IMC or IMC), 50% of landings and departures are from the north. During most of the year, VMC exists over 95% of the time. In December, VMC drops to 77%.
Aircraft currently departing to the north and northwest from SLCIA generally climb to several thousand feet within a mile of the end of Runway 16R-34L. Current departing flight paths take planes at that level over the wetlands to the northwest of SLCIA, the Rudy Duck Club, and Farmington Bay, depending on the aircraft’s ultimate destination. The current glide slope for approaching aircraft from the north and northwest on Runway 16R-34L descends from about 553 feet, at a distance of just over two miles out, to ground level at the northern runway end. This approach, made at an angle of three degrees glide slope (or a ratio of 19:1), is followed by the majority of aircraft arriving at the northern end of Runway 16R-34L.

Operation of the new runway system would follow similar profiles in altitude gain by departing aircraft, although this would occur farther to the west. Aircraft using the proposed runway would fly over or near four duck clubs north of the Airport. On the basis of the three degree approach glide slope that would exist for the new runway, the minimum altitudes of planes over the Rudy Duck Club would be: 360 feet on the south to 750 feet on the north. The Utah and Harrison Duck Clubs are west of the approach corridor. Planes could overfly these clubs would typically be close to 1000 feet above ground level. The clubhouse for the Blackhawk Duck Club, now located at what would be the northern end of the proposed runway, would be relocated as part of the project. Under normal circumstances, planes would pass over the duck clubs at altitudes higher than the minimum flight surfaces identified above.

Waterfowl Disturbance

Exhibit 4.10-6 of the EXEA summarizes the projected shift in noise contours for the Preferred Alternative, as it affects wetlands. While flight frequency in the area north of SLCIA would increase in proportion to the total annual increase in air carrier operations, the resulting disturbance to birds and wildlife from aircraft noise would decline somewhat. This effect is expected because, as indicated in Section 5 and Appendix E of this FEIS, noise contours in this area are expected to contract. Substantially smaller areas would be exposed to noise levels of 65-75 dBA, L50, or greater. Increased exposure of wetlands to these noise levels would occur along the western edge of Sections 7, 18, and 19 (Township 1N, Range 1W). Aircraft noise could occasionally startle waterfowl, but this effect is anticipated to be minor. Startle effects generally occur with aircraft at elevations below 400 feet; most flights would be at higher elevations over waterfowl areas.

Bird-Aircraft Strike Potential

A potential impact on biotic resources would be an increase in aircraft-bird strikes. New runway operation would expand the area of wetland over which aircraft could fly at elevations below 1,000 feet. In addition, overall flight volumes would increase under any of the alternatives. Waterfowl fly at a variety of heights up to about 500 feet in their everyday activities. Flying height varies with location, purpose, climatic conditions, and species. Mallard and pintail tend to fly at heights above 150 feet, as may vigeon, gadwall, and buffleheads. Geese, gulls and pelicans often fly above 200 feet. Teal often fly at less than 150 feet above ground. Eagles and hawks may fly as high as 1,000 feet above the ground.

Birds tend to fly at much greater altitudes when migrating than at other times. Most migrants fly about 1,000 feet above the ground. One study found that 75% of all migrants flew between 800 and 1,600 feet. Migrants generally choose to delay travel during inclement weather, often waiting considerable periods until the weather clears. Other waterfowl and shorebirds also restrict their flights during these periods, remaining close to the ground. These are also weather conditions during which aircraft would descend at minimal altitudes.

Thousands of migratory birds congregate annually in the area to the northwest of SLCIA, including up to 60,000 waterfowl and hundreds of thousands of shorebirds. The large ponded area to the southeast of Rudy Duck Club is an important resting area for ducks. To date, however, bird-aircraft strikes have been infrequent. Expanded operations into areas to the west of the existing runways could increase bird-aircraft strikes. The Response to Comments Section and the Bird Aircraft Strike Hazard Potential. New runway operation would expand the area of wetland over which aircraft could fly at elevations below 1,000 feet. In addition, overall flight volumes would increase under any of the alternatives. Waterfowl fly at a variety of heights up to about 500 feet in their everyday activities. Flying height varies with location, purpose, climatic conditions, and species. Mallard and pintail tend to fly at heights above 150 feet, as may vigeon, gadwall, and buffleheads. Geese, gulls and pelicans often fly above 200 feet. Teal often fly at less than 150 feet above ground. Eagles and hawks may fly as high as 1,000 feet above the ground.

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Other Wildlife

The proposed runway would increase air traffic over areas to the north and west of SLCIA. This activity would increase noise levels over various upland habitats. Disturbance of wildlife on current agricultural lands and developed areas would not be a significant noise impact. Wildlife on saline plains (for example, the snowy plover), however, would be affected by increased air traffic.

Threatened and Endangered Species

The Preferred Alternative could have several adverse impacts on bald eagles and peregrine falcons. These impacts are discussed in Section 5 of this FEIS.
CUMULATIVE EFFECTS

Several possible development projects have been proposed in the long term for the Airport area, in addition to expansion of the Airport itself. These projects are independent of the Airport development and are not part of the proposed project. Notable among these is a "Northwest Quadrant" development that would affect lands several miles to the west of the Airport, including those around Bailey's Lake. In addition, expansion of the International Center adjacent to the Airport is possible as demand for commercial and light industrial uses occurs. This anticipated development would contribute to regional losses of upland wildlife habitats. The land proposed for development is upland and under agricultural uses. Potential cumulative impacts would include loss of habitat for rarer species such as the short-eared owl and the snowy plover. State and federal agencies have expressed concern over these potentially significant cumulative effects.

MITIGATION

A Mitigation Plan for the wetland losses (MPWL) resulting from the Preferred Alternative has been completed and is included in Appendix H of this FEIS. This plan prescribes the replacement of the types of wetland communities impacted, replacement of the approximate acreage of each wetland type impacted, and replacement of the biological functions and values lost on the expansion site. It's implementation will result in compensatory wetland mitigation. Revisions to Section V, "Compensation for Wetland Losses on Expansion Site" of the MPWL have been made since release of the DEIS. These revisions affect Tables 1, 2, and 3 of the MPWL. The entire revised Sections V and VII, "Summary", of the MPWL, along with Tables 1, 2, and 3 follow.

V. COMPENSATION FOR WETLAND LOSSES ON EXPANSION SITE

The goals of the wetland mitigation include compensation for wetland acreage and Habitat Units lost due to impacts to wetlands on the expansion site. In Tables 2 and 3, the number of Habitat Units (HU) lost on the expansion site is compared to the number of HU's gained due to implementation of the mitigation plan on the mitigation site. In a comparison by habitat type, the number of HU's gained by mitigation in excess of those lost on the expansion site range from 114.26 for playas/mudflat habitat to 273.29 for open water. If large trees become established in close proximity to the mitigation wetlands. In a comparison by target species, excess HU's lost range from 0.14 for the shorebirds to 311.65 each for the blue-winged or cinnamon teal and the gadwall. The number of HU's gained by the proposed mitigation will be less than the great blue heron HU's lost if no trees are planted on the mitigation site. However, if trees are planted on the mitigation site and become established, great blue heron HU's gained by mitigation will be more than adequate to compensate for expansion site losses. Planting of trees is being considered in the 404 permit process. Overall, the total number of HU's that will be gained by implementation of the proposed mitigation plan will more than compensate for the total losses of HU's due to impacts to habitat on the expansion site.

According to the least squares estimate generated by the HEP analysis of the amount of area needed per target species to compensate for habitat losses on the expansion site, the size of the mitigation site is more than adequate. The proposed mitigation site will provide 736.2 acres of habitat, of which 483.9 acres are wetlands. As indicated in the table below, the largest area required by those species that utilize predominantly wetland habitat is 434.1 acres. The great blue heron will require 1032.4 acres if no trees are planted on the mitigation site, but this number is significantly reduced with the planting of trees. Assuming that trees will be planted or become established on the mitigation site by natural means, the size of the mitigation site ranges from 1.7 to 7.3 times the size necessary for in-kind compensation for habitat losses for species that use primarily wetland habitat.
For the shorebird guild which uses wet meadow and mudflat wetland habitat, the mitigation site would have to be 1.3 acres larger with the same proportion of habitat types in order to provide in-kind replacement for all of the HU's lost on the expansion site. Observations along the North Point Canal indicate wet meadow habitat has become established in areas where natural wetland hydrology is absent but where seepage occurs. Such habitat is expected to develop outside of the mitigation site dikes to provide more than the 1.3 acres of additional wetland required. Inclusion of these enhanced areas in the analysis would result in a determination that the mitigation is adequate as proposed to compensate for losses of habitat on the expansion site. Improvements in habitat value as a result of increased predictability of water and food resources will also occur although such improvements are not reflected in the Habitat Suitability Model for migratory shorebirds.

A Habitat Suitability Index Model is not currently available for the snowy plover. However, 62.8 acres of mudflat on the expansion site will no longer be artificially flooded due to the expansion project. These mudflat areas will be converted by draining to drier playa habitat that is more suitable for the snowy plover. The 62.8 additional acres of playa habitat on the expansion site will more than compensate for the 55.7 acres of playas to be directly impacted by the expansion project. There will be no temporal loss of habitat because the playas will develop immediately following draining of the mudflats.

The other functions and values of the wetlands to be impacted on the expansion site will also be replaced by the creation of the mitigation wetlands. The types of wetlands to be created on the mitigation site are the same as the types to be impacted on the expansion site, including open water, marsh, saline meadow, and playa or mudflat. The acreage of the mitigation wetlands are compared to the expansion site wetland impacts by wetland type in Table 1. The acreage of each type of wetland on the mitigation site following implementation of the mitigation plan will exceed the acreage to be impacted for each wetland type on the expansion type. Although none of the wetland functions and values have been quantified except for the wildlife habitat values, it can be assumed that the mitigation wetlands more than compensate for the functions and values lost due to wetland impacts on the expansion site by providing more acres of the same types of wetlands.
VII. SUMMARY

The proposed expansion of the Salt Lake City International Airport will result in impacts to 338.9 acres of jurisdictional wetlands, including open water, marsh, saline meadow, and playa/mudflat areas. A Habitat Evaluation Procedures analysis of existing conditions on the expansion site indicates that a total of 504.40 Habitat Units of wildlife habitat will be lost as a result of these wetland impacts. This mitigation plan presents specific criteria for the creation of 483.5 acres of low maintenance wetlands on the mitigation site of the same types as will be impacted on the expansion site. The HEP analysis of the proposed mitigation wetlands projects that the implementation of the mitigation plan will provide 723.35 HU's of wildlife habitat if no trees are planted or 806.51 HU's of wildlife habitat if trees are planted in the vicinity of the mitigation wetlands. Thus, this mitigation plan, as proposed, accomplishes all of the stated goals and objectives of the required mitigation.

It is the intention of the SLCAA to "bank" the excess wetland habitat that will be created on the mitigation site (218.95 HU's with no trees or 302.11 HU's with trees). These excess HU's (wetlands) would be used to compensate for future airport expansion projects (if future mitigation are necessary). A decision on whether "banking" is acceptable to the COE will be made in the 404 permit decision document.
## Acreage Balance

<table>
<thead>
<tr>
<th>Habitat</th>
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<th>Mitigation Site Acreage</th>
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<tr>
<td></td>
<td>Current</td>
<td>Direct</td>
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<tr>
<td>Open Water</td>
<td>392.6</td>
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<tr>
<td>Marsh</td>
<td>533.1</td>
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<tr>
<td>Salarine Meadow</td>
<td>1013.4</td>
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<tr>
<td>Playa/Mudflat</td>
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<tr>
<td>Wetland Total</td>
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<tr>
<td>Upland</td>
<td>3427.4</td>
<td>2090.3</td>
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<tr>
<td>TOTAL</td>
<td>6529.5</td>
<td>5717.1</td>
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</table>

* The indirect impacts to Salarine Meadow will not result in a loss of habitat acreage.

** The indirect impacts to Mudflat will result in a conversion of 62.8 acres of Mudflat to Playa. The net result will be a simultaneous loss of 62.8 acres of Mudflat and gain of 62.8 acres of Playa.

Table 5.21-1
Habitat Unit Balance by Species

<table>
<thead>
<tr>
<th>Species</th>
<th>Expansion Site</th>
<th></th>
<th>Mitigation Site</th>
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<th>Habitat Unit Balance</th>
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<tr>
<td></td>
<td>Current</td>
<td>With Project</td>
<td>Losses</td>
<td>Current</td>
<td>With Project</td>
</tr>
<tr>
<td>Blue-winged &amp; Cinnamon Teals</td>
<td>1582.08</td>
<td>1442.38</td>
<td>-139.70</td>
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<td>451.35</td>
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<tr>
<td>Gadwall</td>
<td>1582.08</td>
<td>1442.38</td>
<td>-139.70</td>
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<td>451.35</td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>235.55</td>
<td>179.61</td>
<td>-55.94</td>
<td>0</td>
<td>39.83</td>
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<tr>
<td>(without trees)</td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great Blue Heron</td>
<td>235.55</td>
<td>179.61</td>
<td>-55.94</td>
<td>0</td>
<td>122.99</td>
</tr>
<tr>
<td>(with trees)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redhead</td>
<td>243.41</td>
<td>184.94</td>
<td>-58.47</td>
<td>0</td>
<td>97.91</td>
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<tr>
<td>Shorebirds</td>
<td>761.86</td>
<td>663.46</td>
<td>-98.40</td>
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<td>98.54</td>
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<tr>
<td>White-faced Ibis</td>
<td>292.14</td>
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<td>88.77</td>
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<td>TOTAL (without trees)</td>
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<td>0</td>
<td>1227.75</td>
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<tr>
<td>TOTAL (with trees)</td>
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<td>4192.72</td>
<td>-504.40</td>
<td>0</td>
<td>1310.91</td>
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</table>
Habitat Unit Balance by Habitat Type

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Expansion Site</th>
<th>Mitigation Site</th>
<th>Habitat Unit Balance</th>
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<tbody>
<tr>
<td></td>
<td>Current</td>
<td>With Project</td>
<td>Current</td>
</tr>
<tr>
<td>Open Water</td>
<td>879.40</td>
<td>669.89</td>
<td>-209.51</td>
</tr>
<tr>
<td>Marsh</td>
<td>835.92</td>
<td>809.33</td>
<td>-26.59</td>
</tr>
<tr>
<td>Salarine Meadow</td>
<td>1388.32</td>
<td>1218.14</td>
<td>-170.18</td>
</tr>
<tr>
<td>Playa/Flat</td>
<td>1593.48</td>
<td>1495.36</td>
<td>-98.12</td>
</tr>
<tr>
<td>TOTAL</td>
<td>4697.12</td>
<td>4192.72</td>
<td>-504.40</td>
</tr>
</tbody>
</table>

* Open Water Habitat Units are dependent upon if trees are planted. If no trees are planted: 723.35 HUs are gained by mitigation; if trees are planted: 806.51 HUs are gained.

Table 5.21-3

Page 5.32c
BIRD-AIRCRAFT STRIKE POTENTIAL

Should a bird-aircraft strike problem develop, Federal Aviation Administration guidelines (Section 337, Part 139 Federal Aviation Regulations) describe requirements for addressing this problem. SLCIA has developed a Wildlife Management Plan that emphasizes bird aircraft strike hazards (BASH) and formed a committee of Airport staff to implement and monitor the progress of the Plan. The Plan was developed in cooperation with wildlife agencies, to coordinate the mitigation for habitat preservation/enhancement with that for bird/aircraft strikes. The Plan identifies areas of greatest hazard; areas close to the end of the new runway in which bird use should be discouraged; flight patterns to reduce strike hazard; means of attracting bird populations elsewhere in the region through creation or enhancement of suitable habitat; and means of discouraging bird use in potential hazard areas around the runway by means such as bird scare tactics, daily cracker-gun patrols, etc. Habitat losses from Plan implementation would be compensated for by additional habitat enhancement (see Appendix VII of the EXEA).

BIRD-POWERLINE STRIKE POTENTIAL

To reduce the possible bird-strike hazard from transmission-line relocation, SLCIA with Utah Power and Light, developed options for relocating the lines that would minimize effects on wetland areas (see Section 3.4 of the EXEA and Section 5 of this FEIS).

The four relocated lines would be placed on towers on islands spaced approximately 600 feet apart to reduce possible bird strike impacts from the current staggered tower placement.

An additional action to decrease bird strikes is to mark the wires with balls. Recent studies have shown marking lines do reduce line strikes by certain bird species. Marking devices are difficult to install initially and can create problems for replacement in mid-span when they fail.

The maintenance road for the transmission line would be constructed with drainage culverts to maintain the natural flow of water through the right-of-way. By maintaining water flows, the potential for avian botulism will be minimized.

5.10 - THREATENED AND ENDANGERED SPECIES

Threatened and endangered species are protected by the Endangered Species Act (1973 and subsequent amendments). The Act is administered by the USFWS, Office of Endangered Species. On receiving a description of the project, the USFWS identified two endangered species that may be present within the project area: bald eagle (Haliaeetus leucocephalus) and American peregrine falcon (Falco peregrinus anatum). The USFWS requested that a biological assessment be conducted for these species in accordance with Section 7(c) of the Endangered Species Act. The EXEA provides the information required for a biological assessment of these two species as specified by the Act. Reference Section 4.0 of the EXEA for a detailed discussion of Threatened and Endangered Species impacts. During the scoping process for this DEIS a commenter requested that the potential for impacts to the endangered plant, Utah Ladies’ Tresses be evaluated. The FAA contacted the USFWS about the potential of the project to impact this species and the response was it would be extremely unlikely. However, should the preferred alternative be constructed, biologists in the field for the wetlands mitigation plan will be requested to include in their surveys a survey of the Utah Ladies’ Tresses.

NO-PROJECT ALTERNATIVE

This alternative would involve no new runway construction. Existing facilities would be upgraded and terminals and support facilities would be expanded on land adjacent to existing facilities. These changes would not significantly affect the extent of wildlife use of the Airport area.

The No-Action Alternative would increase the frequency of flights departing from and arriving at the northern end of Runway 16R-34L, with some potential for increased bird-aircraft strikes in the area to the north of the runway. Impacts under the No-Project Alternative would be similar to those under the Preferred Alternative as described below. No bird strikes involving either the bald eagle or the American peregrine falcon have been reported at SLCIA.

Noise associated with increased flight frequency would not adversely affect either wintering bald eagles or nesting peregrines. Bald eagles at wintering sites appear relatively tolerant of aircraft noise within 100-300 feet of the ground, and become conditioned to background noise. The peregrine hack tower nearest the project area is several miles from either end of Runway 16R-34L; “sudden” disturbances from close-up aircraft would be anticipated to disrupt nesting or cause abandonment would not be anticipated.
CLOSE-IN ALTERNATIVE

The Close-In Alternative is very similar to the Preferred Alternative described below. It would have approximately the same impact on threatened and endangered species as would the Preferred Alternative.

PREFERRED ALTERNATIVE

The Preferred Alternative could have several adverse impacts on birds and peregrine falcons. Foraging habitat would be lost because of elimination of wetlands. The probability of bird-aircraft strikes could increase with the expanded flight zone associated with the proposed runway. Disturbances of birds by aircraft noise could increase. Relocation of existing powerlines closer to wetlands could present increased flight hazards to birds.

One Peregrine Falcon (hack) site is close enough to the proposed Airport expansion area to be affected directly by the project. Also, construction of the project would require removal of approximately eight to ten cottonwood trees (40 to 50 feet tall), a few dogwood trees (approximately 20 feet tall), and about six Russian olive trees (about 10 feet to 20 feet tall). These trees provide perches for some raptors and for avian prey species. As outlined above under the discussion of wetlands, the Preferred Alternative would fill 275 COE jurisdictional acres of wetlands. Modification of adjacent areas, increased human and aircraft activities, and fragmentation of habitat also could inhibit bird use of local wetlands. These habitat losses would be significant and would reduce foraging areas available for both bald eagle and American peregrine falcons. While both raptors range widely over large areas, habitat losses would be likely to be regionally significant.

Raptors feeding in the areas around SLCIA already cross the flight zones of Runway 16R-34L. Generally, much of the length of the runway provides a bird flight zone clear of aircraft traffic for several hundred feet upwards, while the airspace for arrivals and departures off runway ends allow aircraft within several hundred feet of the ground for distances of several miles. No bird strikes involving either the bald eagle or the American peregrine falcon have been reported at SLCIA. The Preferred Alternative would introduce similar bird-flight hazard patterns to the west of the existing runway and increase the width of the flight-hazard zone, although the number of aircraft operations to the north is not expected to be significantly different than the no-project alternative. Falcons flying between downtown Salt Lake City and wetlands along the Surplus Canal and to the north of SLCIA. Wintering eagles also move between these wetlands and the Jordan River area north of SLCIA.

Disturbance of either American peregrine falcons or bald eagles by increased human presence or aircraft activity is another area of concern. While both birds affected by human presence, peregrines appear much more sensitive, especially when nesting. However, the degree of this sensitivity is subject to some debate, given the successful re-introduction of falconaries to downtown urban areas (such as central Salt Lake City, Denver, San Francisco, and Minneapolis). Birds hacked in these environments may be much more tolerant of human presence than birds raised in wilderness areas. The Preferred Alternative would not substantially increase human presence near either peregrine aeries or eagle wintering areas and, because of increased Airport security, could in some cases act to reduce it.

The Preferred Alternative would cause some limited changes in aircraft noise in the area north and west of SLCIA. For the most part, however, noise would be reduced from current levels. Aircraft noise would not be expected to have adverse impacts on wintering bald eagles or nesting American peregrine falcons. Once the hack tower is relocated, low-flying aircraft are not anticipated either over the peregrine hack tower or over eagle roost areas near the Jordan River.

Several alternatives have been investigated for relocating the transmission line corridor. These alternatives fall into two categories; the alternative of putting the transmission lines underground, or the alternatives in which the above ground corridor would be realigned to the east or west of the Airport. Due to design, repairability and economic considerations, putting lines underground was found to be infeasible. Surface relocation of the lines could increase the bird flight hazard, particularly in foggy weather (such as winter ice-fog, common around the Salt Lake area). Although transmission line corridors can be designed to minimize the potential for electrocution, mortality of eagles from collision injuries could be a more serious impact. While raptors, because of their visual acuity, are less likely to collide with transmission lines, those that actively pursue their prey in flight may be more vulnerable to powerline collisions because they are pre-occupied. Depending on how and where lines are relocated, this could be a significant impact of the project.

Another concern related to power lines is avian botulism. Studies indicate that decaying bird carcasses, regardless of the cause of death, can provide the substrate necessary for avian botulism bacteria to thrive and produce poisonous toxin. Botulism does not appear to be a problem until decaying bird carcasses are present. Research has also shown that a high rate of scavenging and predation will decrease the chances of a botulism outbreak.

5-36
Other potential impacts include cumulative effects on raptors from other projects in the Salt Lake City area. Implementation of the County's Northwest Quadrant plan for industrial and residential development could lead to additional future loss of wetlands, and human encroachment and intrusion into these areas. While these projects are too vaguely defined at this time to allow quantification of their impacts, cumulative effects on peregrine and eagle foraging areas, and impacts from increased human presence, would likely be significant.

MITIGATION

Mitigation for the proposed project has been identified through consultation with state, local, and federal agencies, such as the WWR, the COE, the USFWS, and the EPA. Mitigation described below addresses impacts on raptors and threatened or endangered species.

Urgent discussions among Airport staff, planners, and wildlife agencies will be maintained to monitor impacts and ensure development of appropriate mitigation.

Alternate areas of wetland and other foraging habitats for bald eagles and American peregrine falcons are included in the mitigation measures for Biotic Communities, and are designed to draw birds away from Airport areas and to replace affected wetlands.

Methods to make above-ground powerlines more visible to birds will be implemented including marking lines with yellow aviation marker balls spaced at no less than 150 feet between balls on each line. Ball marking will extend the full distance of the relocated lines.

The existing hack tower closest to the airport runways will be relocated regardless of whether or not the new runway is built. The relocation process and site will be approved by USFWS and Utah Division of Wildlife Resources.

To reduce bird electrocution, all relocated transmission towers and lines will be constructed in conformance to the "Suggested Practices for Rapture Protection on Powerlines, the State of the Art in 1981", Raptor Research Report No. 4, Raptor Research Foundation, Inc. 1981

5.11 - FLOODPLAIN AND STORM WATER DRAINAGE

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, SLCIA would not expand and develop a new runway. The location proposed for the new runway would retain its current conditions as vacant land with canals, drainageways, open-water ponds, and wet meadows. The area would remain susceptible to flooding.

The No-Project Alternative would involve upgrade of existing facilities, including high-speed exit taxiways on the eastern side of the terminal, a parking garage, and new terminal structures. These upgrades would occur close to currently developed airport facilities. Portions of the Surplus and North Point Canals would need to be relocated. In addition, the terminal area and support facilities would be expanded; the storm water would need to be discharged to the Surplus Canal as in the Preferred Alternative described below. Those areas are drier than those that would be affected by the Preferred Alternative, and are located outside of the 100-year flood zone delineated on Flood Insurance Rate Maps by the Federal Emergency Management Agency, effective August 1983. While some increase in runoff from new impervious surfaces would occur, the potential for project-induced flooding would be low.

CLOSE-IN ALTERNATIVE

The Close-in Alternative would construct a runway and taxiway similar to those proposed for the Preferred Alternative. However, this alternative would place the proposed runway approximately 150 feet closer to the existing terminal facilities than the Preferred Alternative. Such an arrangement would reduce slightly the impervious surface area devoted to taxiways. A larger contiguous area of permeable surface (the adjacent wetlands) would remain to absorb runoff from the airport facilities. Under this alternative, canals and drainageways in the proposed expansion area would be rerouted in a manner similar to that described for the Preferred Alternative.

PREFERRED ALTERNATIVE

The Preferred Alternative would construct a commercial carrier runway and associated taxiways in a flood-prone area. The site currently contains ponded areas, depressions, and historic flood channels which could hold water in a flood. Parts of the site are below the 4217-foot elevation designated for planning purposes as an upper limit of the Great Salt Lake. These lower elevation areas are contiguous with lands adjacent to the Lake and at even lower elevation. Impervious surfaces created by the Preferred Alternative would further increase the flood potential of the area,
through increased runoff. A detailed discussion of the impacts of this Alternative is included in Section 4.11.2 of the EXEA and the Response to Comments is contained in Appendix X of the EXEA.

**MITIGATION**

The following measures to mitigate the identified adverse impacts of the Preferred Alternative will be implemented:

- Comply with all permit requirements for drainage modification, including those of the Utah Bureau of Water and Pollution Control, the Corps of Engineers (COE), and the Salt Lake County Flood Control and Water Quality Division.

- Drainage canal modification will consider the recommendations of the Salt Lake City Engineering Department’s Westside Drainage Plan. Current flow rates will be improved to account for project-related increases in runoff. Per FAR Part 77, the FAA will be notified of equipment brought in for dredging.

- Canal revisions will be designed and constructed to reduce the possible flooding impact. Canal maintenance facilities, including access roads will be designed to avoid aircraft hazards. The FAA will be notified when high-beam dredging equipment is used.

- Detention basins will be designed to withstand increased runoff during 10-year storm events with an overflow system for storms of greater magnitude. Storm sewers will be designed to contain the 10-year storm events.

- All surface and storm-water runoff will be collected on-site to comply with the City’s discharge policy. Eventual discharge rate would be limited to a maximum allowable discharge rate of 0.2 cubic feet per second per acre of development.

- If the current water table study indicates a regional decline of water table in the Salt Lake Valley, the implications for appropriate groundwater management and increased flooding at SLCIA will be examined.

- Emergency operational procedures for possible floods will be established.

5.12 - COASTAL ZONE MANAGEMENT PROGRAM

SLCIA lies in an inland area and would not affect any Coastal Management Zones under any alternative.

5.13 - COASTAL BARRIERS

SLCIA lies in an inland area and would not affect any Coastal Barriers under any alternative.

5.14 - WILD AND SCENIC RIVERS

No rivers which have been designated as Wild and Scenic would be affected by SLCIA, whether or not the airport is expanded.

5.15 - PRIME AND UNIQUE FARMLAND

Under the Farmland Protection Policy Act (FPPA), airport improvement projects must comply with guidelines established by the U.S. Department of Agriculture (USDA) for protection of farmland. Those guidelines, effective August 6, 1984, apply to lands designated by the Secretary of Agriculture as prime farmland, unique farmland, or farmland of state or local importance. FPPA is not applicable to any land which is not specifically designated in one of these categories.

Un-site investigations of the area to be affected by runway development, and a review of the Salt Lake Area Soil Survey Report, both conducted by the Soil Conservation Service Branch of the USDA, indicated "... none of the soils in the area qualify for any category of Important Farmland. The primary reason is the lack of available irrigation water.” Hence, FPPA does not apply to any of the lands which would be affected by project development. See Section 4.0 of the EXEA for an expanded discussion of Farmland impacts.
5.16 - ENERGY AND NATURAL RESOURCES

NO-PROJECT ALTERNATIVE

Terminal facility growth under the No-Action Alternative would be somewhat less than under the Preferred Alternative, while increases in air traffic operations would be similar for the two Alternatives. Overall, energy requirements of stationary facilities under the No-Action Alternative would be somewhat less than under the Preferred Alternative, but not significantly so.

CLOSE-IN ALTERNATIVE

Because terminal facility growth and increases in air traffic would be the same for the Close-In and Preferred Alternatives, energy requirements of stationary facilities would be about the same as those for the Preferred Alternative.

PREFERRED ALTERNATIVE

By 1996, terminal space would increase by about 170,000 sq. ft., and by 2006, by another 182,000 sq. ft. This increase in stationary facilities would generate an increase in demand for both natural gas and electricity. By 1996, annual consumption of natural gas would increase by about an estimated 11 million cubic feet (MCF) to 57 MCF. Annual consumption of electricity would increase by about 2.2 million kwh to 14.2 million kwh. By 2006, annual consumption of natural gas would increase to about 69 MCF (150% of current consumption), and annual consumption of electricity would increase to about 17 million kwh (142% of current consumption). Utah Power and Light, the electricity supplier, and Mountain Fuel, the natural gas supplier, foresee no difficulty in meeting this demand with existing and planned facilities.

5.17 - LIGHT EMISSIONS

NO-PROJECT ALTERNATIVE

No new runway facilities or lighting would be required for this Alternative. There would be no significant impacts.

CLOSE-IN ALTERNATIVE

Lighting for the Close-In Alternative would be similar to that described for the Preferred Alternative. No significant impacts from light emissions are predicted for the Close-In Alternative.

PREFERRED ALTERNATIVE

Lighting proposed for the Preferred Alternative would be similar to that on existing Runway 16L-34R. High-intensity runway lighting that could be shielded as required and angled upward would be put in place along the runway and taxiways. Category III Approach Lighting Systems (ALS's) similar to that now in use on Runway 16R-34L would be constructed north and south of the runway. The installation would include sequenced flashing lights. ALS lights would be placed in areas currently designated as vacant land, several miles from the closest residences. High-intensity strobe lighting is part of the proposed ALS's. No significant impacts from light emissions are predicted for the Preferred Alternative.

MITIGATION

No mitigation is necessary for potential lighting impacts.

SCLAA will voluntarily continue to coordinate with Utah Power and Light and Mountain Fuel Supply regarding projections of future natural gas and electricity demand at SLCIA.
5.18 - SOLID WASTE IMPACTS

NO-PROJECT ALTERNATIVE

Under this alternative, SLCIA would not construct a new runway. Anticipated growth in aircraft operations would continue as forecast. In 2006, the number of major air transport operations is predicted to be almost the same as that for the Preferred Alternative. Similar levels of solid waste production would thus be expected. Impacts thus would be the same as those discussed below for the Preferred Alternative.

CLOSE-IN ALTERNATIVE

Under this alternative, anticipated growth in aircraft operations would be the same as forecast under the Preferred Alternative. In 2006, the number of major air transport operations would be the same as that for the Preferred Alternative. Similar levels of solid waste production would thus be expected. Impacts thus would be the same as those discussed below for the Preferred Alternative.

PREFERRED ALTERNATIVE

Under this alternative, there would be some temporary solid waste generation as a result of construction activities. This temporary increase could be accommodated by current landfill capacity and would not adversely affect landfill operations.

In the long term, annual aircraft operations, including those of major air transport carriers, would continue to increase. Current 1988 levels of air carrier operation would increase 70% by 2006. On the presumption that most of the SLCIA waste is related to air carrier transport, waste production in 2006 could reach 73 tons per week. This would represent about a 70% increase in solid waste by 2006. Currently, the landfill operation used by SLCIA disposes of 15,000 tons of solid waste per week. The estimated 30-ton-per-week increase in solid waste generated by the airport is not considered by landfill operators to be a significant increase. While current landfill capacity would be reached by 2005, discussions are underway to acquire an additional 100 acres of capacity. County landfill operations would thus be able to accommodate the anticipated increase in solid waste as a result of airport expansion.

FAA Order 5200.5 provides that, where solid waste disposal facilities are located within 3,000 meters (approximately 9,843 feet) of airport runways used by turbojet aircraft, study of potential bird-strike hazards is required. Currently, the closest landfill to SLCIA is about four miles to the southwest of the existing runways, as discussed under 4.10.1 of the ExEA. The proposed runway is more than 3,000 meters from that landfill and would not require additional study in this regard.

MITIGATION

No mitigation measures are required for solid waste impacts.
5.19 - CONSTRUCTION IMPACTS

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, a new runway would not be constructed, and construction-related impacts would be limited to the expected modifications of the existing terminal and support area. While some local soil erosion and transitory shifts in airport operations could occur, effects would be small, particularly in comparison with the runway construction impacts described in the other alternatives. No significant impacts are identified.

CLOSE-IN ALTERNATIVE

The Close-In Alternative would involve constructing a new runway and support facilities, as would the Preferred Alternative. The Close-In Alternative would have construction impacts similar to those described below under the Preferred Alternative. The amount of construction would be slightly less than for the Preferred Alternative; taxiways to the new runway would be about 355 feet shorter than under the Preferred Alternative, and would probably require less fill. Traffic impacts related to transporting fill to the runway, and the associated dust and noise effects, would be similar to those described for the Preferred Alternative.

Under this alternative, the runway would be closer to the existing air carrier runway than under the Preferred Alternative, but would be farther away from wetlands. This alternative likely would result in less construction impact related to soil erosion and noise to the adjacent wetlands than would the Preferred Alternative.

PREFERRED ALTERNATIVE

Section 4.22 of the ESEA contains a detailed discussion on the impact of construction under this Alternative.

MITIGATION

The following measures will be implemented to reduce impacts on water resources and water quality during construction:

- Limit construction activities, particularly excavation and movement of fill, to the dry season or implement measures to contain runoff where needed during wetter periods. Relocate canals during periods of minimum flow.
- Construct settling basins for all temporary drainage channels downstream of construction sites and for adjacent ditches, canals, and wetlands to remove suspended sediment. Alternatively, use straw barriers to filter out sediment.

The following measures will be implemented to reduce erosion of soils during construction:

- Protect cut surfaces from wind and water erosion and stabilize them with berms, drainage structures, and netting.
- Stockpile topsoil and replace it in appropriate areas to encourage site revegetation. A revegetation plan and schedule will be developed.
- Immediately upon completion of construction, revegetate exposed surfaces with an appropriate mixture of grasses and legumes to minimize ongoing erosion.

The following measures will be implemented to reduce potential impacts on air quality during construction:

- To the extent practicable, wet down loose soil areas being actively worked or disturbed, such as unpaved haul roads, excavations, and areas being compacted, regularly with water. Spray stockpiled soils and other fine construction materials with a chemical binder to create a crust that would resist wind erosion of these materials. These measures could reduce fugitive dust emissions by 50% (water) to 85% (chemical binders); however, dust emissions would still be about 8.5 to 28 tons per day with mitigation, which would still be considered significant, albeit temporary.
- To the extent practicable, pave temporary haul roads to reduce fugitive dust emissions.
- Keep stockpiled fill or topsoil covered, where mounded and stored over long time periods, to minimize wind erosion. Large stockpiles should be coated with a chemical binder.

- To the extent practicable, wet down or cover haul trucks transporting fill on local roads, to minimize dust problems.

The following measures will be implemented to reduce traffic impacts during construction:

- Initiate discussions with Salt Lake City Public Works staff to consider potential problems from construction-related movement of fill and to develop appropriate mitigation measures. The following issues will be discussed:

- Haul trucks could bring in fill 24 hours per day (the analysis presented in the impact section assumed 12 hours per day). This measure would essentially reduce the number of truck trips per hour by 50%, substantially reducing traffic congestion.

- 4000 West Street could be closed to all other traffic, and use it exclusively for haul trucks. About 16% of traffic to and from the Airport uses 4000 West Street for access, so this measure would temporarily increase congestion by about that amount. However, since the runway would be constructed prior to 1996, and the I-80 interchange with the northbound and southbound access roads is designed for 2006 traffic volumes with an acceptable level of service, this measure would not result in unacceptable traffic congestion. It would temporarily lengthen trips to and from the Airport for some users.

5.20 - DESIGN, ART AND ARCHITECTURE

According to the Federal Aviation Administration (FAA), design, art, and architectural considerations are applicable to airport actions that involve airport location, extensive earthmoving, disruption of the natural environment, aesthetic integrity of an area, terminal and road access development, and to any development that may affect sensitive locations including parks, historic sites, or public use areas.

Architectural design considerations will be incorporated as part of the project to ensure that the SLCIA expansion would complement the existing airport and encourage functional, efficient, and safe airport facilities while reflecting local, cultural, and architectural heritage considerations. Design influences can be reflected in the interior design, landscaping, and the exterior architectural design. Painting or shielding structures may reduce adverse visual impacts.

The project would not directly contribute to the encroachment into residential or recreational areas, nor would it disrupt scenic views.

Extensive earthmoving would be required for construction of the new runway and support facilities. Sound design and engineering principles will be applied during excavation activities to control erosion and assure adequate drainage.
5.21 - GEOLOGY AND SEISMOLOGY

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, existing facilities would be upgraded, particularly in the existing terminal area. Facilities would be under the same seismic risk as existing structures in the airport area. Construction of the terminal-related facilities would encounter the same concerns raised with regard to the Preferred Alternative. The No-Project Alternative would not be expected to limit possible future extraction of mineral or energy resources in the airport area. See Section 4.0 of the EXEA for a detailed discussion of Geology and Seismology.

CLOSE-IN ALTERNATIVE

Potential geologic and seismic impacts of this alternative would be essentially the same as for the Preferred Alternative as described below. As with the Preferred Alternative, the Close-In Alternative would have a negligible potential to limit extraction of valuable natural resources in the area.

PREFERRED ALTERNATIVE

Soils on the proposed airport expansion site could be expected to settle and experience differential settlement as a result of runway and facility placement. Settlement could result in cracking of pipes, levees, paved areas, and surface structures. Site precompression by surcharging has been recommended, well in advance of paving, to avoid settlement problems. Surcharging would be especially important in areas where abrupt topographic changes occur, such as the Surplus and North Point Consolidated Canals, the ponds on the northern end of the proposed development site, and the ancient river channel near the proposed runway’s midpoint. The EXEA references a study which estimates that 50% of ultimate settlement would occur in one year, while 80% would occur in four years.

The high salinity and low permeability of the project site soils could cause additional problems for the planned facilities. Saline soils can corrode metal pipes.

Because of their proposed location in a seismically active area, the new runway, taxiways, and ancillary facilities of the Preferred Alternative could experience property damage from any combination of groundshaking, surface rupture, fault creep, or liquefaction. Facilities could be flooded from seiches or seismic deformation of the ground surface. Local flooding from cracking of pipes or levees could also occur. Any of these events could endanger human lives in the area.
Fault creep, groundshaking, and surface rupture could occur anywhere on the airport property. Although fault creep refers to barely perceptible ground movement, that movement can produce gradual cracking of pipes, levees, pavement areas, and surface structures. In addition, surface access may be obstructed, fire hazard increased and lives endangered. A major earthquake could render the airport out of service to large planes for up to 30 days.

Some areas at SLCIA could experience liquefaction during an earthquake, resulting in property damage and hazard to humans. Site dewatering during construction would reduce the potential for liquefaction.

Seismic activity could induce flooding, particularly in low-lying parts of the airport area. Ground deformation as a result of seismic activity could cause inundation by Great Salt Lake waters, while "seiches" or standing waves in the Lake could flood shoreline areas. These effects may be minimized by proposed construction of the new runway to 4,226 feet elevation.

Implementation of the Preferred Alternative would have no significant impacts on potential mineral or energy resources in the area. Resources which may be located in the vicinity of SLCIA are available elsewhere in adequate quantities. Their extraction in the airport area is not foreseen and is unlikely, given technical difficulties. Energy resources in the area are still unproved; if either gas or geothermal resources are established, extraction facilities compatible with airport design could be designed.

MITIGATION

The following mitigations are recommended for potential impacts related to soil conditions and seismic hazard.

- A site surcharging plan may be developed, as recommended in earlier geotechnical studies. Additional geotechnical analysis will be performed to update earlier geotechnical recommendations. Construction will be performed in accordance with the most recent geotechnical recommendations. Actual settlement rate should be measured during construction so that paving can be scheduled appropriately.

- Appropriate piping (e.g., plastic, coated pipes, reinforced concrete pipes) will be used to avoid corrosion by saline soils. A regular program of inspection and maintenance of pipes and waterways will be implemented.

- All paved areas and structures will be designed according to local seismic protection standards. A structural and geotechnical engineer will monitor design and construction and sign-off on the project to ensure structural safety.

- Soils on all construction sites will be evaluated for liquefaction potential, and appropriate engineering measures applied to counteract the potential for seismically induced liquefaction.

- SLCIA has prepared and implemented an emergency response plan to respond to a major seismic event. The plan addresses alternate fuel, water, and power sources and anticipate response to possible flooding. Following any major, or minor seismic event in the area, SLCIA will inspect all pipes, canals, conduits and structures for possible damage.
5.22 - TRAFFIC

NO-PROJECT ALTERNATIVE

Under the No-Project Alternative, growth in annual operations would be 96% of the growth anticipated under the Preferred Alternative. Therefore, similar increases in land-side traffic would occur. Potential traffic impacts would thus be similar to those predicted for the Preferred Alternative. A transportation connection between 5600 West and the west side of Davis County would still be needed to provide adequate facilities for the projected growth in the northwest quadrant of Salt Lake County. See Section 4.6 of the EXEA for a detailed discussion of traffic impacts.

CLOSE-IN ALTERNATIVE

Under the Close-In Alternative, growth in annual operations would be the same as anticipated under the Preferred Alternative, since only the runway location would differ between the two alternatives. Therefore, identical increases in land-side traffic would be expected to occur. Potential traffic impacts would thus be the same as those described for the Preferred Alternative.

PREFERRED ALTERNATIVE

Airport growth as projected in the 1988 Master Plan Update and this DEIS would result in increased land-side motor vehicle traffic. A detailed discussion of the impact of this growth on traffic, under the Preferred Alternative, is included in Section 4.19 of the EXEA.

MITIGATION

Significant long-term impacts have not been identified for ground traffic circulation. Mitigation is therefore not required. If and when a new principal arterial is built northwest of SLCIA, planners should consult with SLCIA and FAA to ensure adequate design (such as lamp post heights) in flight zone areas. If a future connection is made between 5600 West Street and the western section of Davis County, consideration should be given to align the road as close to the proposed runway as safety and security will allow. This would minimize additional impacts to wetlands.

5.23 - SUMMARY OF MITIGATION ACTIONS

Noise

Within the planning period, mitigation associated with significant noise impacts under the preferred alternative will consist of acquisition and relocation of residences in accordance with the Uniform Relocation Act or noise insulation at a minimum for areas within the 2006 65 LDN contour.

Land Use Compatibility

Relocation of the Blackhawk Duck Club facilities and a powerline easement acquisition from the Harrison Duckclub as well as other property owners will be done in accordance with the Uniform Relocation Act. Access to the Blackhawk Duckclub and Harrison Duckclub facilities will be provided for. Water impacts to the Surplus Canal caused by the preferred alternative will be mitigated to the extent possible to minimize impacts to the Rudy Duckclub. Noise impacts to the Rudy Duckclub will be less under the Preferred Alternative than the No Project or Existing Conditions.

In addition to residential use, industrial uses are preferred for those areas southwest of SLCIA and within noise impact Zones "B" and "C" (See EXEA and Appendix F). On the basis of the projected noise contours, any new commercial and industrial development in those areas, given mitigation measures stipulated in the Zoning Ordinance, would be compatible with the Preferred Alternative. Mixed-use development that included high-density residential development could be considered a compatible land use at certain locations within Zone "C." However, sound attenuation would be required in design and construction of buildings.

Social Impacts

The project would require relocation of one residence on SLCIA land in the northwestern quarter of Section 30 (Township 1N, Range 1W). Current lease arrangements for this property account for this requirement and conform with the Uniform Relocation Act. Also, mitigation impacts may include residential relocation to offset noise impacts. Any relocation would take place in accordance with the Uniform Relocation Act.

Induced Socioeconomic Impacts

There will be no significant Induced Socioeconomic Impacts, and therefore no mitigation is required.
Air Quality

SLCAA will apply for all necessary permits from the State Bureau of Air Quality. The Bureau has been empowered with permit authority over indirect sources of pollutant emissions, such as runways and taxiways, as well as direct sources such as storage tanks and boilers.

SLCAA will inform tenants on SLCIA property of their permit obligations.

SLCAA already has undertaken some geometric design changes to Airport roads to improve traffic flow. Air quality impacts from motor vehicle traffic could be reduced by additional geometric design improvements and additional traffic lanes that would increase the level of service on roads and at intersections at SLCIA, and thus reduce congestion and idling.

SLCAA already has undertaken some operational changes to reduce vehicle trips to the Airport, and thus reduce CO emissions.

SLCAA has taken measures to eliminate on-airport car rental shuttles continuous driving around the airport. The Airport may undertake additional measures, such as: restricting access of private motor vehicles to the front of the terminal in favor of shuttles, raising parking fees, and providing discount shuttle service between Salt Lake City and the Airport.

SLCAA will cooperate with the local natural gas company to install an automotive natural gas re-fueling facility on airport property. The SLCAA has implemented a program to convert a portion of its vehicle fleet to natural gas. SLCAA will make natural gas re-fueling facilities available for public use if a fuel station is developed in the future.

SLCAA has constructed a new parking structure with elevated pedestrian bridges which will reduce vehicle delays caused by pedestrians crossing the roads. The structure will separate traffic flows to increase vehicle circulation and reduce congestion.

SLCAA has constructed new bridges at major intersections to improve vehicle access and circulation.

See State of Utah letter concerning Air Quality contained in Appendix E of the FEIS.

Water Quality

The following mitigation measures are included in the project as proposed:

- The SLCAA has obtained a NPDES permit for stormwater discharge from the airport.
- Settling ponds will be installed at all points where water is discharged from airport property, including the areas northwest of the proposed runway, to reduce the discharge of sediments and pollutants. Oil water separators will be installed at all discharge points. These ponds would be maintained through a periodic dredging program to prevent their siltation. The settling ponds will be designed as dry ponds so as not to attract birds. Water would accumulate only during major storm events and would be discharged quickly.
- Construction activities will be carried out to minimize erosion and sedimentation of nearby waters. Storm-water runoff from the construction area will be controlled to settle out much of the sediment. The water will be directed to the Surplus Canal.
- SLCAA has installed a new stormwater pre-treatment facility to treat water contaminated with de-icing agents. Centralized de-icing and recovery facilities will be considered in runway design for any de-icing activities that are not performed within the existing collection area.
- Stockpiled fill materials, as well as those in trucks, will, where practical, be kept covered, to minimize erosion.
- Clean fill material will be used for all project construction to avoid surface and subsurface contamination of water resources. Fill sources and quality will be sent to the COE and State pollution control authorities for review before placement.
- Exposed soil surfaces will be wetted down as appropriate to reduce erosion and sedimentation.
- Vector-skimming devices and grease traps will be installed in all settling ponds to remove floatables. A regular maintenance program for these ponds will be implemented to ensure their proper function.
Water quality will be monitored in accordance with NPDES permit requirements at existing drainage discharge points to assess the typical pollutant levels in surface runoff. Parameters of concern include flow, COD, beryllium, cadmium, chromium, copper, cyanide, lead, selenium, zinc, oil, and grease. Results would indicate whether or not further control measures are necessary. If necessary, further measures would be implemented to reduce water-soluble contaminants to below State standards.

Consideration will be given to capping Artesian wells in the proposed runway construction area.

See State of Utah letter concerning Water Quality in Appendix E.

Special conditions and Best Management Practices outlined in comments letter No. 30 will be incorporated into the grant assurances.

If all the measures outlined above are implemented, water contamination by non-dissolved sediment, floatables, and settleable materials will be reduced significantly, but not eliminated completely. None of these measures would reduce contamination by soluble materials. Soluble contaminants could be present as herbicides, pesticides and fertilizers, or from aircraft de-icing agents, and may already be present in the shallow aquifer. Some minor deterioration of water quality would be likely with any of the alternatives, even if all mitigation measures were implemented.

Park/Recreation/DOT Act 4(f) Land

There will be no significant impact to DOT Section 4(f) lands and therefore no mitigation is required.

Historic/Archaeological/Cultural Resources

Should unrecorded cultural materials be encountered during development, activities in the affected area(s) will cease and the Utah State Historic Preservation Office will be notified immediately. A qualified professional would be retained to evaluate the significance of the find.

The location of cultural Site 42SL 155 will be noted by SLCAA. This site is not expected to be impacted by either the proposed transmission line corridor or the project development. However, if the site appears that it may be impacted during construction, the cultural site will be evaluated for its National Register potential.

Personnel and equipment associated with the project will be instructed as to the potential for encountering cultural resources and will be restricted to those areas cleared for the project. Personnel associated with the project will refrain from collecting or otherwise disturbing cultural materials which may be encountered during development.

Wetlands and Biotic Communities

A Mitigation Plan for Wetland Losses resulting from the Preferred Alternative has been completed and is included in Appendix H of this DEIS. This plan prescribes the replacement of the types of wetlands communities impacted, replacement of the approximate acreage of each wetland type impacted, and replacement of the biological functions and values lost on the expansion site. Since release of the DEIS, the Mitigation Plan has been revised to provide an improved habitat unit balance. The details of this revision are contained in Section 5.9 of this FEIS. The implementation of this plan will result in compensatory wetland mitigation.

BIRD-AIRCRAFT STRIKE POTENTIAL

Should a bird-aircraft strike problem develop, Federal Aviation Administration guidelines (Section 337, Part 139 Federal Aviation Regulations) describe requirements for addressing this problem. SLCIA has developed a Wildlife Management Plan that emphasizes bird-aircraft strike hazard mitigation for habitat preservation and enhancement with that for bird-aircraft strikes. The Plan identifies areas of greatest hazard: areas close to the end of the proposed new runway in which bird use should be discouraged; flight patterns to reduce strike hazard; means of attracting bird populations elsewhere in the region through creation or enhancement of suitable habitat; and means of discouraging bird use in potential hazard areas around the runway by means such as bird scare tactics, daily aircraft patrols, etc. Habitat losses from Plan implementation would be compensated for by additional habitat enhancement (see Appendix VII of the EXEA).

BIRD-POWERLINE STRIKE POTENTIAL

To reduce the possible bird-strike hazard from transmission-line relocation, SLCIA with Utah Power and Light developed options for relocating the lines that would minimize effects on wetland areas (see Section 3.4 of the EXEA).
The four relocated lines would be placed on towers on islands spaced approximately 600 feet apart to reduce possible bird strike impacts from the current staggered tower placement.

An additional action to decrease bird strikes is to mark the wires with balls. Recent studies have shown marked lines do reduce line strikes by certain bird species. Methods to make above-ground powerlines more visible to birds will be implemented including marking lines with 12" yellow aviation marker balls spaced at no less than 150 feet between balls on each line. The first yellow marker on the first ground wire will be placed 100' from the first relocated tower and then alternate red and yellow markers will be placed at the appropriate distances. On the second ground wire, the first red ball will be placed 150' from the tower then balls will be placed with alternating colors at the appropriate distances. Ball marking will extend the full distance of the relocated lines.

To reduce bird electrocution, all relocated transmission towers and lines will be constructed in conformity to the "Suggested Practices for Rapture Protection on Powerlines, the State of the Art in 1981", Raptor Research Report No. 4, Raptor Research Foundation, Inc. 1981

Floodplain and Stormwater Drainage

The following measures to mitigate the identified adverse impacts of the Preferred Alternative will be implemented:

- Comply with all permit requirements for drainage modification, including those of the Utah Bureau of Waste and Pollution Control, the Corps of Engineers (COE), and the Salt Lake County Flood Control and Water Quality Division.

- Drainage canal modification will consider the recommendations of the Salt Lake City Engineering Department's Westside Drainage Plan. Current flow rates should be improved to account for project-related increases in runoff. Per FAR Part 77, the FAA will be notified of equipment brought in for dredging.

- Canal revisions will be designed and constructed to reduce the possible flooding impact.

Canal maintenance facilities, including access roads will be designed to avoid aircraft hazards. The FAA will be notified when high-beam dredging equipment is used.
Detention basins will be designed to withstand increased runoff during 10-year storm events with an overflow system for storms of greater magnitude. Storm sewers will be designed to contain the 10-year storm events.

All surface and storm-water runoff will be collected on-site to comply with the city's discharge policy. Eventual discharge rate would be limited to a maximum allowable discharge rate of 0.2 cubic feet per second per acre of development.

If the current water table study indicates a regional decline of water table in the Salt Lake Valley, the implications for appropriate groundwater management and increased flooding at SLCIA will be examined.

Emergency operational procedures for possible floods will be established.

Coastal Zone Management Program
No Coastal Management Zones are affected.

Coastal Barriers
No Coastal Barriers are affected.

Wild and Scenic Rivers
No rivers designated as wild and scenic are affected.

Prime and Unique Farmlands
No mitigation is necessary for prime and unique farmlands.

Energy and Natural Resources
SCLAA will voluntarily continue to coordinate with Utah Power and Light and Mountain Fuel Supply regarding projections of future natural gas and electricity demand at SLCIA.

Light Emissions
No mitigation is necessary for potential lighting impacts.

Solid Waste Impacts
No mitigation measures are required for solid waste impacts.

Construction Impacts
The following measures will be implemented to reduce impacts on water resources and water quality during construction:

- Limit construction activities, particularly excavation and movement of fill, to the dry season or implement measures to contain runoff where needed during wetter periods. Relocate canals during periods of minimum flow.
- Construct settling basins for all temporary drainage channels downstream of construction sites and for adjacent ditches, canals, and wetlands to remove suspended sediment. Alternatively, use straw barriers to filter out sediment.

The following measures will be implemented to reduce erosion of soils during construction:

- Protect cut surfaces from wind and water erosion and stabilize them with berms, drainage structures, and netting.
- Stockpile topsoil and replace it in appropriate areas to encourage site revegetation. A revegetation plan and schedule will be developed.
- Immediately upon completion of construction, revegetate exposed surfaces with an appropriate mixture of grasses and legumes to minimize ongoing erosion.

The following measures will be implemented to reduce potential impacts on air quality during construction:

- Wet down loose soil areas being actively worked or disturbed, such as unpaved haul roads, excavations, and areas being compacted, regularly with water. Spray stockpiled soils and other fine construction materials with a chemical binder to create a crust that would resist wind erosion of these materials. These measures could reduce fugitive dust emissions by 50% (water) to 85% (chemical binders); however, dust emissions would still be about 8.5 to 28 tons per day with mitigation, which would still be considered significant, albeit temporary.
- To the extent practicable, pave temporary haul roads to reduce fugitive dust emissions.
- Keep stockpiled fill or topsoil covered, where mapped and stored over long time periods, to minimize wind erosion. Large stockpiles should be coated with a chemical binder.
- Wet the fill or cover haul trucks transporting fill on local roads, to minimize dust problems.

The following measures will be implemented to reduce traffic impacts during construction:

- Initiate discussions with Salt Lake City Public Works staff to consider potential problems from construction-related movement of fill and to develop appropriate mitigation measures. The following issues will be discussed:
  - Haul trucks could bring in fill 24 hours per day (the analysis presented in the impact section assumed 12 hours per day). This measure would essentially reduce the number of truck trips per hour by 50%, substantially reducing traffic congestion.
  - 4000 West Street could be closed to all other traffic, and use it exclusively for haul trucks. About 16% of traffic to and from the Airport uses 4000 West Street for access, so this measure would temporarily increase congestion by about that amount. However, since the runway would be constructed prior to 1996, and the I-80 interchange with the northbound and southbound access roads is designed for 2006 traffic volumes with an acceptable level of service, this measure would not result in unacceptable traffic congestion. It would temporarily lengthen trips to and from the Airport for some users.

Design/Art/Architecture

Architectural design considerations will be incorporated as part of the project to ensure that the SLCIA expansion would complement the existing airport and encourage functional, efficient, and safe airport facilities while reflecting local, cultural, and architectural heritage considerations. Design influences can be reflected in the interior design, landscaping, and the exterior architectural design. Painting or shielding structures may reduce adverse visual impacts.

Sound design and engineering principles will be applied during excavation activities to control erosion and assure adequate drainage.

Geology and Seismology

The following mitigation is recommended for potential impacts related to soil conditions and seismic hazard.

- A site surcharging plan may be developed, as recommended in earlier geotechnical studies. Additional geotechnical analysis will be performed to update earlier geotechnical recommendations. Construction will be performed in accordance with the most recent geotechnical recommendations. Actual settlement rate should be measured during construction so that paving can be scheduled appropriately.
  - Appropriate piping (e.g., plastic, coated pipes, reinforced concrete pipes) will be used to avoid corrosion by saline soils. A regular program of inspection and maintenance of pipes and waterways will be implemented.
  - All paved areas and structures will be designed according to local seismic protection standards. A structural and geotechnical engineer will monitor design and construction and sign-off on the project to ensure structural safety.
  - Soils on all construction sites will be evaluated for liquefaction potential, and appropriate engineering measures applied to counteract the potential for seismically induced liquefaction.
  - SLCIA has prepared and implemented an emergency response plan to respond to a major seismic event. The plan addresses alternate fuel, water, and power sources and anticipates response to possible flooding. Following any major or minor seismic event in the area, SLCIA will inspect all pipes, canals, conduits and structures for possible damage.

Traffic

Significant long-term impacts have not been identified for ground traffic circulation. Mitigation is therefore not required. If and when a new principal arterial is built northwest of SLCIA, planners should consult with SLCIA and FAA to ensure adequate design (such as lane post heights) in flight zone areas. If a future connection is made between 5600 West Street and the western section of Davis County, consideration should be given to align the road as close to the proposed runway as safety and security will allow. This would minimize additional impacts to wetlands.
FIGURE 5.3
NOISE CONTOURS
YEAR 1996
CLOSE-IN ALTERNATIVE
FIGURE 5.7
NOISE CONTOURS
YEAR 2006
PREFERRED ALTERNATIPE
SECTION 6.0 - ADVERSE IMPACTS WHICH CANNOT BE AVOIDED, SHORT-TERM USES AND LONG-TERM PRODUCTIVITY, AND IRREVERSIBLE AND IRRRETRIEVABLE COMMITMENTS OF RESOURCES

ADVERSE IMPACTS WHICH CANNOT BE AVOIDED

Adverse impacts which cannot be avoided are discussed under the appropriate FEIS Environmental Consequences section as well as section 6.0 of the ESEA, and are summarized below:

Noise - Nineteen residential acres are within the 65-70 DNL contour for 1996, including three residences. These three residences will be relocated in accordance with the Uniform Relocation Act or noise insulated. The number of residential acres within the 65-70 DNL contour falls to one in the year 2006.

Land Use Compatibility - Two Duck Clubs (Blackhawk and Harrison) will be impacted by the relocation of the transmission lines and the construction of the preferred alternative. The relocation of the transmission lines across the Harrison Duck Club may limit hunting near the transmission line corridor. The construction of the new runway will displace the clubhouse and access road of the Blackhawk Duck Club. Mitigation is proposed for these impacts which include compensation in accordance with the Uniform Relocation Act and alternative access.

One leased residence is located within 500 feet of the new runway and will have to be relocated.

Social Impacts - Some impacts related to relocating residences will occur but these will be mitigated.

Induced Socioeconomic Impacts - None

Air Quality - The project will decrease air quality pollutant emissions relative to the no project alternative. However, operations at the airport with or without the preferred alternative, will result in emissions of pollutants.

Water Quality - Even if all mitigation measures are properly met, some minor deterioration of water quality is likely. Contamination by non-dissolved sediments, floatables, and settleable materials will be reduced significantly by the mitigation measures, but will not be completely eliminated. Soluble contaminants such as de-icing fluids, pesticides, herbicides, and fertilizers, will be reduced by the mitigation measures and may already be present in the shallow aquifer.

Park/Recreation/DOT Act 4(f) Land - None

Historic/Archaeological/Cultural Resources - None
Wetlands and Biotic Communities - The project will have significant impacts on biotic communities. The new runway would affect both wetland and upland habitat. Although the impacts will be mitigated to the extent feasible, the resources will suffer unavoidable adverse impacts.

Threatened and Endangered Species - Impacts to threatened and endangered species will be mitigated to the extent feasible; however, the project will affect the peregrine falcon and the bald eagle.

Floodplain and Storm Water Drainage - None
Coastal Zone Management Program - None
Coastal Barriers - None
Wild and Scenic Rivers - None
Prime and Unique Farmlands - None
Energy and Natural Resources - The project will not increase consumption of energy over the no project alternative in the long term. However, there will be some irreversible and irretrievable commitment of resources relative to construction materials associated with the preferred alternative.
Light Emissions - None
Solid Waste Impacts - None
Construction Impacts - Construction impacts will be mitigated to the extent practical however, there will be some temporary unavoidable adverse impacts associated with construction.
Design/Art/Architecture - None
Geology - None
Traffic - There will be some temporary unavoidable adverse impact associated with the project construction.

SHORT-TERM USES AND LONG-TERM PRODUCTIVITY OF THE ENVIRONMENT
The activities from the beginning of construction to the opening of the runway constitute the short term uses of the environment. The impact of the construction process on the construction site will not cause any special environmental problems which cannot be dealt with as part of the design and management of construction. In the long term, the project will add to the safety and reliability of air travel to and from the Salt Lake City area.

IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES
No depletion of materials in short supply or significant irreversible changes in natural and cultural resources is anticipated. No unusual materials are anticipated to be used during construction, and the airport site contains no prime or unique farmlands.
This section lists those individuals who assisted in the preparation of the PEIS and who are responsible for the independent evaluation of information submitted during the preparation process.

Federal Aviation Administration

Johnson, Barbara - B.A., Environmental Biology and Environmental Conservation, University of Colorado; M.S., Environmental Science, University of Colorado; Utah/Wyoming State Planner, FAA Denver Airports District Office, Environmental Planner, FAA Denver Airports District Office (7 years). Project management, text preparation, technical review, planning and coordination.

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800 Independence Avenue, S.W.
Washington, D.C. 20591

U.S. Department of the Interior (9 Copies)
Assistant Secretary - Program Policy
Environmental Project Review
Washington, D.C. 20240

Federal Aviation Administration (1 Copy)
National Headquarters
Community and Environmental Needs Division APP-600
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Washington, D.C. 20591

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Public Review Locations

Salt Lake City Airport Authority
776 North Terminal Drive, Terminal One
2nd Floor, Salt Lake City International Airport

Salt Lake City Library, Main Branch
309 East 500 South
Salt Lake City, Utah

Marriott Library
Building 330, Documents Section
University of Utah
Salt Lake City, Utah

Salt Lake County Library, West Valley Branch
2880 West 3650 South
West Valley City, Utah

Salt Lake County Library, Whitmore Branch
2197 East 7000 South
Sandy, Utah

Salt Lake County Library, Kearns Branch
5350 South 4220 West
Salt Lake City, Utah

Davis County Library, South Branch
725 South Main
Bountiful, Utah

Davis County Library Headquarters
38 South 100 East
Farmington, Utah
SECTION 8.0 - REFERENCES

Salt Lake City International Airport 1988 Airport Master Plan Update, December 1988, ESA Planning and Environmental Services

Salt Lake City International Airport Master Plan Update, Expanded Environmental Assessment, January 1992, ESA Planning and Environmental Services

Airport Environmental Handbook, Order 5050.4A, October 1985, Department of Transportation, Federal Aviation Administration

14 CFR Part 91 General Operating and Flight Rules, October 1991, Department of Transportation, Federal Aviation Administration

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Salt Lake City International Airport Draft Environmental Impact Statement, April 1992, Department of Transportation, Federal Aviation Administration

Federal Aviation Administration Order 6830.1A, Microwave Landing System Implementation Plan, March 1986, Department of Transportation, Federal Aviation Administration

Airport and Air Traffic Control System, 1981, Congress of the United States, Office of Technology Assessment
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APPENDIX A
STATEMENT OF RESPONSIBILITIES AMONG THE CORPS OF ENGINEERS AND THE FEDERAL AVIATION ADMINISTRATION

STATEMENT OF RESPONSIBILITIES AMONG THE CORPS OF ENGINEERS AND THE FEDERAL AVIATION ADMINISTRATION

Purpose: To establish an understanding among the Army Corps of Engineers (Corps) and the Federal Aviation Administration (FAA) regarding the preparation of an Environmental Impact Statement (EIS) for the proposed new air carrier runway at Salt Lake City International Airport (SLCIA). In order to complete a comprehensive EIS the FAA and the Corps, because of their respective regulatory responsibilities, have determined that it is necessary to establish a formal mechanism whereby the concerns of the two agencies are coordinated. This statement of responsibilities provides an avenue of communication between the aforementioned governmental entities.

Background: The proposed construction of a new runway at SLCIA at the preferred location identified in the Environmental Assessment would require the taking of several hundred acres of wetlands. The Environmental Assessment has been under preparation by the Salt Lake City Airport Authority for over three years. Extensive alternatives analysis and evaluation of environmental impacts has taken place. The Army Corps of Engineers has been actively involved in the Environmental Assessment process and is cognizant of the significant impacts associated with the proposal. The Federal Aviation Administration has provided guidance to the Airport Authority to ensure that the Environmental Assessment was completed in compliance with applicable environmental legislation.

Statements of Work: The Federal Aviation Administration is responsible for the EIS and will act as Lead Agency. The Corps of Engineers has a major interest in the project since significant wetland impacts are associated with the proposed action and therefore will act as a cooperating agency.

The Federal Aviation Administration, as the lead Federal Agency for National Environmental Policy Act (NEPA) compliance will be responsible for the following:

(1) Preparation of the EIS to comply with the requirements of NEPA, Council on Environmental Quality (CEQ) regulations, and agency requirements.

(2) Preparation of the EIS, to the extent practical, to meet the needs of other federal government entities who have major authorizing actions, such as the Corps of Engineers. The EIS may be adopted by the Corps for the purpose of exercising its regulatory authority so as to avoid duplication of effort.

As the lead agency for the EIS, the FAA has ultimate responsibility for the EIS and the decisions affecting content and adequacy. The Corps will be a cooperating agency under CEQ regulations. Nothing in this Statement shall amend or abridge the authority of the Corps.
The Corps will provide technical input on the following Environmental Categories (and possibly others not listed):

- Wetlands (including wetlands mitigation)
- Biotic Communities
- Alternatives

The FAA will consult with the Corps but will retain sole responsibility for the determination of which alternative runway location is selected as the preferred alternative in the EIS.

The FAA will consult with and obtain assistance from the Corps in the determination of necessary mitigation measures. The FAA retains sole responsibility for the determination of which mitigation measures will be necessary for FAA approval of the proposed construction. The Corps, pursuant to Section 404 of the Clean Water Act, is responsible for determining the mitigation necessary to permit the project.

The Federal Aviation Administration will write and prepare the EIS.

The Corps will have a representative attend all public meetings associated with the EIS.

The FAA is responsible for publishing and distributing the draft and final EIS's.

The Corps will be given a preliminary copy of the Draft and Final EIS for comment prior to FAA approval and/or distribution of the document.

The Corps will respond to the FAA with comments on the preliminary copy of the Draft and Final EIS within 30 days of receipt.

The EIS will be prepared in accordance with FAA Environmental Order 5050.4a.

This statement of responsibilities is terminated when the FAA signs the Record of Decision, 90 days from the date the involved agencies give notice of termination, or three years from the date this statement is signed, whichever comes first.

Notwithstanding the paragraph above, in the case of litigation, the FAA and the Corps will be respectively responsible for defending any information set forth in the EIS which they provided.
The Federal Aviation Administration held a public hearing regarding the Draft Environmental Impact Statement on Monday, May 11, 1992, at 7:00 p.m. in Room 315, City Council Chambers, City County Building, 451 South State Street.

In Attendance: Louis Miller, Director of Airports; Steve Domino, Airport Planning, Manager

Ms. Barbara Johnson, FAA conducted the meeting.

The meeting was brought to order at 7:02 p.m.

Barbara Johnson, of the Federal Aviation Administration (FAA), welcomed the audience to the public hearing regarding the draft Environmental Impact Statement (the "Statement") for Proposed Improvements Salt Lake City International Airport. She said the FAA was the lead agency on the draft Environmental Impact Statement. She said the FAA was working with the Corps of Engineers, who had a large interest in the project due to the wetlands impact associated with the proposed runway.

She said the environmental process had been going on for four years. She said the Salt Lake City Airport Authority had completed an Environmental Assessment that had been started in 1987, and completed in November of 1991. She said at that time there was a public hearing for the Environmental Assessment. She said the Environmental Assessment was submitted to the FAA as a decision document in January 1992, at which time the FAA elected to prepare the Environmental Impact Statement. She explained the FAA began the written process of the Environmental Impact Statement in January, finished in February, and distributed the Statement in early April. She said the FAA was accepting written comments on the draft Statement through May 27, 1992. She said following the acceptance of the comments, the FAA would respond to both the verbal comments made tonight and the written comments in the final Environmental Impact Statement. She said there might be additional analysis also included in the Statement in regards to air quality modeling and wetlands. She said copies of the Final Environmental Impact Statement would be available upon written request.

The following minutes will be presented verbatim.

Steve Domino, Salt Lake City Airport Authority, Manager of Planning and Environmental Air Mail Facility Box 22084, Salt Lake City, Utah, said "I would like to give a brief presentation and description of the project for the benefit." Mr. Domino read the attached report in conjunction with a slide presentation.

Fred Lewis, the Northpointe Duck Club and the Westside Duck Club member, said "a lot of things I seen tonight are basically the same things we saw last time we sat here in this meeting. One thing that has eased my mind somewhat from the last meeting is I have met with the Canal Company as to where the water is going to be coming from to develop this new marsh. Any water that is diverted out of the Surplus Canal before it reaches the or leaves the Airport property, does not get into any of the duck clubs, and so it is a very big concern of all of the duck clubs out there. We've been somewhat assured that if you people will follow what the Canal Company is proposing, we will be better off with our water system. But, any changes to that, we're going to be right in there looking at it and fighting against it. Noise. I really question the noise studies that you could see with these new stage III aircraft that are supposedly coming in, and I don't know when they're going to get here, but right now we cannot live in our area out there with all of the noise. It is so bad that we cannot converse with each other. I was a mile north of the VORTAC Tower about two hours ago talking with some surveyors, and we had to wait several times while aircraft passed overhead. We couldn't even hold our conversations. So, I have some real concerns about that, and how that's going to impact the wildlife as well as our lifestyle out there. As far as the mitigation hazard from the birds in the area, I still have doubts about that. I question whether your plans will work. I'm also very concerned about how those mitigation practices will harm or effect our operations out there, and that's something that we're going to be watching very closely. Whatever action is necessary to protect our interests in that area. I don't believe I have any further questions at this time.

Galey Colosimo, principal of St. Francis Xavier Elementary School in Kearns, Utah, said "setting three rows back is the Reverend Joseph M. Mayo, who is my immediate supervisor at St. Francis. St. Francis Xavier is the School and Parish is involved in this particular situation by virtue of the fact our property is located almost directly between Airport No.1 and Airport No.2. What makes the issue of concern to us is that in 1987 there was a midair plane collision that occurred almost directly over our school. Ten people were killed in that accident, six of them dies on our property. The fourth and fifth grade classroom served as the morgue for that particular incident.

I came here back in December, and I raised three basic issues for the draft of the Environmental Impact Statement. The first obvious issue of concern for us is the third runway, with increased air traffic, what the possibility of moving and relocating a lot of the traffic from Airport No.1 to airport No.2, will do in terms of causing greater congestion particularly over our head, and we'd asked in December for someone, somewhat to look at that particular issue.
I guess the third issue that we raised at that particular time was an economic issue. St. Francis Xavier is a private school, it's a Catholic school, it relies solely on tuition and on fund raisers to survive. In many instances, and many cases, you might look at a school that is a business. And as you might well imagine it's not good for business to have an airplane collision study your head. We spent the last five years trying to dig out from the image problem of the runway. This was a family school where 'wasn't that at St. Francis, and will occur now that we'll have an aircraft over our head. Thank you.'

Joe Nemaska, an attorney representing the Westside Associated Duck Clubs and member of the Lakefront Duck Club, said "I'm here to represent our concerns with respect to the Environmental Impact Statement. We didn't prepare a slide show. Mr. Domino has done an excellent job with that. But the concerns really are that the Environmental Impact Statement. The draft Environmental Impact Statement that was presented to me fails to address the biggest environmental impact of all, and that is the proposed runway is going to have on downstream wetlands. Our concern is that at this present time there is no control structure at the confluence of the Surplus Canal and the Goggin Drain. Before the floods in 1983 there was a control structure there, so that when the flow was increased the water could be diverted into the Goggin Canal. The Army Corps of Engineers recognized this when they first built it back in the '50s. There's no question but there's a problem right there at that area. The impact Statement doesn't even address those issues at all. We feel good about the way it was studied, but we're not real satisfied with what we've seen. We have seen evidence that anyone's looked at just exactly what's going to happen, what economic impact has already occurred at St. Francis, and will occur now that we'll have an aircraft over our head. Thank you.'

I'm also very concerned over, I don't like Canal on page 526 and 527 of the draft Environmental Impact Statement it says "modification of wetlands could be required to discouraged water fowl use in flight areas north of the new runway." Well as Mr. Lewis has pointed out, he's a member of the Northpointe, they're directly north of the runway, and I don't know what modifications that you all are talking about, but whatever it is, we're not too pleased about it. I've heard comments about them, about the Airport Authority putting noise, some kind of speaker system, I couldn't really pick it out of the Impact Statement, but it looks like they're going put some kind of speaker system at the end of the runway to scare the runway out. Well, obviously we're not too thrilled about that either. On page 527 of the draft Environmental Impact Statement says "Concomitant with the permanent alteration of wetlands would be a loss of habitat for water fowl, and reasonable decline in water fowl productivity." Well, we spent the last six years working on rebuilding the areas out
Authority has elected, or ethylene glycol or something, expansion of airports. And he deiced and everything's is just going to be sufficient. That discharged into the system.

gentleman in Cincinnati, the information I have might be totally wrong on that, who is definitely against any heads shaking back here, and I propose to put in, and I read through the Impact Statement and I was very concerned over the lack of controls over the deicing that's done by the Airport Authority. To the best of my knowledge, at the present time, the Airport Authority simply pays a fine because they deice and everything's is just going to be sufficient. That discharged into the system.

The last thing that I would like to raise is that I didn't see in there and I read through the Impact Statement and I was very concerned over the lack of controls over the deicing that's done by the Airport Authority. To the best of my knowledge, at the present time, the Airport Authority simply pays a fine because they deice and everything's is just going to be sufficient. That discharged into the system.

The last thing, and I'll shut up, I've said to much already, which is usual for attorneys, and that is management of the mitigation area. We've pretty much concluded that the road to our clubs is going to be paved. It's going to go through the mitigation area, but I read through the Impact Statement, and it seemed to be deficient in my opinion, as to who's going to manage all of this stuff when the Airport Authority builds it and then decides to walk away from it. It looked to me, and I was not per say against the runway, was but I've been told that I'm not anymore, but I guess what I'm saying is it seems to me that the Airport Authority really can't build these areas, it can't build a mitigation area and build a new canal, we're supportive of the Northpointe Canal, but that's what the plans are. Then they're going to wash their hands of it and say okay well somebody else is going to do it. There's nothing in place as far as I can tell, as to who's going to manage this canal area, and that really bothers me. As I indicated, we're supportive of the Northpointe Canal people, Fred and I had a big meeting with them, we went out and toured the whole area out there, and I think the plan is a great plan. If I had to support any plan for a runway, that's the one I would support. I think they did a little bit more that needs to be done in the final Environmental Impact Statement, and those issues that I've addressed. I would really like to see a little bit more impact in those areas. Thank you.
losing the new runway to ravages of the lake have not been spelled out in the analysis of the preferred alternative. And second, in calculating the area of the wetland losses to be mitigated one must consider the entire area of those and then restate some of them. First of all, I want to question the need for a third runway if we really trying to obtain a sustainable society. The project says that there will be 340,000 operations, or were in 1991, that would expand to 415,000 in the year 2006 for a 37% increase in the fifteen years. I want to give a few, want to give a little bit more data in relationship to that. This project is made when a new runway is the most energy intensive from of transportation. This projection is made when oil remains at 1989 production rates were estimated at 44 years. This projection was done by the Great Salt Lake. True, the airport and the consultants have and much to their credit I've appreciated working with them, worked hard to provide a mitigation site of 464 acres of wetlands to compensate for 339 acres that will be directly filled. But the impact of the expansion site would be felt over 3,000 acres of wetlands and over 3,400 acres of uplands. The impacts of the new runway would include increased air pollution, increased bird strike concerns, putting in a concrete runway that will separate parts of the same ecosystem, and pollutants from the runway going into the surrounding lands. Here are any valid concerns, there are valid reasons to be concerned about whether or not this proposed runway is a good match for the path for our future. There are also new technologies that make the need for the project questionable. And if there is a third runway the need for rerouting transmission lines to Alternative F very highly questionable.

On April 29, 1992, I had the opportunity to discuss landing systems with Nelson Spawnheimer, Electronics Engineer with FAA in Seattle. Mr. Spawnheimer stated that the airports electronic technologies for landing that will likely be frequently used by the year 2005 or 2010. These new technologies, called microwave landing system and global positioning service, would define soon, perhaps later, the requirements for implementation landing. I did not ask Mr. Spawnheimer if the new landing systems would alter the requirements for separation between runways, but assume they would. And assume you could have two runways 3100 feet apart. If this assumption is made then choosing On-site Alternative 4, Realign Runway 15L-34R, would mean that there would likely be absolutely no need for a third runway for IFR conditions after 2005 or 2010, perhaps sooner, perhaps later. This is a very important statement, since the draft EIS stated that the increase in need at Salt Lake City International Airport to accommodate airport operations during intermittent conditions, and as one of the main bases for the new runway. Given these new technologies there is need to clearly indicate whether they would allow for simultaneous approaches. Runway 15L-34R are aligned. If simultaneous approaches would be allowed then there should be a more better analysis on the viability of On-site Alternative 4 before 2005 or 2010 and after this time period.

I want to switch to the record for a moment. Alternative C was a preferred alternative prior to the relatively recent FAA Directive which redefined the runway’s navigational cones. Alternative C would be closely aligned with Airport’s existing runway and as one of the main bases for the new runway. If a new runway is to occur, Alternative C is greatly preferred over Alternative F because it means the transmission lines are not moved 15,000 feet farther west over prime wetlands and there would almost certainly be fewer birds striking powerlines.

Mr. Spawnheimer indicated that the new landing system technologies would not require the transmission lines to be moved out to the Alternative F position. But, would be satisfactory in Alternative C position. In other words, if the new runway were built, the new powerlines would only be needed at Alternative F position for ten to fifteen years. Alternative C would be better because it would not sacrifice wetlands when the need is only for a short period of time. Alternative C would be able to use the preferred runway alternative is accepted, a full analysis must be conducted on what impacts would occur if the new lines were in Alternative C location or some other location that would would be negatively impact the wetlands. At this point, I do not believe Alternative C could be viewed as a good site, and further analysis needs to be done.

In summary, there are many legitimate questions that need to be better answered regarding the need for a new runway, and if there is to be a new runway,
there are many more questions that need to be answered regarding the relocation of the transmission lines. Thank you.

Carol Warner said "I came tonight because I heard a story on the news a couple of weeks ago in the morning, it was the NPR local KUER station. It was an interview, I think the interview was done by Howard Burkes, a interview with an engineer from the Army Corp of Engineers, and I think Howard on a tour of the Jordan River saying these are all the places where we were proposed to us by the Airport on the north and not far from the Airport on the north and we had to land here and we had to land elsewhere. This one failed. This one failed. This one failed, and I was astonished because I trusted the engineers who said "Oh we can come in here, we'll build this little wetland, it will be fine." Now tonight, I learn not only are we jeopardizing the 339 acres, but the tens of thousands of acres in the adjacent area, and I'm really quite upset about this. Because, the traditions that we have here tied to the Airport, the tradition of family values, the tradition of development and economic growth to the area. I'm really upset about this. We have a lot of traveling and who has interest in seeing that travel be safe, and also having spent a lot of time as both a photographer and hunter on wetlands in the area. In the early days a good time at the Bear River Refuge, and I think I see the point of view of people who have spoken. I think from the standpoint of those of us who hunt, we've been seen during the time when we had the incursion of heavy wind surf that occurred during the flooding days, and we look over our club, the Rudy which borders the Airport on the north and not far from the runway comes off the new runway, we I think took our caretaker and his family out about 11 o'clock at night when the flood care in, and the water high as these desks, cano over the entire area. We were speaking of the ducks getting away. Then we have seen over the years, as the other duck club members have seen, the problems of having as was indicated the Gogglin Drain coming across one of the fields, controls when the water comes in, and now we're facing a near drought so we don't know what our future it. We've also during the course of this, in a very informal fashion sent in several photographs showing the bird life in the area. Sometimes the concerning volumes of birds, large ones as well as the small ones, which has been the concern from the standpoint of safety.

At the risk of being maybe unduly personal, I happen to be the Executive Director for the LDS Church Hospital System, and Administrator of the Salt Lake LDS Hospital for a period of some 30 years by the LDS Hospital and at the time that we had the disaster in 1965, and I pointed out the fact that we had the responsibility at the hospital of taking care of a vast number of the bad injuries, some of which proved to be fatal. During that time working with the CAB, the predecessor of the FAA, so from the safety standpoint and now as a traveler, I recognize the need for the additional runway as being a severe and important need having had several diversion to different cities during the flights that come at a time when for some reason or other it wasn't possible to land here and we had to land elsewhere. In my judgement I would think that a group like this must recognize what must be accomplished in my judgement. Someway of keeping pace with the volume of flights that are going to be coming, and at the same time trying to truly look out for the problems whether they be school, or people that like to be in a natural area without interruption.

The comments that Mr. Domino clearly indicated that the statistic outrage the forecast, and its difficult to o I don't want to get to long winded, but in my judgement not as a official officer of a club I represent, but as a person who is interested in seeing Salt Lake's future, interested in the airport that serves it, interested in seeing that everyone's interests are assuaged whether they be farmers, whether they be hunters or whatever, I guess I've been a person interested in protecting wildlife and trying to strengthen our ability to produce additional wildlife on the one hand, and seeing that now with the addition of this new facility that we will have some severe problems as a result of being so close to this hunting and shooting, and photograph, business. I just wanted to pay my respects and compliments to the Airport management and also
the FAA in an honest effort to take care of a situation at a moment’s notice. I think we have to find a way of seeing that we have the capacity at any given time to do something on a simultaneous departure ways over an expanded area and still try to be fair to those people whose property is going to be devalued as a result. It was almost as I saw the figures, it was almost as much as a billion dollars going into the project, and if somebody is being hurt, whether it be a cattle grower or whomever it is, those funds were said not to be tax funds, but from whatever source those funds come some of it ought to be directed at maybe expanding and help the duck clubs in the battle they’ve had through the years because of slitted sand or because of this or that. And to me, I think that all those here will feel comfortable about seeing the Airport go ahead, but those that are affected adversely somehow, someway compensated or assisted. And that is my plea, and I say it with grateful appreciation of the chance to be here.”

Ms. Johnson invited anyone who had not signed up to speak to come forward at this time.

Ron Phillips, 2486 Imperial Street, said “I give my time at first over to Fred Lewis, he is with the Westside Duck Club Association. I am the president of the Bayview Duck Club. We are located west of Clearfield. Now you may not think that we have any interest in this airport or runway expansion and the pushing around of these marshes, but sooner or later that is the kind of thing that will happen to all of us, and that’s why I’m here.

I’ve heard a lot of talk, well first off let me say one thing, every time I come to a public meeting or something do to with the economy or recreation of the State is involved, I see the same five people sliding down the same hill. Hunting in this state brings in approximately ten times the money that skiing ever does now or probably ever will. It’s a much larger industry than skiing, and hunting in this state brings does not benefit one natural resource. Hunting, from the sale of stamps, licenses such as your migratory and federal migratory license and your state bird license, goes to the propagation and construction of new resources, new areas. We have the Pittman Robertson funds, all those sold on all hunting equipment. That also goes into this where the hunters who are involved in the resource are replacing the resource. You can not say that about skiers.

Now, wetlands are diminishing in this country at a rate of approximately one-half of one acre a year. There are less than half the number of wetlands in this country now as there was when the pilgrims arrived. I have been involved not only in the duck club that I belong in, I have been involved in a raising of funds through a private conservation group dedicate tow water fowl for over twenty-five years. I have the most seniority of anybody in this State of that.

And there’s more to duck hunting than shooting ducks. When you happen in a duck blind because of the noise, the value of this experience, no matter how silly it may sound, the experience of hunting is diminished and somehow this should be brought into consideration. It is very important. These duck clubs are privately owned, they’re privately maintained and I know how much it cost, and I know how much it did cost to rebuild them. We have really had our club to have to put off a lot of things to just try to get back to where we were before. Whether it be with the Corp of Engineers, they say your working with the Corp of Engineers, this is it; I would like to see anybody do. You may try to work with the Corp of Engineers but “The Corps” as they like to be called, is not easy to work with. I worked with them, we had to give up the idea of rebuilding or building a new dike which would enhance the water control, because they showed up when they said they would, and our club was filling up with water. The Corp of Engineers reminded me that there’s more to marsh than ducks and geese. I reminded the Corp that without the ducks and the geese there would not be marshes, there would be no invertebrates, there would be no yellow-headed blackbirds, there would be no ibis, coromants, whatever. It’s the clubs, the bird refuges, all of which were built by hunters that are bringing these things in.

We have got to start concerning ourselves with the loss of these grounds. Once they’re gone we can’t bring them back. Thank you.”

Clifford Haber, West Valley City, said “My concern is basically the low flying aircraft that come over West Valley City. I’m kind of here, I like to think that I represent a good part of the West Valley City on their concern. It seems to me that even now, we have extremely low flying aircraft coming over the City, and maybe where we need to adjust the flight paths, or adjust their rates to the south, or maybe twice as high as their coming in now, to where those, the rise back into the South, before they start ascending into a pattern, now I don’t know if they can do it the other way or not, but it seems to me that they wouldn’t have any problem. As far as the environment, I think there’s enough here that are concerned about that. My concern is about the people.

There’s also another alternative, perhaps that maybe we haven’t thought about. But a few years ago the port authorities I believe bought the airport in Tooele County, and they’re also taking about expanding this. Maybe, it’s only fifteen to twenty minutes’ worth of the Salt Lake Airport. You give it some thought. There may be some extraordinary possibilities. We talked to people that live out in that area, and that airport has never been fogged in, so if we need an alternate site for landing aircraft, it would appear to me that Tooele might be that place. Thank you.”

Ms. Johnson asked for a representative of the US Army Corps of Engineers; however, none was present.
Ms. Johnson explained the Corps of Engineers was going through a public process right now associated with a 404 permit for the wetlands mitigation. She said she was not real familiar with their process but believed it's about a thirty to forty-five public comment period. She said they were a cooperating agency with the FAA.

Louis Miller, Airport Director for Salt Lake City, said "I just want to make a couple of statements relating to items that may or may not be in the Environmental Impact Statement, but I believe they are important of the public to hear, and that is that obviously the Airport Authority is definitely concerned and committed to a wetland mitigation project. There have been some statements relating to whether or not it will be successful or who will manage the project when it's complete. We will manage it, we will ensure the long term management of the wetlands we correct. That's just a statement that I just wanted to make, whether we do that personally or we hire somebody else to do that or we turn it over to another agency, we are committed to the long-term development of these wetlands. So, we feel very good about that, we will negotiate with others, we may try to find someone with more expertise than us to manage wetlands, but they will be managed.

Secondly, I just want you to know, it hasn't been brought up, the Airport Authority to date as we speak, we have spent an excess of two-million dollars in studying the environmental impacts relating to our expansion program. It's gone on for two and one half years. We take these matters very, very seriously. A lot of the comments I'm hearing tonight, this is a large document and I can understand why somebody might not find something in there, but I can assure you at least to the best of my knowledge, most of the issue that were raised tonight have been addressed in the Environmental Impact Statement and have been considered. Of course Barbara will address them again as we respond to the comments we receive tonight.

I think it is important to point out that the, Steve did in the presentation, but the airport is here to serve the public, and it's our understanding that the public wants the airport to grow to meet the demands so that the City can continue to grow and the State can continue to grow. I think we all lose if the airport stops growing. If we stop growing and don't build a runway we lose even more, because if the airplanes still continue to come it's a very negative impact on air quality. It's a negative impact on all of the resources we are talking about tonight by not having the runway. The runway is better than no project alternative. I would mention we already treat our runoff. It was brought up about glycol runoff, we already pretreat glycol operations at the airport. I don't want anyone to get the understanding that we're discharging off into the storm drains and contaminating materials, because we're not. We completed a project in the last two years, about three million dollars, to capture glycol runoff, place it in pretreatment ponds, aerate it, and then discharge it into the sanitary sewer and not into the storm sewer, and we would assume something very similar with the runway. I think that's the only comment I have. I personally want to just thank all of you for coming out and expressing your opinions relating to development of the Airport, it's something we're very proud of and I hope the citizens of the State of Utah recognize how important this airport is and we do take these matters very seriously."

Ms. Johnson instructed citizens to submit written comments to 5440 Roslyn, Suite 300, Denver, Co., 80216-6026. She said comments would be accepted through May 27, 1992. She said the rest of the process would be as follows: Issue a final Environmental Impact Statement early July, 1992, the FAA anticipated making a decision the Final Environmental Impact Statement in August of 1992.

The meeting was adjourned at 8:15 p.m.

FEDERAL AVIATION ADMINISTRATION
## APPENDIX C

### DRAFT EIS WRITTEN COMMENTS RECEIVED

<table>
<thead>
<tr>
<th>COMMENT NO.</th>
<th>COMMENTER</th>
</tr>
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</table>
| 1           | Howard S. Kutzer  
Regional Environmental Officer  
Office of Operational Support  
U.S. Dept. of Housing and Urban Development  
Denver Regional Office, Region VIII  
Executive Tower  
1405 Curtis Street  
Denver, Colorado 80202-2349 |
| 2           | James L. Dykman  
Regulation Assistance Coordinator  
State of Utah  
Dept. of Community and Economic Development  
Division of State History  
Utah State Historical Society  
300 Rio Grande  
Salt Lake City, Utah 84101-1182 |
| 3           | Mary Ward  
Melvin J. Ward  
809 First Street  
Rupert, Idaho 83350 |
| 4           | Marcus G. Theodore P.C.  
Attorney at Law  
Registered Patent Attorney  
466 South 500 East  
Salt Lake City, Utah 84102 |
| 5           | Robert E. Druchnisk  
114 Apache Drive  
Evanston, Wyoming 82930 |
| 6           | Wayne Martinson  
Utah Wetland Coordinator  
National Audubon Society  
1181 First Avenue  
Salt Lake City, Utah 84103 |
| 7           | Galey Colosimo  
Principal  
Saint Francis Xavier Catholic School  
4501 West 5215 South  
P.O. Box 16631  
Kearns, Utah 84118 |
Craiq Hayes
Regional Manager, Properties
Delta Airlines Inc.
General Offices
Hartsfield Atlanta International Airport
Atlanta, Georgia 30320-6001

Carol M. Werner
1018 South 1325 West
P.O. Box 431
Farmington, UT 84025

Washington Elementary School
First Grade Class
420 North 200 West
Salt Lake City, Utah 84203

James D. Maxwell
Resource Coordinator
Utah Association of Conservation Districts
Zone II
60 W. Gentile St.
Layton, Utah 84041

Brad T. Barber
State Planning Coordinator
State of Utah
Office of Planning and Budget
Resource Development Coordinating Committee
116 State Capitol
Salt Lake City, Utah 84114

Brad T. Barber
State Planning Coordinator
State of Utah
Office of Planning and Budget
Resource Development Coordinating Committee
116 State Capitol
Salt Lake City, Utah 84114

Don E. Ostler, P.E.
Executive Secretary
State of Utah
Department of Environmental Quality
Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114

Clark D. Johnson
Assistant Field Supervisor
U. S. Department of the Interior
Fish and Wildlife Service
Fish and Wildlife Enhancement
Utah State Office
2078 Administration Building
1745 West 1700 South
Salt Lake City, Utah 84104

Kiran L. Bhayani, P.E., D.EE., Manager
Design Evaluation Section
State of Utah
Department of Environmental Quality
Division of Water Quality
288 North 1460 West
P.O. Box 144870
Salt Lake City, Utah 84114

Additional Commenters from May 11, 1992 Public Hearing:

Fred Lewis
3011 Orchard Drive
Bountiful, Utah 84010

Clarence Wonocott
1503 Greenfield Avenue
Salt Lake City, Utah 84121

Ron Phillips
2486 Imperial
Salt Lake City, Utah 84023

Clifford Heber
West Valley City, Utah
April 10, 1992

MRS. BARBARA JOHNSON
FEDERAL AVIATION ADMINISTRATION
DENVER AIRPORTS DISTRICT OFFICE
5440 ROSLYN STREET, SUITE 300
DENVER, CO 80216

DEAR MRS. JOHNSON:

This is in response to your request for comments on the Draft Environmental Impact Statement (DEIS) for the proposed improvements to the Salt Lake International Airport.

Your Draft EIS has been reviewed with consideration of the areas of responsibility assigned to the Department of Housing and Urban Development. This review considered the impact of the new runway on housing and community development in proximity to the runway.

We would recommend that housing not be permitted in the 65 dnl noise range or higher noise ranges. We would also recommend that all residential development be prohibited in the runway clear zones. Within these parameters, we find this Draft EIS adequate for our purposes.

If we may be of further assistance, please contact me at PTS 564-3102.

Very sincerely yours,

HOWARD S. KUTZER
Regional Environmental Officer
Office of Operational Support

BARBARA JOHNSON
Environ.mental Planner
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn Street
Suite 300
Denver, Colorado 80216-6026

In reply please refer to Case No. K607

Dear Ms. Johnson:

The Utah State Historic Preservation Office received the above referenced environmental assessment. After review of the EA, the Utah Preservation Office has only one technical comment to take into consideration.

1. On page 130 of the EA, there was a statement about the use of nine artifacts in a 10 x 10 meter area to define a prehistoric site. The idea has been around for awhile, but it was never put into code and never has been used in Utah. It should be taken out of the EA.

This information is provided on request to assist the FAA with its Section 106 responsibilities as specified in 36CFR800. If you have questions or need additional assistance, please contact me at (801) 533-7039.

Sincerely,

JAMES L. DYKMAN
Regulation Assistance Coordinator

JLD:K607 FAA

Department of Community & Economic Development
Division of State History
Utah State Historical Society

NORMAN H. BAUGHER
Director
MAX J. ERASME
Assistant Director

300 ROSS GARDNER
SALT LAKE CITY, UT 84121-1162
(801) 328-5755
FAX (801) 328-4438

APR 15 1992

FAA DEN-ADO
Mrs. Barbara Johnson:

Dear Mrs. Johnson, I, Mrs. Mary Ward, own ten acres West from the Airport. The Church of Jesus Christ of Latter Day Saints, owns the land on the West side of my 10 acres, where the Church was going to let my son have 10 acres so he could drill for water, and build a home, put in trees, growing Peach, Pears, Cherries, etc. He also was given permission to grow Strawberries, etc. The only reason he didn't follow his wishes was because my husband passed away, so he dropped his plans for my land.

If you want information about the 10 acres the call the L.D.S. Church at the Presiding Bishops Office in Salt Lake, or write to the Church.

Always, Mrs. Mary Ward
Always, Kelvin J. Ward

Mrs. Mary Ward

Mrs. Barbara Johnson

Dear Mrs. Johnson:

My family and I are frequent flyers and users of the Salt Lake City International Airport. I also am a taxpayer residing in Salt Lake City, Utah. As a frequent air traveler, I am very concerned about the poor reliability of the present airport located within a swamp area, and the new runway proposed to be constructed even further into the swamp. This airport is routinely shut down by fog and inversions, and the air quality continues to degrade. The entire tenor of the report therefore focuses on cost considerations, rather than passenger safety and convenience. The 30,000 to 40,000 duck hunters can take their millions of hunting dollars to Idaho or Wyoming as this last vestige of hunting habitat is removed from Salt Lake City. However, I am not aware of any expendable Utah citizens that should have to be exposed to this unnecessary flight hazard using a runway placed further into the swamp directly under the migratory flight path of 11 million birds (Even the military pays hazardous duty pay to volunteers assuming similar risk exposures to flack). The DEIS should have dealt in more depth with the inadequacy of a single international airport serving an entire state's air travel needs regarding safety, the inadequacy of air service delivery from a single airport, and the monopoly and the effect on pricing the single Delta hub has on air service in Salt Lake City. The DEIS biased cost analysis was also flawed and failed to include the significant cost impacts of strikes, fog delays, and accident and earthquake delays in evaluating the airport expansion alternatives.

Specifically regarding your request for comments concerning the above environmental impact statement, the following environmental areas were not properly addressed:

1. The report fails to discuss the heavy ground fogs and dews which precipitate unburnt jet fuels and deposit the same over wide areas near the airport. Anyone who has left their car parked in the airport parking lot for a few days has noticed these heavy film deposits on their cars. These fogs, when coupled with the annual inversions, generally close the airport, leaving the entire state without air service. By increasing flights over the swamps and wetlands, significant increases in contamination from these unburnt jet fuels will result. No mapping of the water flows affected by the unburnt jet fuels, and the places these contaminants would concentrate in the swamps was included in the report. Consequently, no realistic cleanup costs
were included in the financial analysis regarding the ongoing clean-up measures required to remove these unburnt fuel deposits left by planes using the new proposed runway flying directly over the swamps.

2. The report fails to address the impact these unburnt jet fuels will have on the insect populations which support the birds in the swamps. Conceivably, these petroleum films could kill the entire insect larvae populations; thereby materially interrupting the food chain causing extensive damage to wildlife for which Salt Lake taxpayers would be responsible to mitigate.

3. The report fails to map the actual migratory flight paths of the birds. The eleven million annually migrating birds travel directly in line over the new proposed runway at a height of between 600 and 1500 feet on their way to the Farmington Bay Bird Refuge. The report seems to assume that these birds are destined to visit the duck clubs into the area. This is not the case. These duck clubs were established near the turn of the century to hunt low flying birds happening to settle below the migratory flight path of the birds on their way to the Farmington Bay Bird Refuge. The Farmington Bay Bird Refuge is adjacent to and just north of the Northpoint Fur & Reclamation Duck Club and is the main destination for these migratory birds. Although the impacts on the duck clubs are briefly mentioned in the report, the report fails to discuss the impact the new runway flights will have on the migratory birds visiting the Farmington Bay Bird Refuge.

4. The report does not adequately analyze the safety hazards associated with the increased probabilities of bird impacts with planes landing and taking off from the new run-way directly in line with the migrating birds' flight paths. These bird impacts will materially delay flight because of increased accidents. The report fails to include the cost of these accident delays in the cost analysis of the airport expansion alternatives. Nor have any actual flight tests during the Spring and Fall annual migrations been conducted through the new runway's projected flight path to determine the frequency of bird impacts. Without these tests, the report's conclusions regarding safety are speculative.

5. The report does not contain any provisions to warn air travelers ahead of time which flights will be using the new runway overflying the migrating bird flight paths to forewarn them of this extreme flying hazard. Those passengers deeming this hazard too severe, such as myself, should have the option of taking other flights using the old runways to minimize exposure to this bird contact hazard.

6. The report does not include a discussion of the location and the annual associated costs to maintain the new replacement 1,000 acres of wetlands with adequate drainage and water flows. Each year the duck clubs mentioned in the report expend hundreds of thousands of dollars to repair dikes, and water canals which repeatedly silt up from the slow flowing silt laden waters.

7. The report does not itemize the relocation costs to mitigate the impacts on the duck clubs in the area caused by constructing a new runway directly in line with the Blackhawk Duck Club to fly over said clubs. These costs, under a worst case scenario, would require moving the clubs into comparable new locations at a cost of millions of taxpayer dollars to replace these long held water rights, blinds, hunting areas, and cabins.

8. The report contains no discussion of the impacts the increased noise and degradation in air quality from the planes flying low over the swamps will have on the 30,000 to 40,000 duck hunters using public grounds for hunting along the Farmington Bay migratory flight path. In this regard, it should be noted that no air monitor readings were actually taken at points within the swamps, so the air modeling is at best an approximation, and at worst fails to include ambient sound waves in the modeling calculations.

9. The report's discussion of air contamination mitigation recommendations fail to consider the improvement in air quality around the airport if a second and third airport were built north and south of Salt Lake City to eliminate motor vehicle travel along the I-15 highway corridor.

10. The report fails to discuss the impact of an earthquake on the unstable sediments beneath the Salt Lake International Airport, and its effect on air service in the event of a tremor.

11. The report does not discuss the effect the rising of the Great Salt Lake will have on the Salt Lake City International Airport in the event the drainage pumps malfunction, and its impact on air service also has not been evaluated by the report.

12. The report's discussion of the technical inadequacies of the cross-wind runway options which increase flight safety and avoid the ground and air contamination of the swamps was not adequately explained in the report. This most obvious safety solution mitigating all wetland impacts on the surrounding habitat, the duck clubs, and the Farmington Bay Bird Refuge, should be more seriously explained without usage of incomprehensible FAA technical jargon. From the maps showing the incoming and outgoing flight paths, it appears that many flights actually are routed in an east/west direction. Nor is there any discussion as to whether a variance can be acquired from these regulations, if other airports are presently operating under similar exemptions.

13. The report contains no hydrological discussion of the drainage flows and speeds, and their impacts on the leaching of salts into the farm and marsh lands. Nor is their any mapping of the flow paths of fuel spills and their speed of travel of these light petroleum distillates along the canals throughout the marsh. The parties responsible for these clean up costs and the cost of the necessary standby equipment is not included in the report.

14. The report contains no discussion of the weather reliability of the third runway located even further into the swamp. This runway will be subject to even thicker fogs and inversions because of its location in a more humid area. Consequently, it is doubtful if the stated number of flights from this runway will be as great as improving the utilization of the existing runways.

In addition, the DEIS selection cost analysis regarding the various expansion options is flawed. In evaluating costs, the party who assumes responsibility for the project costs must be favored, not a third party. The taxpayer applying for financing and paying the airport construction bonds should only have to assume the minimal cost burden. However, the report recommends the most expensive cost alternative to the taxpayer to provide for future expansion. For example, in the no build scenario utilizing high speed runways and generating approximately the same
number of flights during normal flight conditions, the Salt Lake City taxpayer pays approximately $7 million dollars, and the airlines bear the costs of 13 minute flight delays, which supposedly exceed the $276 million dollar cost to build a new runway in the swamp (if this were in fact the case, the airlines themselves would pay for the cost build the new runway). However the report recommends the new swamp runway option costing the Salt Lake City taxpayer $276 million dollars, and charging the airlines nothing. The airlines are already subsidized enough. The Salt Lake City taxpayer should not have to bear 40 times the cost of an optimization expansion program which only provides a few additional flights during inclement weather conditions, and does not eliminate the problem of severe fog shutdowns.

Nor is there any reason why the Salt Lake City taxpayer should assume the entire burden of providing future air service for an entire state. Salt Lake City taxpayers should only have to pay the $7 million dollar price to optimize usage of its existing facilities. Ogden should negotiate an interlocal cooperation agreement with Hill Air Force Base for commercial use of its facilities—with the present military outbacks, domestic usage of this facility will incur its optimal maintenance and readiness in the event of emergency. A third airport should then be built south of Salt Lake to meet Provo and Orem's projected growth needs.

These optimized and additional airport facilities would provide better more competitive air service and prevent the entire state's air service from stopping when the Salt Lake City facility is shutdown by fog. They would: 1) avoid the safety hazards of forcing passengers to encounter bird impacts by flying through well known migratory bird flyways in the swamps; 2) attract competing carrier hubs to reduce prices and provide better service; 3) insure the availability of an alternative airport for Utah travelers in the event of severe weather, accident, earthquake, or strike shutdowns; 4) minimize air pollution by minimizing motor vehicle emissions from traffic driving from the Ogden and Provo areas to the Salt Lake City International Airport; 5) minimize water pollution of the wetlands and protect Utah's unique bird population; 6) avoid the relocation expenses of moving the duck clubs; and 7) minimize the financial risk to the Salt Lake City taxpayers if future flight expansion needs do not materialize.

In view of the foregoing, it is respectfully requested that additional study be carried out to address the above areas of concern.

Would you also please send me a copy of the Final Environmental Impact Statement regarding the above project.

Sincerely yours,

Marcus G. Theodore

cc: Mayor Deedee Corridin

F.A.A. Denver A.O.O.
5410 Federal Suite 300
300, Denver, CO 8023-6026

Dear Mr. Johnson & F.A.A.

The proposed 339 acre complex north of the Salt Lake International Center is a destruction of wetlands as a natural area.

In complying with Federal Law and through the development of new habitat for fast and other species, S.D.C. Int. Airport officials are violating laws of nature. The "new" habitat is no longer a natural wetlands. The interweaving of diverse food chains is not something man can duplicate effectively. Such if management of the "wetlands complex" is going to be necessary—then the project is doomed from the start.

 Destruction of the proposed 339 acres of wetlands, while it complies with Federal Law or not, is deliberate disregard of ecosystems which should be considered sacred. Not some human traditions are downright dangerous.

Sincerely,

Robert E. Drushel
Mr. Spohnheimer indicated that the new landing system technologies would not require the transmission lines to be moved out to the Alternative F position, but would be satisfactory in Alternative C position. In other words, if a new runway is built the power lines would only be needed at Alternative F position for 10 to 15 years. Alternative F would mean sacrificing wetlands when the need is only for a short period of time. Clearly, if the preferred runway alternative is accepted a full analysis must be conducted on what impacts would occur if the power lines were placed in Alternative C location. This analysis needs to include the loss of two simultaneous IFR landings for a period of 10 to 15 years, but it also needs to look at other viable options that would decrease the need for IFR simultaneous landings. Without further good in-depth analysis, I do not believe Alternative F can be viewed as needed.

Specific Comments on Mitigation Plan

1. The following statement in the Mitigation Plan in draft EIS should definitely be deleted or changed. "Although none of the wetland functions and values have been quantified except for the wildlife habitat values, it can be assumed that the mitigation wetlands more than compensate for the function and values lost due to wetland impacts on the expansion site by providing more acres of the same types of wetlands" (Page 53). This statement may be technically correct, but it is very misleading.

Table 1, in the Mitigation Plan, indicates there are direct and indirect impacts on 338.9 of wetlands. It also shows that the mitigation site will create 464 acres of wetlands, which is above the 339 acres impacted. This willingness to create increased wetland acres is appreciated. In fact, the airport and the consultants are to be commended for their efforts to establish a satisfactory mitigation plan. Technically, the statement can be made that the mitigation will more than compensate for the impacts.

But the impacts referred to are only on those 339 acres that are going to be covered over. The impacts of the expansion site will be felt over 3,000 acres of wetlands and over 3,400 acres of uplands. The impacts of the runway will include noise pollution, air pollution, pollutants from the runway going into the surrounding wetlands, putting in a concrete runway that will separate parts of the same eco-system and increased BASH concerns. The power lines that cut through prime wetland habitat will result in bird strikes but will only directly fill 13 acres of wetlands. The airport and the consultants are doing a good job of mitigating what is legally required. But what is legally
power lines. Therefore, I would like to strongly request that a public hearing be held to consider this application.

Questioning the Need for a Third Runway If We Were Truly a Sustainable Society

In my Dec. 9, 1991 letter regarding the Expanded Environmental Assessment, specific comments were raised about the need for a new runway if we were serious about creating a sustainable society. Some points are worth repeating: Projections for increased air traffic are based on current transportation modes and demands that could decrease in the future, commercial airlines use twice as much energy to move people as do passenger trains, and peak hour pricing at airports should promote more efficient use of existing facilities.

But there are other issues. We have a very exhaustible source of carbon fuels. A new runway will increase use of those fuels and encourage growing air traffic use. There are many who believe global warming is a fact and many others who believe that the possibility is so real that we must cut carbon fuel emissions. There are many legitimate proposals to increase gasoline prices to help compensate for the possible destruction that use of carbon fuels creates and to decrease current use. If proposals to raise carbon fuel prices did succeed the demand for air travel would be decreased. Furthermore, prices for carbon fuels is potentially very unstable and could increase over time due to many other circumstances. I would appreciate an analysis of projections on decrease in air travel based upon a one-fold to five-fold increase in carbon fuel prices.

A new runway would increase growth incentives for Salt Lake and the Wasatch Front. In general, this increased growth should not necessarily be viewed as a sign of developing a sustainable or healthy society. In particular, the new runway would result in major destruction of a wetland system. How often can we continue to cover over and "develop" major pieces of the Great Salt Lake ecosystem and still have it function in a sustainable way?

Impact New Technologies for Landing Systems Have on Choosing Other On-site Alternatives

On April 29, I had the opportunity to discuss landing systems with Nelson Spohnheimer, Electronics Engineer for FAA in Seattle. Mr. Spohnheimer stated that there are two major technologies that will likely be frequently used by the year 2005 or 2010. These technologies, called Microwave Landing System and Global Positioning Service, would definitely change the requirements for instrumentation landing. The next two sections indicate what those changes might mean.

Impact New Technologies for Landing Systems Have on Choosing Other On-site Alternatives

I did not ask Mr. Spohnheimer if the new technologies for landing systems would alter the requirements for separation between runways. Assume these technologies would be fully usable for simultaneous landings with runways up to 3,100 feet apart. If this assumption is made then choosing On-Site Alternative 4: Realigned Runway 16L-34R would mean that there would likely be absolutely no need for a third runway for IFR conditions after 2005 or 2010, perhaps sooner. This is very important since the draft EIS states "there is a more significant need at SLCIA to accommodate airport operations during instrument conditions" (Page 1-2).

Given these new technologies, there is a need to clearly indicate whether they would allow for simultaneous approaches if Runway 16-34R were realigned. If simultaneous approaches would be allowed, then there should be a much better analysis on the viability of On-Site Alternative 4 before 2005 or 2010 and after this time period.

In making this recommendation, I recognize that Alternative 4 would still require crossing one runway to get to the realigned runway and that there would be costs and delays associated with this. Nevertheless, I am hopeful that a thorough analysis would show Alternative 4 very viable considering the new technologies and considering that instrumentation landing is required roughly only 5% of a year.

Desirability of Transmission Line Rerouting-Alternative C, if Preferred Runway Alternative is Chosen

Alternative C was the preferred alternative prior to the relatively recent FAA's directive to move the corridor beyond the Airport's navigational cones" (EIS Page 3-7). Alternative C would be closely aligned with airport property. If a new runway is to occur Alternative C is greatly preferred over Alternative F because it means the transmission lines are not moved 1,500 feet farther west over prime wetland habitat and there would almost certainly be fewer birds striking power lines.
required does not come close to compensating for the cumulative wetland losses that would occur with a new runway and relocation of power lines.

2. This is a very technical comment: Table 2 indicates shorebird habit loss is 32.82. When I subtract 91.04 from 98.40 I get 7.36. I believe this needs correction.

3. Table 2 indicates that the projected habitat unit gains for Blue Winged, Cinnamon Teal and Gadwall are over twice what is lost. On the other hand there appears to be a 7% loss of habitat units for shorebirds and a 28% loss of Great Blue Heron.

In talking with Dusty Dunstan, one way we would strongly recommend that this shorebird habitat be increased is by not having a 3:1 slope between Mudflat and open water and Marsh and Open water. If the slope continues gradually this will allow more management options for shorebirds, as well as waterfowl. One main reason for having a sharp slope drop was to sharply curtail phragmites. But the existence of phragmites in marsh or mudflat areas would also sharply decrease the value of the marsh. Since phragmites will probably have to be actively managed for anyway, the preference is to allow for a broader range of management options by not having the 3:1 slope.

4. Using something other than angle iron in the Py Pass Canal Detail as indicated in Section B-F would be preferable so that rusting does not occur.

5. As has been mentioned numerous times management of this proposed mitigation site would be very important. Controlling water levels, assuring appropriate usage of the road, maintaining the dikes and other management techniques would help the site remain a well functioning wetland.

If the costs of a new runway are over $110 Million and it takes $10 Million to create the wetland, then a $2 Million trust fund established to help maintain the wetland over time would be the best way to assure the mitigation site functions in perpetuity. This trust fund would help ensure funding would be available for general operating expenses and maintenance as well as for major repairs.

Summary
There are many legitimate questions that need to be better answered regarding the need for the new runway and the relocation of the transmission lines. Also, there are aspects of the mitigation plan that can be improved if the new third runway is built.

Thank you for the opportunity to comment on this application. I would welcome the invitation to provide more information and/or to work further on the recommendations made in this letter.

Sincerely,

Wayne Martinson
Utah Wetland Coordinator

cc: Barbara Johnson, FAA
Steve Domino, SLC International Airport
Dusty Dunstan, Vice President, Audubon Sanctuaries
Catherine Quinn, Division of Wildlife Resources
Cal Haskell, Black Hawk Duck Club
Bill Kidder, Harrison Reclamation Co. and Duck Club
May 1, 1992

Mrs. Barbara Johnson  
Federal Aviation Administration  
5440 Roslyn Ste. 300  
Denver, Colorado 80216-6026

Dear Mrs. Johnson,

This letter is in response to the F.A.A.'s draft of the environmental impact statement for the proposed runway at the Salt Lake International Airport. During the scoping process for this report, our school was asked to state our concerns about the runway project. We responded by listing three basic concerns that included safety, sound and economic issues. (A copy of the letter submitted that more fully explains our position has been enclosed)

From our reading of the D.E.I.S., no investigation was made regarding our concern for the safety of our children or the economic impact the new runway could have on our school. The study does have an exhaustive section that examined the issue of sound and at this point we are satisfied that this concern has been studied by the F.A.A.

We do not understand why the F.A.A. will not examine the other two issues. You must realize the anxiety we feel about a new runway whose airspace will be almost directly over our heads, especially in light of the 1987 mid-air plane collision. Would you please consider studying the other two issues? It may be that the new runway poses no safety hazards relative to Airport #2. Our point is that we should know for sure through the E.I.S. that this is the case. And if it is not, then steps should be recommended to insure safety.

As for economic impact, please be aware that we are a private school that depends solely on tuition and fundraisers to survive. Therefore, maintaining a marketable image in the community is essential. We feel the 1987 plane collision and the new runway proposal damage the school in a way that affects its financial viability. Should some renumeration by the F.A.A. and/or the Airport Authority be made as a fair acknowledgement of these circumstances?

Would you please consider studying both of these issues in your final E.I.S.? Thanks for allowing us to voice our concerns. We look forward to the final E.I.S.

Sincerely,

Galey Colosimo  
Principal
Mrs. Barbara Johnson  
Federal Aviation Administration  
5440 Roslyn Ste. 300  
Denver, Colorado 80216-6026

Dear Mrs. Johnson,

St. Francis Xavier Regional School is located at 4420 west and 5215 south in Kearns, Utah. The new runway being developed by the Salt Lake International Airport will be located at approximately 4200 west and North Temple. A second smaller airport, called Airport #2, is located at 7400 south and 4600 west. The immediate concern that we have about this proposed runway relates to our school being located directly between these two airports.

What makes our concern real and legitimate for consideration by the FAA is a mid-air plane collision that occurred directly over our school on January 15, 1987. The accident happened when a Skywest commuter plane collided with a single-engine aircraft practicing takeoffs and landings from Airport #2. Ten people were tragically killed by this accident, six of them died on or around the school property. During the course of the disaster our school was converted into a command post for the various official agencies while our fourth grade classroom served as a temporary morgue. Our children suffered emotionally from this accident and are still affected by the tragedy.

The three major issues that concern us are safety, sound and economic impact and are discussed below;

Safety

The safety of our children as well as the entire west side community of Salt Lake City is of paramount importance in the development of this new runway. In your Environmental impact statement, will you please consider the following questions:

1. Will another major airline enter the Salt Lake area with the completion of the new runway?  
2. If another airline enters the Salt Lake market, will traffic increase at Airport #2 as smaller aircraft are forced out of the Salt Lake International Airport?  
3. Are the safeguards which were installed after the 1987 accident, primarily terminal control, enough to ensure proper safety now that the new runway is even closer to a much busier Airport #2?  
4. Should a tower be built at Airport #2 to ensure the proper communications between the two airports?  
5. Should Airport #2 be moved to reserve the entire corridor of the Salt Lake Valley for the major aircrafts landing at the three runways?

Sound

There are nine schools, including ours, in the Kearns area alone which are located within four blocks of the airspace for the new runway. Our questions for EIS consideration are as follows.

1. With regards to takeoffs and landings, how will the new runway proposal adjust for the increased volume of noise?  
2. Is our school far enough away from the airport so that noise will not be a major factor?  
3. We have been told by the Salt Lake Airport Authority that the new stage three aircraft eliminates noise as a major factor for airport neighborhoods. Critics of the airport, however, say that although the stage three aircraft is quieter, it is certainly not quiet, especially for those directly underneath the runway's airspace.

Economic Impact
St. Francis Xavier Regional School is a private, Catholic school that receives no funding from any educational agency. We operate entirely on income from tuition and our various fundraisers. Unlike a public school, there is no guarantee that we will remain open from year to year. Our only financial security is in developing an attractive educational opportunity and then successfully marketing our product to the community.

The image of any private school in a community is critical to its survival. A private school must carefully construct its image so that people see it as a viable alternative for parents looking for something other than what the public schools can offer. We have spent the last five years trying to make our educational product more famous than the tragedy of the mid-air plane collision. To this day, people commonly become acquainted with St. Francis Xavier School by their association with the 1987 accident. This issue has had an impact on our financial security. The questions we have for the EIS are below:

1. Does our situation, because of the 1987 disaster, merit unique consideration because of the special circumstances of the 1987 disaster?
2. How can the FAA and the Salt Lake Airport Authority work with us to help mitigate the damages that have already occurred to the school’s image as well as the threat of future marketing problems that the new runway may cause?

Thank you for listening to our concerns through this scoping process. We hope that we can work together and are confident that a positive resolution to our concerns can be created.

Sincerely,

Gale Colosimo
Principal
Mrs. Barbara Johnson  
Federal Aviation Agency  
Denver Airports District Office  
5440 Roslyn Suite 300  
Denver, CO 80216-6026

Dear Ms. Johnson:

I would like to thank you for the opportunity to comment on the Draft Environmental Impact Statement concerning the proposed expansion of the Salt Lake International Airport. I would appreciate it if these comments could be made part of the official hearing record.

I am a physician by profession and a naturalist by avocation. I have observed bird life around the Great Salt Lake for the past 14 years. I also appreciate the importance of our excellent airport to the economic well-being of Salt Lake City. Therefore I am keenly interested in seeing that airport development be done prudently and in a way that mitigates to the greatest extent any adverse impacts on wildlife.

The Great Salt Lake is a critical wildlife resource upon which millions of migratory birds and hundreds of thousands of nesting birds depend. It is also a highly variable resource that confounds attempts to set stable boundaries.

Permit me to comment specifically about the DEIS.

1. The lake level is highly variable. The attached chart from a 1975 reference shows the history of the level of the lake since 1850. I have added two recent points, one at the peak level in 1987 and one at the current level. I am presenting this because I didn’t find this information in the EIS or DEIS. I would like to point out specifically the ability of the lake to change height by as much as 10 feet in five years. The level depends on a delicate balance between evaporation and fresh water influx. We would be foolish indeed to predict the level of the lake in the next twenty or thirty years.

What about the pumps? They will help, but have their limits, too. The recent drop in the lake resulted chiefly from drought conditions and not from pumping, contrary to what is stated in the DEIS. The DEIS should give an analysis of the ability of the pumps to keep up with the historical tendencies for the lake to rise, and the expense of adding more pumping capacity in a worst case scenario. This analysis should also take into account effects of recent manmade alterations of the lakeshore, particularly by mineral extraction companies. These alterations restrict the enlargement of the lake at high water, thereby reducing the available area for evaporation, and potentially exacerbating high water excursions.

2. Floodplain classification is flawed. Floodplain and wetland inventory schemes were drawn up with more stable eastern hydrology in mind and do not readily apply to the Great Salt Lake. It would be a gamble to rely on a floodplain classification based on the 4212' peak level. The proposed runway could be inundated if the 1980-1987 scenario were repeated in the next decades.

3. Wetland classification is flawed. Although it may be in keeping with the letter of the law to classify wetland impacts according to a snapshot in time, such as the status in the past year, who knows whether in ten years the entire area of the Preferred Alternative wouldn’t become wetland acreage?

I would argue first, that the risks of losing the new runway to the ravages of the Lake have not been spelled out in the analysis of the Preferred Alternative. Second, in calculating the area of wetland losses to be mitigated, one must consider the entire area of development as potential wetland. Thus the mitigation area needs to be enlarged considerably.

I thank you again for considering these remarks.

Sincerely yours,

Carleton Detar

(See oral presentation)
FLUCTUATIONS OF GREAT SALT LAKE

Source: "Great Salt Lake, Past and Present", David E. Miller (Publisher's Press, Salt Lake City, 1977)
March 19, 1992

Mrs. Barbara Johnson
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn, Suite 300
Denver, Colorado 80216-6026

Dear Mrs. Johnson:

We have reviewed the Salt Lake City International Airport Expansion, Salt Lake City, Utah.

We have no comments.

I appreciate the opportunity to review and comment.

Sincerely,

[Signature]

FRANCIS T. MOLT
State Conservationist
MEMORANDUM FOR: David Cottingham
Ecology and Environmental Conservation Office
Office of the Chief Scientist

FROM: Rear Admiral J. Austin Yeager, NOAA
Director, Coast and Geodetic Survey

SUBJECT: DEIS 9204.05 - Salt Lake City International Airport Expansion, Salt Lake City, Utah

The subject statement has been reviewed within the areas of Coast and Geodetic Survey's (C&GS) responsibility and expertise and in terms of the impact of the proposed actions on C&GS activities and projects.

A preliminary review of C&GS records has indicated the presence of no geodetic control survey monuments in the proposed project area.

For further information about geodetic control monuments in areas adjacent to this project, please contact the National Geodetic Information Branch, N/CG174, Rockwall Building, room 24, National Geodetic Survey Division, NOAA, Rockville, Maryland 20852, telephone 301-443-8631.

cc: N/CG1x32 - R. Cohen
N/CG17 - J. Spencer
N/CG23x1 - R. Fisher

May 19, 1992

The Department of the Interior (DOI) has reviewed the Draft Environmental Impact Statement (DEIS) for the Salt Lake City International Airport, Salt Lake County, Utah and has the following comments.

Fish and Wildlife Resources

Previous comments provided by the Fish and Wildlife Service (FWS) on major issues have been addressed in the DEIS. However, the following concerns regarding the mitigation site need to be addressed in the Final EIS (FEIS). Appendix C, Section A.1, "Hydrology" indicates that water to maintain the wetland mitigation site is available for the life of the project. This water supply should be guaranteed by some form of contractual agreement, deed, or water right. The agreement should be recorded and in place before any project construction begins. Also, Appendix C, Section E, "Wildlife" indicates that monitoring of the wildlife populations on the mitigation site will be the responsibility of the Corps of Engineers, Utah Division of Wildlife Resources, or FWS. We suggest that various nonprofit, environmental protection organizations (such as the Audubon Society or The Nature Conservancy) also be considered as potential monitoring entities.

Mineral Resources

Mineral resources are not mentioned in the DEIS. DOI recommends that impacts on mineral resources be discussed in the FEIS in the same manner as in the January 1992 Salt Lake City International Airport Master Plan Update. A discussion of the availability of construction materials for the proposed project, and the resultant impacts to other customers, should also be included. This could be accomplished by conducting an assessment of the...
ability of local aggregate producers to supply the proposed construction needs with existing resources or with those available from planned expansion.

Hydrologic Resources

The proposed capping of wells at the northern end of the proposed runway will not increase the rate of flow in nearby wells, but it will increase the head in the nearby wells. (The rate of flow out of an artesian flowing well is controlled by the transmissivity of the aquifer, not by the potential head above land surface.) Nonetheless, even though the flow in the nearby wells will not be increased, consideration should be given to capping all flowing wells on airport property in order to reduce waste of the groundwater resource.

Sincerely,

Robert F. Stewart
Regional Environmental Officer
May 22, 1992

Mr. Craig Sparks, Supervisor
Utah/Wyoming Section
Denver Airports District Office
Federal Aviation Administration
5440 Roslyn St., Suite 300
Denver, Colorado 80216-6026

Dear Mr. Sparks,

The Wasatch Front Regional Council is pleased to respond to your letter of April 28, 1992, wherein you requested our comments on the Draft Environmental Impact Statement (DEIS) for proposed expansion of the Salt Lake City International Airport (SLCIA). We have been part of the technical committee for the Master Plan and have had an opportunity to review both the Airport Master Plan and the DEIS.

Based on our involvement to date, and our review of the DEIS, the population and employment projections used as a basis for aviation and motor vehicle traffic predictions are consistent with those we have used for regional transportation planning. The selected enplaned passenger forecast (SLCIA Master Plan, Pg 3-21) is based on the same projections. The DEIS assesses no significant difference between aviation activity levels and ground traffic projections across alternatives, except for ground transportation within the airport due to internal interactions. We concur with that assessment. In the case of SLCIA, Vehicular Miles Travelled (VMT) and total air operations are essentially proportional to public demand for commercial air service and are relatively independent of the alternatives under consideration. Therefore, we support the projection that aircraft operations would increase to approximately 96% of the preferred alternative should the no action alternative be adopted.

The Region has not yet attained NAAQS levels for Carbon Monoxide (CO), Ozone (O₃), Respirable Particulate Matter (PM₁₀) and Sulfur Dioxide (SO₂). Aircraft activity at SLCIA contributes only to the first two, plus Nitrous Oxides (NOₓ). Since SLCIA lies in an area compliant with NAAQS NOₓ standards, only the Prevention of Significant Deterioration (PSD) provisions apply. The DEIS data indicate that the aircraft contribution to CO levels at SLCIA is particularly sensitive to ground delays. Since most delays occur during Winter IFR operations when temperature inversions prevail, measures which reduce ground delays, such as the preferred alternative, show excellent potential for improving air quality. By 2006, the preferred alternative also allows for a 28% reduction in total airborne Hydrocarbons, which function as O₃ precursors. Achievement, largely through reduction in ground delays, could significantly improve local air quality.

Under all of the alternatives, automobiles contribute most significantly to the two pollutants where the Region is non-compliant with NAAQS. In addition to mitigating measures proposed by SLCIA, there are Metropolitan and Regional initiatives under investigation which might further offset the effects of growth at SLCIA. Some of these are: improved urban mass transit, a light rail system linking SLCIA with downtown, increased regional use of alternative fueled vehicles. Again, we believe that VMT are essentially proportional to public demand for commercial air service, and that the airlines will try to meet that demand within the constraints of safety and profitability.

We concur with the Airport District Office assessment that an overall improvement in air quality, leading toward attainment of NAAQS at SLCIA, is likely when comparing the preferred alternative with the no-project alternative. This is based on the following DEIS projections for SLCIA:

- a 36% growth in total air operations from 1991-2006, with air carrier operations increasing 53% and commuter/air taxi operations growing 25%.
- a decrease in total aircraft emissions from the 1988 baseline (adjusted for more appropriate background levels) through the introduction of more efficient, lower polluting aircraft types and reduction of ground delays.
- mitigation of on-airport vehicle emissions through design and operational improvements, such as alternative fuels, more efficient routing, and improved parking facilities.

Assuming these projections prove accurate, adoption of the preferred alternative will allow SLCIA to meet the expected growth in operations with a relatively insignificant impact on air quality.

Sincerely,

Wilbur R. Jeffries
Executive Director

BB/BB/sg

cc: SLCIA (S. Domino)
RE: Draft Environmental Impact Statement for SLC International Airport Expansion

Dear Mrs. Johnson:

Please accept this letter as the written comments of the Westside Associated Duck Clubs & Wildlife Refuge, Inc. in regard to the above-referenced draft EIS and our request for a copy of the Final Environmental Impact Statement when it is completed.

As I stated at the public hearing which was conducted in Salt Lake City on May 11, 1992, I believe the draft EIS fails to address a potentially devastating wetlands issue, to-wit: the effect of the new runway on downstream wetlands. This failure to provide a solution to the problems associated with the lack of a control structure at the confluence of the Surplus Canal and the Goggin Drainage canal could have a much greater wetlands impact than the 340 acres being displaced by the new runway.

It is our position that unless the FAA, in connection with the development of the mitigation area, puts in a new structure which will allow control for the amount of water going down the Surplus Canal, the Section 404 permit requested of the Army Corp of Engineers should be denied.

In connection with the proposed mitigation area, I also believe the draft EIS failed to adequately consider alternatives which would eliminate the need for purchasing the land to be used for mitigation. There are literally thousands of acres of private land within the various duck clubs that make up the Westside Association that could be developed in lieu of creating a whole new wetlands area. There are two distinct advantages to this alternative. Most if not all could be developed with considerably less money and the ability to manage these new areas is already in place.

The development of currently non-wetland areas within the various duck clubs would eliminate the need of purchasing the land within the proposed mitigation area. (This is assuming the land owners would be willing to sell and if they didn’t, my research to date indicates there is a serious question of whether the Airport Authority has the statutory right to condemn private lands to create a wetland as contrasted with the right to condemn to build a new runway.) There are numerous areas in the various clubs which in the past have been approved by the Corp of Engineers as potential mitigation areas for 404 permits. Thus, there is absolutely no need for the Airport Authority to purchase land when there is more than enough land available without cost and where the actual development would cost considerably less than what has been proposed.

At present the draft EIS does not adequately address the issue of who will manage the proposed mitigation area and from all indications it would appear the Airport Authority simply plans to build it and then wash their hands of it. It is obvious that it would be better to develop a wetland area that is already expertly managed than to develop an area where management of same is an issue. The clubs that make up the Westside Association have been managing wetlands for over 50 years. We have the personnel, dikes, and equipment available to insure that whatever is created will remain so long as the control structure at the Surplus/Goggin is repaired or replaced.

I would ask that these issues be adequately addressed in the final EIS and again that the undersigned receive a copy when it is completed.

Respectfully,

JOSEPH N. NEmELKA JR.
Attorney at Law

cc: Westside Board of Directors
    Lakefront Board of Directors
    Army Corp of Engineers
    Glen Marcos, SL County Flood Control

May 22, 1992
May 26, 1992

Mrs. Barbara Johnson
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn Street, Suite 300
Denver, Colorado 80216

In re: DEIS for Salt Lake City International Airport Expansion

Dear Mrs. Johnson:

This letter serves as notice that to the extent the above project is implemented and adversely impacts the North Point Fur & Reclamation Company, Northpoint Fur & Reclamation Company demands full and complete just compensation for the damages so caused to the club's hunting, occupancy, water, land, and wildlife rights.

Sincerely Yours,

E. Fred Lewis, President

EFL
cc: Mayor Deedee Corridini

May 27, 1992

Via Facsimile 303 286-5539
and U.S. Mail

Mrs. Barbara Johnson
Federal Aviation Administration
Denver Airport’s District Office
5440 Roslyn, Suite 300
Denver, CO 80216-6026

Re: Draft Environmental Impact Statement for Salt Lake City International Airport Expansion

Dear Ms. Johnson:

This office represents First Interstate Bank, Trustees with respect to property which it owns immediately to the west of the proposed Salt Lake City International Airport expansion area. Exhibit 4.3-1 of the Expanded Environmental Assessment, Current Land Use in the Airport Area, shows the property owner as Walker Bank, which is a predecessor of First Interstate Bank. As you can see from that Exhibit, the property consists of Section 24 and portions of Sections 23, 13 and 14.

The Draft Environmental Impact Statement fails to adequately address the potential effects of the proposed airport expansion on this property, and fails to specifically address how any mitigation of anticipated effects will apply to this property.

The proposed airport expansion project would have various consequences and effects upon the property, including:

1. Access.

Access to the property is presently obtained from 4000 West. The proposed new runway and accompanying facilities would appear to block that access, or the access would be terminated. The Draft Environmental Impact Statement does not indicate how alternative access would be provided to the property or whether the property would be condemned as a result of loss of access.

2. Transmission Lines.

The airport expansion project would require relocation of transmission lines. There is no discussion of the effect of
relocation of the transmission lines on to this property, compensation for easements, the effect on existing uses, and other potential consequences including preclusion of various uses.

3. Water.

Water rights are used in connection with the specified property. The Draft Environmental Impact Statement fails to indicate how possible relocation of ditches or canals will affect the availability of water to this property in the manner previously available. Also, the expansion project may also affect drainage patterns, not adequately discussed regarding this property.


Figure 3.4 of the Draft Environmental Impact Statement shows the noise contours for the preferred alternative. More than half of the property is affected by noise levels in excess of 65 Ldn, although that level might be reduced for a significant portion of the property by 2006 as shown in Figure 3.5 to the Draft Environmental Impact Statement. As stated in Section 5.0 of the Draft EIS, "According to Airport Noise Compatibility Planning Guidelines and Federal Aviation Regulation Part 150, all land uses are normally compatible with noise levels less than 65 Ldn."

Obviously, the initial projected noise levels affecting most of this property exceed the 65 Ldn level, precluding some potential uses. Again, the Draft EIS fails to specify the consequences which such impacts will have on the property.

On behalf of First Interstate Bank, Trustee, you are requested to address the foregoing issues and indicate more specifically the effects of the proposed action on the indicated property, and the manner in which the Salt Lake City Airport Authority would deal with those impacts.

Very truly yours,

MOYLE & DRAPER, P.C.

Wayne G. Petty
Barbara Johnson  
May 27, 1992  
Page 2

Domino, Manager, Planning and Environment Salt Lake City Airport Authority, indicated his belief that the Federal Uniform Relocation Assistance And Real Property Acquisition Act of 1972 authorized the use of eminent domain to acquire proposed property for mitigation. Our research and reading of that Act and the Utah eminent domain statutes does not suggest the same conclusion and we will resist any attempt by the Airport Authority to condemn Florence Gillmor's property as a site for mitigation. Her property may be desirable by the Airport Authority for mitigation, but the purpose for its acquisition does not fit the eminent domain requirements.

While we understand the time constraints and procedures which must be followed in preparation of a Draft Environmental Impact Statement, we are concerned that the FAA and the Salt Lake Airport Authority are proceeding on the assumption that the proposed mitigation site can be acquired without dealing appropriately and in a timely manner with the current property owners.

Please send me a copy of the final EIS and any pertinent information as it becomes available.

Very truly yours,

David R. Bird  
of and for  
PARSONS BEHLE & LATIMER

cc: Louis E. Miller, Director of Airports  
Russell Pack, Airport Property Manager  
Steven L. Domino, Manager, Planning and Environment  
Florence Gillmor
population of California gulls; a migration stopover of over 75 percent of the western population of tundra swan and 25 percent of the continental pintail population; the world's largest American pelican nesting colony; and the annual production of over three-quarters of a million waterfowl.

The area associated with the Salt Lake City International Airport (SLCIA) contains almost 40 percent of Salt Lake County's wetlands. About 70 percent of these are classified as first-magnitude. This means they are areas with a stable water supply, developed natural or managed marsh, and which receive waterfowl use for reproduction, migration and wintering (Evaluation of Existing Wetland Habitat in Utah; F. Clair Jensen, 1974 Division of Wildlife Resources publication). This site offers a mosaic created by the mixture of wetland and uplands that greatly increases the number of species that use the area. Shallow water areas feed shorebirds, deeper waters provide nesting and feeding areas for a variety of waterfowl, and islands and upland sites provide safe nesting areas. These areas are not easily mitigated, and, unfortunately, these habitats are being lost.

Throughout the documents published for this project, direct and indirect impacts to the wildlife resource are addressed, among which are the following:

- Destruction of about 400 acres of wetlands
- Draining of other wetlands
- Increased noise directly over remaining wetlands and within bird flight patterns
- Realignment of power lines directly over other wetlands
- Permanent loss of hunting opportunities to several clubs
- Disturbance of two endangered species (the bald eagle and American peregrine falcon)
- A BASH plan to discourage wildlife use of some areas
- Damage to wetlands from sediment and pollution contamination from construction and operation of the airport facility
- Loss of "low-disturbance" lands to "high-disturbance" lands

No-Project Alternative:

Wildlife Resource's reasons for supporting the no-project alternative include:

- Minimization of impacts to the wetlands and wildlife associated with the Great Salt Lake. The first step in mitigating impacts is avoidance. When avoidance is not possible, minimizing impacts is the next step. Of the alternatives offered, only this one would minimize impacts. Impacts to bald eagle roosting sites and peregrine falcons would be minimized through this alternative. The mosaic of wetland/upland areas would be kept in tact, and the increase in disturbance to existing areas would be kept to a minimum.
- This alternative will not require realignment of the power lines. A major concern is the increase in bird kills from collisions with the power lines, and the potential of botulism outbreaks from the decaying carcasses.
- Collisions with birds may increase because of increased air traffic, but the corridor will remain the same. A new wider corridor for approaching planes will increase the area where management of (hazing) birds will be necessary - to keep them clear of approach lanes.
- The loss of sport hunting opportunity will be minimized.
- Some of the alternatives deserve further discussion. There is some difference of opinion about the potential for routing much of the current airport traffic to other airports, such as Ogden, and Provo. By shifting use of some of the smaller aircraft, and military aircraft, a third runway may not be required.
- New landing system technology is expected within ten to twenty years. One of the reasons for the realignment location of the power lines is the interference they could cause with the planned instrumentation for foul weather landings.
- This alternative would require mitigation of some wetlands losses but they would not be as extensive as under the preferred alternative. The potential success of the mitigation would be increased greatly and the management of the mitigation site would be simplified greatly.
- Cumulative impacts of projects in the area would be reduced. This is just one of many proposed projects and developments in this area. Although there will certainly be future development in the area, the concerns with this one involve the total destruction of some key habitat, the direct impacts of the placement of the new power line, and the indirect impacts this project will have because of placement of future developments in the area.

The Division can support some growth at the SLCIA in the form of the no project alternative. DWR will be willing to work with the Airport Authority in developing a mitigation plan for the wetland destruction caused by this alternative.
Specific comments:

Page vii, 2nd paragraph: "The effects of this impact could result in the loss of..." There is no doubt that the effects will result in loss. The only question is whether or not they can be mitigated.

Preferred and Close-In Alternatives:

Concerns over the close-in or preferred alternative are essentially the same. The destruction of habitat, disturbance to wildlife, and the major role this project plays in the direct, indirect, and cumulative impacts to the area. The close-in alternative may have a few benefits over the preferred alternative as the impacts relate to wildlife -- a smaller bird strike hazard zone, impacts on a smaller amount of open space, and potentially decreased runoff into the wetlands.

The power line realignment concerns us greatly. To minimize impacts, we suggest that the wires be sheathed to increase their size, in addition to the bails that would be put on the lines as identified on 5-54. Newly fledged peregrine falcons, as well as other species, will have difficulty avoiding these lines, and all measures should be taken to avoid collisions and avian botulism outbreaks as a result of collisions.

Mitigation Site

We have been working with the Salt Lake Airport Authority and others in developing the mitigation plan should the preferred or close-in alternatives be approved. We continue to have some of the same concerns over the proposed mitigation site. The following addresses those concerns.

Based on the parameters used, the mitigation plan comes close to successfully mitigating for the direct impacts to wetlands. However, it does little, if anything, to mitigate for the indirect impacts and the impacts to non-jurisdictional wetlands and associated upland areas. These areas help create the mosaic so important to the functions and values of wetlands. In light of the above concerns, we find it hard to accept the statement on page 53 of Appendix C: Mitigation plan for wetland losses. "Although none of the wetland functions and values have been quantified except for...the mitigation wetlands more than compensate for functions and values lost..."
should be done, and who is responsible, and it should identify a budget for the area. Specific goals and objectives for monitoring, maintenance, access, and other needs should be identified in order to know when to advance to the next management phase. The revisions to the mitigation plan made for the DEIS do offer more detail on monitoring and maintenance, however, a more detailed plan needs to be developed before acceptance of the mitigation proposal.

This meeting could also facilitate identifying the long-term manager of the area. The Audubon Society and the Division of Wildlife Resources have expressed interest in managing the area. The idea behind the management plan is to direct the managing entity to be sure that the area will meet public and agency expectations, as well as requirements of the mitigation site.

Budget.

The Airport Authority or FAA should fund the construction and developmental phase of the mitigation site and be directly responsible for this phase in its entirety (with adequate review by agencies to assure progress). Responsibilities would include budget, management, monitoring, assessment, and possible reconstruction. Upon acceptable completion of the developmental phase, the area could be turned over to a manager with budgeting from a trust fund established to continue operation and maintenance of the area. The trust fund is the critical link back to the FAA or Airport Authority for their continued responsibility and involvement in the mitigation site. The amount of the fund must allow for day-to-day management to be paid from the interest received and should grow or be enough to handle any major reconstruction or repairs.

404 Permit

The 404 Permit should not be issued until legally binding documentation committing the necessary water is received from the applicant, and it is guaranteed that the water is allowed to be used to sustain the mitigation site.

The Permit should be conditional upon the stipulation that a management plan as, as identified above, be developed and approved by appropriate entities by a specific date. With the management plan in place, the question of who is to manage the area is less critical as the plan will dictate a long-term management strategy. A team made up of representatives from the Corps, USFWS, DWR, Airport Authority and other appropriate groups should be established to continue oversight of the management and development of the mitigation site.

Other conditions of the permit should include long-term financial commitment from the applicant for the mitigation site and sheathing and banking of the power line.

BASH

We would like to reiterate that, even though the BASH plan seems to address the concerns, the expansion of the airport runway system will cause a variety of unknown factors to come into play and may require an ecological study. With potential changes in a number of factors that could affect bird movement and perhaps bird strikes, the Division wants to maintain its involvement in changes that will be necessary to accommodate a safe air traffic environment.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this correspondence to the Utah State Clearinghouse at the above address, or call Carolyn Wright at (801) 538-1556 or John Harja at (801) 538-1559.

Sincerely,

Brad T. Barber
State Planning Coordinator

BTB/rpj
As you know, the obligation of the SLCAA and FAA in meeting the objectives of the 404(b)(1) Guidelines is to sequence its wetland mitigation action, minimize avoidance, mitigation, and then to provide adequate compensation for functional replacement of wetland values. Mitigation should be sufficient to provide functional replacement of values "with an adequate margin of safety to reflect the expected degree of success. According to the Memorandum of Agreement between the EPA and the Corps of Engineers in this regard, a minimum replacement on 1-for-1 basis on acreage is appropriate unless the functional value of the wetland losses are low and the likelihood of success of mitigation is high. Neither of the latter conditions appear to be present for the proposed runway expansion area and wetland mitigation area northwest of SLCAA. According to the draft EIS, the proposed mitigation area may result in an increase in habitat values (HUs) over the losses at the impacted areas for the mitigation plan should "717 HUs may be developed at the mitigation area without trees - 800 HUs if trees are planted - versus 503 HUs lost in the runway expansion area.") The proposed mitigation plan, if successful, appears to offer about 1.4-for-1 replacement values considering about 465 acres of created wetlands versus 338 wetlands lost at the expansion area. A 1-for-1 mitigation ratio is acceptable when former wetland areas are to be restored, but a ratio of 2-for-1 is appropriate when mitigated wetlands are to be created, as proposed, in order to compensate for uncertainties in mitigation success. The ability of SLCAA to "bank" what it now considers excess wetland habitat at the mitigation area has yet to be established and may not be appropriate in these circumstances. Consequently, EPA suggests that the final EIS include an alternative action plan that provides for 2-for-1 replacement for created wetlands.

In addition, means to improve the certainty of success of the proposed mitigation plan, for example, precluding development of wetlands to prevent stagnant water conditions leading to potential outbreaks of avian botulism, the firm agreement of an appropriate public entity to operate the proposed wildlife management area in perpetuity, and the air quality analysis to reflect recent changes in the Clean Air Act for the conformity determination to be made by FAA.
Another issue that FAA will need to address in the final EIS is the requirement that the project be analyzed for conformity with the State Implementation Plan (SIP) promulgated under the 1990 provisions of the Clean Air Act Amendments. The revised Clean Air Act requires that federal actions must be in conformity with objectives of the SIP to eliminate or reduce the severity of violations of National Ambient Air Quality Standards in the area where the project is in a non-attainment area for certain standards, an updated conformity analysis will be required. (See our attached detailed comments on needed air quality analysis.)

The draft EIS does not specify the amount of the proposed increase in aviation traffic that would be associated with air carrier hubbing operations independent of origin and destination passengers to and from the Salt Lake City area. The draft EIS indicates that increases in operational forecasts could amount to an increase of 49 percent in annual operations by 2006. With the now certain expansion of Denver International Airport (DIA), expected to begin operations in late 1993, and the proposed expansion of the adjacent Front Range Airport to handle additional regional air cargo hubbing operations; the need for increase airfield capacity to accommodate regional hubbing for air carriers operations at SLCA should be reassessed in the final EIS. This analysis should use the latest information from the likely air carriers as to their intent for expanding hubbing operations at SLCA.

According to the procedures EPA uses to evaluate the adequacy of EISs, the Draft EIS for Salt Lake City International Airport Expansion, Salt Lake City, Utah, will be listed in the Federal Register in Category EC-2. This means EPA has some environmental concerns regarding the uncertainty of success of the proposed wetland mitigation plan and seeks additional information in the final EIS as noted above. Thank you for the opportunity to comment on the draft EIS for the proposed expansion of Salt Lake City International Airport. Please contact either Mark of our staff at (303) 282-1439 regarding NEPA compliance or Bob Hairley of our staff at (801) 293-1352 regarding wetland issues.

Sincerely,

Robert R. DeSpain, Chief
Environmental Assessment Branch

Enclosure

c: Steve Domino, SLCAA, Salt Lake City
Brooks Carter, Corps of Engineers, Salt Lake City
Catherine Quinlin, Utah Dept. of Natural Resources, SLC

Detailed Comments by the Region VIII Office of the U.S. Environmental Protection Agency

Draft: EIS for Salt Lake City International Airport Expansion
Salt Lake City, Utah

Wetland Mitigation

The proposed wetland mitigation actions are not necessarily actual mitigation commitments. Some of the proposed mitigation measures have suggested options. The specific commitments need to be further defined. The actions to be taken by SLCAA need to be committed activities so that the planned mitigation actions are enforceable. We recommend that FAA and the Corps of Engineers work out a joint process of 404 permit obligations completion to assure that the proposed wetland mitigation plan.

The draft 404 permit has provided a determination of the number of acres of waters of the United States that will be lost or adversely affected and this process is appropriate for compliance with the 404(b)(1) Guidelines. However, EPA disagrees that the Federal 'no-net-loss' policy applies only to jurisdictional wetlands. For example, the public interest review conducted as part of the 404 permit process can consider 'no-net-loss' for all wetlands as well as other habitat types. NEPA requires at least the identification of mitigation for all impacts, even insignificant impacts. In addition, we are concerned about the need to assess the value of wetland complexes rather than individual wetlands. There is a need to assess the quality, function, and value of wetlands according to their associated complexes. Further, if some of the wetlands in the project are less than one acre, and thus not jurisdictional wetlands under the 404 permit process, losing these wetlands could still represent a loss in terms of wetland functional value. We suggest consideration of replacing some scattered, smaller wetlands within the mitigation area to replicate the scattered wetland conditions in the runway expansion area to achieve better functional value of the wetland replacement in larger wetlands as proposed. This concept may also aid in improving the expected net deficient in shorebird habitat units. If the FAA does not intend to provide wetland mitigation of all wetland types, the final EIS should provide the rationale for not doing so.

Water Quality

The settling pond discussion indicates the ponds will be periodically dredged. Since slurry is designed to control pollutants, the dredged materials are likely to be polluted. An acceptable disposal plan for the dredged materials needs to be developed and committed to. Some analysis of the settling capability needs to be conducted to ensure that the settling
ponds do not discharge so quickly that they defeat their purpose. The project needs to be required to meet all existing State water quality standards. A concern that state standards will be maintained needs to be added. It is also noted that settling ponds, to be installed at a number of locations, the surface water will be discharged from the airport property, will be designed as dry ponds to reduce the attraction to birds. Sufficient detention time, over 24 hours, is needed to provide for settling to occur so that the discharge of these settling ponds should not occur immediately after storm events. The Airport Authority has recently installed a new stormwater treatment facility for stormwater contaminated with de-icing agents. However, a centralized de-icing facility and its associated recycling and recovery operations may well be cost-effective for the Authority by reducing sewage effluent charges. Such a facility would further reduce the risk of groundwater contamination from ethylene glycol agents. It is noted that the City of Denver intends to construct a centralized de-icing facility at its new airport. Contact with their planning department might be useful for the SLCAA in this regard. What is the status of the planning and commitment of a central de-icing facility?

Air Quality

EPA had significant concerns with the adequacy of the air quality analysis provided in the sponsor’s Expanded Environmental Assessment (EXEA) for the project, and with the outcome of that analysis. Since additional analysis has been provided, and based upon further discussions with FAA and the project sponsors many of our concerns have been adequately addressed.

EPA’s principal concern was that the EXEA documented adverse air quality impacts. It showed that emissions of carbon monoxide (CO) and volatile organic compounds (VOC) from the facility were higher in the build scenario than in the no-build scenario, and modeling showed violations of the CO standard near the facility in either scenario for both 1996 and 2006. EPA was further concerned that the emissions estimates presented in the EXEA were based on modeling that did not account for emissions factors, contrary to the requirement of Section 176(c)(1) that determinations of conformity be based on the most recent estimates of emissions. Finally, EPA was concerned that assumptions regarding traffic impacts were not supported, and traffic impacts were not considered. Our earlier comments are detailed in a letter to FAA dated March 24, 1992.

These comments were discussed in a meeting with FAA and the Salt Lake City Airport Authority (SLCAA) on April 19, 1992. Utah Division of Air Quality staff also participated in the meeting via speakerphone. In that meeting, FAA and SLCAA provided additional information which addressed most of EPA’s concerns. SLCAA representatives indicated that the emissions estimates for the facility summarized in the EXEA were in error. Corrected estimates were provided indicating that air quality impacts would not occur in the build scenario for both 1996 and 2006, eliminating the previous concern of finding of conformity. This, in turn, partially addresses EPA’s concern that outdated emissions factors had been used; while newer emission factors would improve the accuracy of the estimates in an absolute sense, they would not change the outcome of the analysis, i.e., that emissions are lower in the build scenario. In addition, a regional-scale air quality analysis of the airport emissions impact is no longer necessary to determine the impact of the project on the ability of the area to attain and maintain air quality standards, again because emissions are projected to be lower for the build scenario than for no-build.

EPA’s other major concern was that the modeling for the project showed violations of the CO standard near the airport under either build scenario. EPA attempted to address this concern with modeling which modeled Section 176(c) that FAA can provide conformity if its approval of the project itself will not exacerbate existing violations, cause new violations, or delay attainment of the National Ambient Air Quality Standards (NAAQS) pursuant to Section 176(c)(1)(B). In this case, the airport expansion can be found to conform even with modeled violations, because the modeled concentrations are lower for the build scenario than for the no-build scenario. Expansion of the airport to reduce delays reduces overall CO emissions, and this in turn produces a localized air quality benefit.

EPA was also concerned with the accuracy of the modeling results in question, because the modeling relied on outdated emissions factors and on a background value that was lower than the CO standard. To address this concern, FAA and SLCAA have agreed to revise the modeling analysis using up-to-date emission factors and a more realistic background value. The modeling will further refine the modeling for the project's impact on the airport, including the impacts of aircraft, and the modeling results in progress and should be presented in the final EIS. In particular, the impacts of the vehicle inspection program may not have been properly accounted for in the previous analysis. The regional impacts were not assessed in the final EIS needs to provide these latest vehicle inspection inputs into the MOBILE emissions factor model.

EPA was concerned that the analysis assumed similar levels of traffic in any scenario without any supporting documentation (See 1996 Section 161 of the EXEA), and did not discuss regional population or vehicle miles travelled (VMT) impacts. EPA has also found that this assumption of similar traffic levels in the air quality
section of the EEXA is contradicted by page 174 of the EXEA, which indicates that traffic is expected to increase on three local roads under the build alternative. The Salt Lake City area experiences regional-scale nonattainment of the ozone and particulate matter (PM10) NAAQS, and increases in VMT due to direct and indirect employment increases related to the airport expansion could exacerbate these problems.

At the April 15 meeting, FAA agreed to consult with the Wasatch Front Regional Council (WFRC), the Metropolitan Planning Organization for the Salt Lake City area, and obtain their approval of the traffic assumptions and estimates used in the analysis. If WFRC agrees with the determination that traffic (VMT) levels are the same in any scenario, no further analysis of this issue is necessary for purposes of a finding of conformity. However, if VMT increases in the region are expected as a result of implementation of the preferred alternative, the emissions impacts of these increases must be quantified and mitigated. **Noise Analysis**

The noise analysis is effectively accomplished and well summarized in the draft EIS. The basic conclusions are that three homes would have increases in noise levels since they would then lie within the 70-75 Ldn contour interval after the preferred runway expansion alternative is operational. These and other residences will be relocated according to Part 150 procedures. According to the draft EIS, the local land use planning of vacant lands indicates that future development will be limited to compatible uses as most of the undeveloped lands within the 65 Ldn noise contours are currently zoned for industrial use. Therefore, the draft EIS concludes, no changes of local zoning are necessary. We have several suggestions regarding these conclusions. First, residential noise complaints are not necessarily limited to residences with the 65 Ldn interval. Consideration should be given to zoning for non-compatible residential uses in vacant land out to the 60 Ldn contour for these reasons. Such zonings have been affected by Adams County and the City of Aurora for vacant lands surrounding the Denver International Airport and the City of Denver is planning to acquire the residential property right within the 65 Ldn to assure lack of conflict if local zoning were amended. Second, the dramatic decrease in the noise contours in the future as a result of improvements in the aircraft fleet mix may tempt local land use authorities to downzone in anticipation of such reduced noise impacts. We suggest that such downzoning not be considered until the noise reductions have actually occurred. The final EIS could indicate the local land use planning authorities intentions in this regard.
After review of the DEIS the following comments are being provided which pertain to the relocation of 4.9 miles of Utah Power’s transmission lines.

Pg. 3-8, Alternative F
1) All references to islands should be changed to read “peninsulas.”
2) The wording in the last couple of lines should be changed to read “Of the 178 acres required for the right-of-way only 13 acres of COE jurisdictional wetlands would be directly impacted. The COE requested a variation of this alternative be considered that would place the transmission lines further west of Duchesne Lake.
3) The Duchesne Lake variation would impact 3 not 4 more acres of wetlands.

Pg. 3-9, last paragraph
1) All references to islands should be changed to read “peninsulas.”
2) The sentence which reads “Islands would be 275 feet by 50 feet,...” should be changed to read “Peninsulas would be 275 feet long by 50 feet wide at tangent locations and 100 feet wide at angle locations. The peninsulas would be constructed to an elevation of 4212 feet and would be spaced at approximately 600-foot intervals with maximum lower elevations of 4330 feet.

Pg. 5-3, Preferred Alternative
Delete the words “a power” and insert “an electrical” before the word transmission in the first sentence.

Pg. 5-11, Duck Clubs
The DEIS states that “hunting would not be permitted across the corridor.” Utah Power has previously stated to the duck clubs that it would allow hunting across the corridor. The terms contained in the right-of-way easements prepared by Utah Power also don’t prevent hunting by club members. If the airport authority precludes hunting as a provision of their corridor easement or purchase acquisition, then that should be stated. However, Utah Power doesn’t intend to regulate hunting within the corridor.

Pg 5-31, Bird-Powerline Strike Potential
1) In the first sentence the reference to “islands” should read “peninsulas.”
2) The second paragraph should have “shield (uppermost)” inserted before the word “wires.”

Pg. 5-34 Mitigation
The paragraph which describes the proposed powerline marking techniques needs to be rewritten. The technique of using 12” as well as 9” aerial marker balls has been used effectively in various locations by utilities to reduce bird line strikes. The static or shield (uppermost) wires of various voltage powerlines have been marked with different colored balls or marking devices at staggered intervals in recent line-strike studies. Utah Power utilizes the 9” ball instead of the 12” ball due to additional wind and ice loading problems associated with the larger diameter balls. Recent bird-powerline collision studies have determined that utilizing yellow colored marking devices is preferred because yellow is more visible under low light conditions. Study results and Utah Power’s experience in marking lines suggest that 9” yellow marker balls be placed on the static wires of the various lines. The balls would be placed in a zig-zag pattern staggered at approximately 150’ spacing. (Attached is a figure which shows Utah Power’s proposed marking plan.)

Pg. 5-35 Mitigation
The DEIS references the publication “Suggested Practices for Rapture Protection on Powerlines, the State of the Art in 1981.” Rapture should read Raptor.

Pgs. 5-49 and 5-55 Air and Water Quality
1) The requirement to cover trucks hauling fill will increase the cost to construct the access road and peninsulas. Cost estimates provided do not reflect this increased cost.

Pg. 5-51 Bird-Powerline Strike Potential
1) The reference to “islands” in the second paragraph should read “peninsulas.”
2) Rewrite the proposed line marking as proposed in the comments for pg. 5-34.
3) Replace the word Rapture with Raptor in the fifth paragraph.

Pg. 5-52 Threatened and Endangered Species
1) Rewrite line marking section as previously mentioned (see pg. 5-34 comment).
2) Suggested practices for “Rapture” protection should read Raptor.

Pg 6-1 Land Use Compatibility
1) The relocation of the transmission lines across the Harrison Duck Club will not limit hunting near the corridor unless required by the airport authority.

Figures (See attachments)
1) Figure 3 should show the shield wire support arms on the 345 and 230 kV structures as shown on the corrected figure drawing enclosed.
2) Sheet 2 shows wetlands at station 324 + 49.69. The original COE jurisdictional wetland maps did not show this area as wetlands and was not included in the direct impact calculation for fill materials in wetlands.
9" Yellow Aerial Marker Balls will be installed on the shield wires of the lines relocated for the SLCAA Airport Expansion. The 9" Yellow Marker Balls will be installed on the shield wires (the small uppermost wires) of each line as shown. The larger phase conductors will not be marked.

Utah Power and Light
Airport Relocations

Typical Shield Wire Marking with
9" Yellow Aerial Marker Balls
- No Scale -
Dear Mrs. Johnson:

This is in response to the Federal Aviation Administration’s request for comments to the "Draft Environmental Impact Statement for Salt Lake City International Airport", dated April 1992. The ATA and its member airlines serving SLCIA reviewed the DEIS, and generally concur with the environmental findings.

The preferred alternative for a 12,000 x 150 foot runway located 6,155 feet west of existing Runway 16R/34L will meet future airport demand and result in improved operating efficiencies during both VMC and IMC weather conditions. Overall delay reduction benefits are estimated at 30,000 hours per year for the first ten years, and 61,000 hours per year thereafter, based on forecasted operational demand. This improvement in efficiency will be a significant benefit to the estimated 11 million annual enplaned passengers that are forecasted to use the Salt Lake City International Airport by the year 2005.

Sincerely,

John E. McNamara
Director
Mrs. Barbara Johnson
Federal Aviation Administration
Denver Airport District Office
5440 Roslyn Suite 300
Denver, CO 80216-6026

Dear Mrs. Johnson:

Thank you for this opportunity to comment on the Draft Environmental Impact Statement. In my brief review of the impact statement, I was impressed at how many concerns related to wetlands mitigation and raised in public comment on the Environmental Assessment had been addressed in the EIS.

I am unable to comment on how effective the mitigation efforts will be; I suggest, however, that the Airport Authority commit to follow up to monitor habitat gains or losses beyond the expansion and mitigation areas so that unexpected impacts or losses of wetlands beyond those estimated can be mitigated also. For example, if interruption in groundwater and changes in irrigation patterns result in the loss of habitat, I believe the Airport Authority should be prepared to invest in additional mitigation, even though this may go beyond what is required. The various statutes and regulations relating to wetlands are a guide to preserving wetlands or mitigating unavoidable losses. My hope is that the FAA and the Salt Lake City Airport Authority are committed to the value of wetlands and not just to observing the letter of the laws and regulations that apply.

My primary concern with this process is that I do not think the Environmental Assessment and the Draft Environmental Impact Statement focus on broad enough issues and areas. I believe that the developments proposed by the City of Salt Lake, of which the SLCA expansion is a part, should have been included. The fact that no impact statement or a separate impact statement will be prepared for each project makes the process piecemeal. Why should this be if Salt Lake City is the responsible party in all projects? The cumulative impacts of these various developments along the Wasatch Front of the Great Salt Lake will not be adequately assessed. It is impossible to put aside the suspicion that this was Salt Lake City's intent.

Others in the community with far more insight and understanding of the issues will be reviewing the EIS. I leave to them the more detailed comments on the effectiveness of impacts and mitigation.

Sincerely,

Edie Trimmer

cc Salt Lake City Mayor's office
Salt Lake County Commission
Unburnt jet fuel will make breathing difficult and leave a film of grease and dust on everything left outside at the airport.

The environment is another problem of the expansion of the airport. If a new runway is built, it will destroy over 1,000 acres of wetlands, and as stated above be in the flight path of 11 million birds. The pollution from the airplanes on the runway destroys the waters surrounding it, causing the insects to die and leaving a gap in the food chain.

It was also said that more flights could be made, but due to being built in an even more humid area has proved to be untrue. Bringing more industry to Utah was another statement made for building a new runway. Why not build another airport in Bingham City or Ogden where all of our industries really are?

Enclosed is a petition containing 94 signatures of people who oppose the airport expansion project.

Sincerely yours,

Mary Theodore
Anne Fratto
Karen Green

cc: Mayor Deedee Corridini

May 14, 1992

Mrs. Barbara Johnson
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn Suite 300
Denver, Colorado 80216

Dear Mrs. Johnson:

Delta has reviewed the draft environmental impact statement (DEIS) for Salt Lake City International Airport expansion dated April, 1992.

We concur with DEIS findings generally for the third runway at Salt Lake City International Airport and specifically the preferred option of a 12,000 x 150 foot runway 6,155 feet west of existing runway 16R/34L. The new runway meets future airport demand and significantly reduces delays by improved efficiencies during VMC and IMC weather conditions.

Best regards,

Craig Hayes
Regional Manager
Properties

cc: John E. McNamara - ATA
Louis Miller - SLC Airport Authority
Steve Domino - SLC Airport Authority
SLC AAAC
Harris Morris - DL
D. J. Jankowski - DL
Barry Slakman - DL
C. B. Smith - DL
Dan Carr - DL
I would like to elaborate on the comments I made at the recent public hearing on the proposed new runway at the Salt Lake City Airport. My primary concern is the welfare and future of the many species of wildlife living in the marshlands near the airport. As I said at the meeting, I had assumed that the various efforts to mitigate this new development would be successful, so I wasn't terribly concerned about the proposal. But when I heard the interview with an engineer from the Army Corps of Engineers that wetlands are extremely difficult to create and that in fact, severa attempts to create wetlands along the Jordan River had failed, I was quite alarmed (the interview was on the morning news program several weeks ago; I can get more information if you need it). And when I heard the very eloquent testimony from the Audubon spokesperson and members of the duck clubs around the airport that the development will bring additional dangers, I had to speak out.

Most of the participants at the hearing stressed that the airport authority has been extremely responsive to their concerns. I appreciate that, and believe that the airport representatives are good businessmen, and wouldn't be preparing to spend this kind of money unless it were really necessary. At the same time, I must challenge the basic assumption that the new runway is essential to smooth functioning at the airport. One seeming critical reason for the expansion is that landings are dangerous on foggy days; I appreciate that - I wouldn't want anyone killed in a fog-endangered landing. However, Utah fogs are cyclical; we have been through some pretty serious fogs recently, and if the cycle holds, we will likely be out of the foggy cycle by the time the expansion is completed. When the fog returns, we should have better technology.

Furthermore, all of the evidence that I saw was based on a "peak time" analysis, and ignored the fact that the airport is pretty idle for much of the day (if I gather data to prove this point; as I said at the meeting, my student was unable to collect his research data during the day because there were too few scheduled arrivals and departures). I was especially intrigued by the figure showing that projections in earlier years had underestimated traffic at the airport. I believe the airport representative attributed that underestimate to Delta's naming of SLC as its Western hub. A colleague of mine suggested that deregulation had probably also contributed a great deal to underestimates of peak time use - who would have guessed that airplanes would have so much freedom to schedule their flights? So I challenge the airport to 1. complete its figures, separating out the impacts of deregulation and Delta. Then perhaps we can get a much more accurate estimate of future needs.

Most Utah school systems are shifting to year-round school in order to use their buildings more efficiently. Power companies are also discovering that they can avoid pollution from power plants by getting consumers to use existing power more efficiently. It seems to me that the airport should adopt the same philosophy. Use what you have efficiently; make changes that have minimum impact.

Apparently, the airport has considered alternatives to building the proposed runway. But their proposal indicates that they still hold
I am Alexander. If you're going to spend so much money on the runway, why don't you just take the money you've spent on it and W/D You want to build the runway where you are planning to?

Sincerely

Kerr

BEST COPY AVAILABLE

215
Dear Barbara,

I think you have run away and lost your hat. I hope you find it before you get cold. It will be very cold tonight. I hope you will put it on when you get home.

Yours,

Sam Wolf

Dear Barbara,

I cannot put the family in a hurry and you can't do it if you don't have a hurry. I hope you are back home soon.

Sincerely,

Louis

4-29-92

Dear Barbara,

Collin Lee
Dear Barbara,

I don't like that you're putting a runway through the bird's territory at the Salt Lake airport.

Sincerely,

Neil

---

Dear Barbara,

4/29/92

How would you like it if someone put a runway in your backyard? Will you take care of the wetlands?

Sincerely,

Matt Polson

---

Dear Barbara,

4-29-1-

Why can't you do it somewhere else? I went to the Millward, I saw enough. How would I lift it if someone put a runway through it?"
Do you think that you could sell the new airplane over the birds brat at the salt lake airport somewhere else? How would you feel if no one put a runway through you and made you do something or

JONATHAN CHENG

AP RACE ALCUT

INUT

The birds have the

HER IN PLEASE WRITE BACK

They are going to put the new runway at the salt

Dear Barbara how would you feel like it? I said Buddy running your

haws I would be sad

please do not make a run was you already have a

Janin Mouser

BEST COPY AVAILABLE
Hi Moey, and I'm from SLC, UT. How come you're making another runway? It's just a waste of funds. Well get it back.

Sincerely,
Moey
Nelson

P.S. please write back.

Thank you

Dear Barbara,

You know that runway you're going to build over the bird's home at the flight park, I feel sad. Could you build it in another part of the city or like in a field? Why do you guys want to build another runway? You have enough of them.

Nathan
Your friend
from

KIND TO [P. FR.]

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KINDS

FRUMP!

KIND TO [P. FR.]

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KINDS

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April 27, 1992

RECEIVED
MAY 4, 1992

Dear Mr. Haria:

I received a copy of a US Army Corps of Engineers Public Notice No. 1992 50040 dated 4/23/92 with comments due by April 30, 1992. The subject is an application by the Salt Lake City airport authority to the Army Corps of Engineers for a permit under authority of section 404 of the Clean Water Act to discharge 2,672,500 cubic yards of material into 338.9 acres of wetlands adjacent to the Great Salt Lake. The purpose of the project is to add a third runway and associated land side support facilities to the Salt Lake International Airport.

The need for the project seems apparent and the schematic plans seem to cover most environmental concerns.

My purpose in writing is merely to point out some areas that should be addressed in the plans for the project and in any environmental policy act documents that are prepared:

1-Have the suitability or limitations of the soils been adequately considered for the proposed action?
2-Are there adequate provisions for control of erosion and management of water during construction?
3-Are there adequate provisions for soil and water conservation measures?
4-Are there adequate provisions for storm water discharge from project lands to prevent erosion and protect water quality?
5-Are there adequate provisions to maintain natural drainage patterns or to modify them to permit irrigation water, storm water and/or water from drains to be uninterrupted?
6-Are existing soil and water management systems be maintained?
7-Are the impacts on ecosystems accounted for adequately?

8-Are there adequate drainage and water table controls and adequate provisions for construction techniques that will allow a large airport runway facilities and buildings to be stable when constructed on wetland soils?
9-Are the final elevations of installed facilities high enough to prevent disastrous flooding when the water levels of the Great Salt Lake rise to previous historic levels or even exceed those levels?

The prudent use of public money for projects built in wetland areas requires adequate protection of new public facilities as well as proper mitigation of ecological values lost by installation of such projects.

I appreciate the opportunity to review and comment on these types of natural resource projects. Soil Conservation Districts are charged under State Statutes to help protect and conserve all our natural resources.

Sincerely,

James D. Maxwell
Resource Coordinator

cc: James G. Christensen, Utah Department of Agriculture
Gary Briggs, USDA Soil Conservation Service
The Committee appreciates the opportunity to review this proposal and will anticipate review of the Draft Environmental Impact Statement. Please direct any other written questions regarding this correspondence to the Utah State Clearinghouse, at the above address, or call Carolyn Wright at (801) 538-1536 or John Harja at (801) 538-1559.

Sincerely,

Brad T. Barber
State Planning Coordinator

BTB/rpj
Enclosures
cc: Bob Mairley - EPA
Environmental Quality
Brooks Carter
May 26, 1992

Colonel Laurence R. Sadoff
U.S. Army Corps of Engineers
Sacramento District
Attn: Regulatory Section
1325 J Street
Sacramento, CA 95814-2922

SUBJECT: P.N. # 199250040
State Identifier # UT920406-010

Dear Colonel Sadoff:

The Resource Development Coordinating Committee, representing the State of Utah, has reviewed this public notice. The attached Water Quality Certification from the Division of Water Quality supplement our previous comments.

The Committee appreciates the opportunity to review this proposal. Please direct any other written questions regarding this correspondence to the Utah State Clearinghouse, at the above address, or call Carolyn Wright at (801) 538-1535 or John Harja at (801) 538-1559.

Sincerely,

Brad T. Barber
State Planning Coordinator

BTB/rpj
Enclosures
c: Bob Maierly - EPA
Environmental Quality
Brooks Carter

April 30, 1992

Colonel Laurence R. Sadoff, District Engineer
US Army Corps of Engineers
Sacramento District
Attn: Regulatory Section
1325 J Street
Sacramento, CA 95814-2922

RE: Water Quality Certification
404 Permit Application No. 199250040
State I.D. No. UT 920406-D10
St. Airport/GSL Marshes

Dear Colonel Sadoff:

We have reviewed the application by Steven Domino, Salt Lake City Airport Authority for a Corps of Engineers 404 permit. The project site is located on property administered by the Salt Lake Airport Authority. The proposed airport expansion and powerline relocation is located in Township 1 North, Range 1 West, Sections 17, 18, 19, 30; and Township 1 North, Range 2 West, Sections 13, 24, 25; Salt Lake City, Utah. The purpose of the proposed project is to add a third runway and associated landside support facilities. The proposed expansion is deemed necessary to accommodate forecasted growth of aircraft use. The new runway would permit simultaneous landings and departures. Utah Power and Light’s main north-south powerline will need to be relocated in order to not interfere with the navigation aids associated with the new runway.

It is our opinion that, with the implementation of the special conditions attached to this letter and applicable Best Management Practices (BMPs) in order to minimize the erosion - sediment load to the affected waters during project activities, the adverse environmental impact on the existing water quality of Great Salt Lake will be minimal. We recommend that applicable water quality parameters be monitored for effectiveness of BMPs.
Pursuant to Section 401(a)(1) of the Federal Water Pollution Control Act, as amended 1987, it is hereby certified that any discharge resultant from the project will comply with applicable State water quality standards and, to the best of our knowledge, will comply with applicable provisions of Sections 301, 302, 303, 306, and 307 of said Act.

Sincerely,
Utah Water Quality Board

Don A. Ostler, P.E.
Executive Secretary

Enclosure

DAO: MKR: cjl

Attachment A - Special Conditions

1. All discharges from the facility are to be covered under the NPDES (UPDES) permit for stormwater. The permit will be adjusted accordingly.

2. Any de-icing and recovery facilities must be considered in the runway design so that any de-icing activities will be intercepted by and included in the de-icing system presently in place.

3. The water quality to be monitored in accordance with NPDES permit requirements shall include de-icing agents (glycols).

4. Best Management Practices (BMP's) during construction are to be identified to minimize any impacts to water quality during construction activities.

5. BMP's are to be monitored for their effectiveness and if found ineffective they are to be changed or altered until they are effective.

6. A water quality monitoring program shall be developed and conducted before, during and after construction. The program shall be designed and implemented to document BMP effectiveness.
May 4, 1992

Laurence R. Sadoff, Colonel, CE
U.S. Army Corps of Engineers
Sacramento District
1325 J Street
Sacramento, CA 95814

RE: Public Notice No. 199250040, Salt Lake City International Airport Authority, Salt Lake City, Utah

Dear Colonel Sadoff:

We have reviewed the referenced application concerning the proposed construction of an additional runway and support facilities at the Salt Lake City International Airport, Salt Lake County, Utah. We inform you that staff from this office have attended numerous meetings with the airport authority and other interested parties over the past several years concerning the proposed work.

Though the mitigation for wildlife impacts will be off-site, we believe it is an appropriate location. Although the site does contain some wetlands, it is generally considered as an upland area and used for various types of agriculture and ranching activities. The proposed mitigation will restructure the upland area to create new wetlands and enhance existing ones.

As the general area is considered a desert by most, we do have several concerns. Should the following stipulations be included as a condition of the permit, we will have no objection should the decision be made to issue the permit. They are:

1. The construction of a delivery system to transport water to the site as needed to maintain wetland water levels at the appropriate levels for shorebirds and waterfowl.
2. Rights to this water must be guaranteed and allowed to be used as appropriate by the management agency of the site once construction of the mitigation features have been completed.
3. Construction of the mitigation features must be concurrent with construction of the proposed airport additions.
4. Once mitigation is completed the public will be allowed access.

This response has been prepared under the authority of and in accordance with the provisions of the Endangered Species Act (16 U.S.C. 1531 et seq.) and the Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.) and represent Department of Interior comments on this public notice.

Sincerely,

Clark D. Johnson
Assistant Field Supervisor

cc: COE-Bountiful
    DWR-SLC
    EPA-DEN
Ms. Barbara Johnson
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn Street, Suite 300
Denver, Co 80216

RE: Comments, Draft Environmental Impact
Statement (DEIS), Salt Lake City Airport
Expansion

Dear Ms. Johnson:

We appreciated the opportunity to comment on the following project. Most water quality aspects of the project seem to have been addressed. We submit the following for clarification of required stipulations.

1. As the project will involve stormwater discharges to surface waters of the State, Stormwater Discharge and Utah Pollutant Discharge Elimination System (UPDES) permits will be required prior to start of construction of various project components planned in the report. A ground water discharge permit will have to be obtained if the project involves any discharges to the groundwater through infiltration or settling ponds or through injection wells.

2. As storm water discharges will occur from the large surfaced areas of the project, the documents indicate that pollution mitigation measures will include settling ponds, oil/water separators and surface skimming devices. This technology represents wastewater treatment devices and, therefore, a Construction Permit is required prior to construction of these components.

3. The wastewater treatment devices specifically mentioned in the DEIS will reduce the quantities of suspended solids, oils and greases in the waste stream. These devices may not necessarily reduce the concentrations of these pollutants and of other dissolved contaminants such as deicing chemicals, COD, and of compounds including cadmium, chromium, copper, cyanide lead, selenium and zinc, which may be present in the waste stream, to concentrations required for discharge to receiving waters. Additional treatment may then become necessary to achieve this required compliance. Although the Expanded Environmental Assessment indicates that further control measures for dissolved contaminants may be necessary, the proponents should be prepared to consider more expensive technologies such as filtration, carbon adsorption, chemical coagulation or ion exchange to achieve discharge standards.

4. The scope of the project should include the capture of drainage from all deicing areas to pretreatment facilities prior to discharge to the sanitary sewage system. Drainage from all areas used for deicing should be isolated from the stormwater discharge system.

If you have any questions regarding these comments, please contact John Kennington or me at 538-6146.

Sincerely,

Kiran L. Bhayani, P.E., D.EE., Manager
Design Evaluation Section

KLB/JRK.st

cc: Salt Lake City Airport Authority
APPENDIX D

RESPONSE TO DRAFT EIS WRITTEN AND PUBLIC HEARING COMMENTS

Response to Comment Section

The response to comment section references Appendix C which provides a list of commenters identifying each by number plus a reproduction of all comments received on the DEIS and 404 permit in their original form in numerical sequence.

The response to comment section presentation format is as follows:

- The commenter is identified by number and name of individual, agency, or organization.
- The characterization of the primary issues requesting a response and identification of that issue by commenter number and a letter.
- A response to the characterized comment.
1. U.S. Department of Housing and Urban Development

Comment 1a. Recommendation that housing not be permitted in the 65 DNL or higher noise range.

Response: All residential uses within the 65 DNL or higher will have noise impacts mitigated below the threshold of significance within the planning period.

Comment 1b. Recommend that all residential development be prohibited in the runway clear zones.

Response: All residential development is already prohibited within the Runway Protection Zones (clear zones) by local zoning ordinance and is further under the control and ownership of the Salt Lake City Airport Authority.

2. State of Utah Division of State History

Comment 2a. Technical comment concerning page 130 of the EXEA defining a prehistoric site.

Response: Comment noted. The EXEA has not been changed but the comment has been incorporated in the FEIS as part of this section.

3. Mary and Melvin Ward

Comment 3a. Concern for acquisition of property.

Response: Any land that which must be purchased due to direct construction impacts or mitigation land will be purchased in accordance with the Uniform Relocation and Real Property Acquisition Act.

4. Marcus Theodore

Comment 4a. Flight hazards due to potential bird strikes.

Response: The EXEA discusses the typical flight patterns and altitudes of both aircraft and birds in the vicinity of the Airport. In addition, a Wildlife Management Plan was prepared by the SLCAA and is included in Appendix VII of the EXEA. The Plan identifies specific management measures and operational procedures that the SLCAA undertakes to reduce potential; bird-aircraft strike hazards. The EXEA presents the SLCAA bird control program and identifies numerous actions that are taken, as necessary, to make the airport property less attractive for bird use. The program includes daily monitoring of bird activities, issuing pilot advisories, bird dispersal using bioacoustics and pyrotechnics, modifying bird habitat, and controlling bird food sources. The Wildlife Management Plan also includes provisions for the Airport Authority to make operational changes in runway use. This is accomplished by closing specific runways if hazards are determined to exist that cannot be controlled by routine measures.

Comment 4b. The DEIS should have dealt with the inadequacy of a single international airport serving the entire State of Utah.

Response: There is more than one international airport serving the State of Utah however, only one international airport is located in the State of Utah. It is beyond the scope of the project to environmentally evaluate an alternative of building an additional international airport within the State of Utah.

Comment 4c. The report should have dealt in more depth with the monopoly of service by Delta Air Lines and its effect on pricing.

Response: The purpose of the Environmental Impact Statement is not to evaluate the pricing strategy of the airlines but instead the environmental impacts of proposed impacts to the environment; the benefits and disadvantages resulting from federal airline deregulation are not issues related to the environmental impacts of the proposed project. Delta Airlines does not have a monopoly on air service at SLCAA. Seven commercial airlines voluntarily provide service at SLCAA in accordance with the various laws and regulations established by the federal government. Under federal deregulation of the air transportation industry, all commercial airlines are allowed to provide service at various airports and establish fares based on individual corporate policies.

Comment 4d. The cost analysis was flawed in that it did not include significant cost impacts associated with bird strikes, fog delays and accident and earthquake delays.

Response: It is inappropriate for a technical cost analysis to include potential costs associated with speculative and highly variable circumstances such as accidents and earthquakes. Since the forecast of operations for the no project alternative is projected to reach 96% of that of the preferred alternative, costs attributed to highly variable and speculative circumstances are expected to be similar. The environmental analysis documents that significantly higher delay costs are expected under the no project alternative because of weather conditions which can be reasonably quantified.

Comment 4e. No realistic clean-up costs were included in the cost analysis for the clean-up of unburnt fuel deposits in the swamps around the airport.

Response: The environmental analysis does not indicate that a measurable relationship between ground fog and precipitation of unburnt jet fuels exists. A cost analysis to this effect was therefore not prepared. The most recent air quality analysis indicates that emission of air pollutants will be lower under the
Preferred Alternative than under the No-project Alternative. The State of Utah Divisions of Air and Water Quality have issued approval orders and letters of reasonable assurance indicating the applicable air and water quality regulations will be satisfied. 

Comment 4f. Impact of unburnt fuel on insect populations.

Response: The environmental analysis identifies that the water which feeds the wetlands and insect populations comes from the urban storm-water runoff system for Salt Lake County (including the surplus canal). This stormwater system collects runoff from streets and developed areas within the county and contains oils and grease before reaching the airport. The environmental analysis does not indicate that the proposed project would have a significant contribution to the presence of petroleum in the waters which serve insect populations.

Comment 4g. Impact of the use of the new runway on migratory birds visiting Farmington Bay Bird Refuge.

Response: The flight tracks associated with operations from the existing runways extend over Farmington Bay Bird Refuge. The flight tracks associated with the proposed runway also extend over the Farmington Bay Bird Refuge. There is not a significant difference between the existing and no project flight tracks and the proposed project flight tracks in terms of their location or height above the Bird Refuge. There is not a history of conflict or a defined incompatibility now, and given the height of the aircraft over the Bird Refuge, there is not forecast to be a conflict in the future.

Comment 4h. Impact of increased bird strikes due to the new runway and cost of delay due to accidents from bird strikes.

Response: SLCAA effectively manages the birdstrike potential now, and has a management plan which addresses the potential with the operation of the preferred alternative. SLCAA also has an emergency response operation which is designed to respond to any aircraft accident, regardless of the cause. The likelihood of an accident is statistically very small and if there were an accident, the delay to other aircraft would be a minor consideration. Also see response to 4a.

The environmental analysis includes a discussion of the SLCAA Wildlife Management Plan. The analysis indicates that aircraft presently overfly many wetland areas at altitudes higher than typical bird flight. The analysis indicates that relatively few bird strikes occur at SLICIA. The analysis concludes that the Wildlife Management Plan and bird control program as implemented by SLCAA has been successful in minimizing bird strike hazards. The analysis indicates that operations on the proposed new runway will be similar to those on existing runways. The environmental analysis does not indicate a quantifiable increase in bird strike incidence as a result of the proposed new runway. A cost analysis of unquantifiable events is not appropriate.

Comment 4i. The report does not include a discussion of the location and the cost to maintain the wetland mitigation site.

Response: The documentation adequately identifies the proposed location of the wetlands mitigation site. Regulatory policies require that wetland losses be balanced with gains through mitigation. Therefore, the acres of wetlands being impacted by the proposed project, the acres required for mitigation and the costs associated with maintaining the replacement wetlands are relative to one another. Costs to maintain replacement wetlands can be expected to be similar regardless of site location. The 404 permit will require a guarantee from the project sponsor to ensure maintenance of the mitigated wetlands. Any costs related to maintaining the replacement wetlands are incorporated into the overall operating budget of the project sponsor.

Comment 4j. The report does not include the cost associated with relocating duck clubs.

Response: The Environmental analysis does not indicate a need to relocate a duck club in its entirety. Duck club impacts are discussed on pages 5.3, 5.11, 5.12 of the DEIS as well as proposed mitigation measures. Any land or easement acquisition or relocation will be undertaken in accordance with the Uniform Relocation Act.

Comment 4k. The report does not address noise and air quality impacts to duck hunters from low flying planes over Farmington Bay.

Response: The ESEA and DEIS did address the extent of significant noise and air quality impacts. No significant noise or air quality impacts resulting from air travel over Farmington Bay were identified. The preferred alternative will not result in significant differences between existing and future altitude or location of flights over Farmington Bay.

Comment 4l. The report fails to consider the improvement in air quality if a second and third airport were built north and south of Salt Lake City to eliminate motor vehicle travel along I-15.

Response: Comment Noted. The DEIS did consider alternatives such as replacement airports; however, one or two new airports being built north or south of Salt Lake City was not environmentally evaluated.

Comment 4m. The report fails to discuss the impact of an earthquake and its affect on air service.
Response: The EXEA, DEIS and FEIS includes an analysis of seismology, please refer to page 5-43 of the DEIS.

Comment 4n. The effect on air service caused by the rise of the Great Salt Lake in the event drainage pumps malfunction.

Response: The environmental analysis adequately discusses the possible effects of the Great Salt Lake on the airport if the lake rises. The analysis does not indicate that there is a significant threat by the fluctuating level of the Great Salt Lake to the airport. Project designs indicate that runway pavements wiere similar in elevation as existing facilities. Proposed elevations will vary between 4221 feet and 4226 feet. The highest recorded level of Great Salt Lake is 4212 feet. Pumps and canal improvements on Great Salt Lake are intended to control the water elevation at an elevation 4208 feet. The proposed project provides reasonable protection from possible varying water level.

Comment 4o. Why is building a cross-wind runway not a solution?

Response: Please refer to pages 32 and 44 in the EXEA for an analysis of the Crosswind Runway Alternative. The document states that terrain and TERPS criteria prevent this alternative from meeting the project purpose and need. High terrain to the east of the airport such as Ensign Peak and the Wasatch Mountains would penetrate airspace. Aircraft would not have clear, unobstructed approach and departure airspace.

Comment 4p. The impact of fuel spills on drainage.

Response: The environmental analysis indicates that most storm drainage from the proposed development would be discharged into the Surplus Canal. Under worst case conditions, some stormwater overflow would be discharged overland to low depressions on airport property. The analysis indicates that the Surplus Canal is a major element of the urban stormwater runoff system for Salt Lake County. This stormwater system collects runoff from most streets and developed areas in the county and contains oils and grease before reaching the airport. The proposed project includes constructing detention basins equipped with oil water separators at all discharge points to contain and recapture all spills and other petroleum products and to prevent their introduction into adjacent drainages. The proposed project is therefore not expected to contribute significant amounts of pollutants to the receiving water. The cost analysis for the proposed projects includes all water quality facilities. The Utah Division of Water Quality will require that all storm water discharges comply with federal and State water quality standards in terms of quality and flow rates before issuing a final construction permit for the project. The Division of Water Quality has issued a letter of reasonable assurance indicating that the proposed project is expected to comply with all water quality regulations.

Comment 4q. Weather reliability of the third runway subject to thicker fog because of its location further into the swamp.

Response: The weather reliability of the proposed new runway is not forecast to be significantly different than that of the other runways at SLCIA. The runway instrumentation is designed to allow operations in fog.

Comment 4r. The cost analysis is flawed in that it does not consider the Salt Lake City taxpayer burden for providing air service for the entire State.

Response: The EXEA indicates that small beneficial and socioeconomic impacts are anticipated from the proposed project. No local tax dollars are used by the SLCAA for development or maintenance of any airport facilities. The Airport Master Plan Update - Salt Lake City International Airport. 1988 indicates that the funds to complete the proposed development will come from various sources. The sources include revenues from rates and charges assessed to airlines, airport tenants and concessionaires, Federal grants, and Airport revenue bonds.

5. Robert Druchivak

Comment 5a. Concern about the ability to successfully mitigate wetland impacts.

Response: The SLCAA has worked closely with USFWS, COE, EPA, and the State DWR to develop an effective wetland mitigation plan. The 404 permit will be conditioned upon the successful establishment and maintenance of the mitigation area. The grant assurances associated with the preferred alternative will include the conditions of the 404 permit. In addition, SLCAA has a considerable amount of time, effort, and capital invested in the success of the wetlands.

6. National Audubon Society

Comment 6a. Request for a public hearing.

Response: The FAA and COE have worked in cooperation on the environmental analysis for the proposed project. A public hearing was held on the EXEA on December 2, 1991 and on the DEIS on May 11th of 1992. The commenter spoke at both public hearings. The DEIS included information that the 404 permit public comment period would occur simultaneous with the public comment period for the DEIS.
Comment 6b. A new runway will increase the use of carbon fuels and encourage growing air traffic use.

Response: The projected traffic is not significantly different between the no project and development alternatives. The purpose of the new runway is not associated with encouraging additional air traffic. The expenditure of fuel will be less under the preferred alternative than the no project alternative due to a decrease in delays.

Comment 6c. Request for an analysis of projected decrease in air travel based upon a 1 to 5 fold increase in carbon fuel prices.

Response: There are no reliable forecasts projecting a 1 to 5 fold increase in fuel prices within the next 10 to 15 years. Therefore, there is no benefit in trying to predict air travel response.

Comment 6d. A new runway would increase growth incentives for Salt Lake City.

Response: The definition of growth incentives is unclear; however, the purpose of the preferred alternative is not associated with inducing growth.

Comment 6e. Impact of Microwave Landing System (MLS) and Global Positioning System (GPS) in year 2005 or 2010 on the simultaneous approach capability on the existing runway system with the realignment of runway 16L-34R.

Response: In a 1984 published document, Airport and Air Traffic Control Systems, Congress of the United States, Office of Technology Assessment, pg 133, it identifies three phased plan over 13 to 16 years for the implementation of MLS. The first phase was to be an installation of 10 to 25 systems. The second phase was to be the installation of 900 systems over 6 to 9 years. The final phase, was to be the installation of an additional 300 to 500 system. The report recommended a comprehensive analysis of the cost/benefit of the system between phase 1 and 2. Eight years after the report was published, approximately 5 MLS systems have been installed in the United States. The first phase is not nearly complete, nor has a comprehensive analysis of the cost/benefit been conducted. In 1986 the FAA published Order 6830.1a which on page 35 similarly describes the phases for MLS implementation. Phase 1 was to be the installation of 30 systems in a two year period. In June of 1992 the FAA issued contracts to two competing vendors for the production of 6 systems each and delivery within a couple of years. The FAA then plans to contract with one of the two companies for the delivery of MLS systems at approximately 100 airports. The installation of the MLS has been a slow process and there is no indication that the pace will quicken. There also has not been a comprehensive evaluation of the systems benefits since phase one has not been completed.

The Global Positioning System (GPS) as a base system does not allow for precision instrument approaches as those proposed for Salt Lake City International Airport. However, the system can be augmented with additional systems which may allow for precision instrument approaches. The most promising appears to be the differential GPS which basically takes the difference between a satellite signal and a signal from a ground system that must be installed at the airport and uses a known error and the difference between the two signals to provide the information needed for a precision approach. The GPS is somewhat new technology and a recent horizon planning document identifies a GPS system such as just described as potentially being available in 2002 barring unforeseen political, financial or technical roadblocks.

The impact of waiting until 2010 for either of these systems to effectively provide simultaneous instrument landing capability at SLCA under the existing runway network or with the straightening of runway 16/34, assuming they could in fact do that, the cost of aircraft delays would cost approximately 465 million dollars.

Comment 6f. The transmission line Alternative C is better than Alternative F. What would be the impact of having Alternative C for ten to fifteen years until GPS and MLS are available.

Response: The impact of maintaining the powerlines in an Alternative C configuration rather than Alternative F would be the probable inability to utilize the new runway for instrument approaches. The primary purpose of the alignment is to provide for simultaneous independent instrument approaches. Without that capability, the DEIS estimate of operational cost is approximately 465 million. Also, the concerns associated with the Alternative C alignment were also the concerns associated with the Alternative F alignment, however, the Alternative F alignment accentuated the concerns by being located further toward the wetlands. Mitigation measures associated with making the powerlines more visible would be a condition of a grant assurance. It is notable that the existing powerlines traverse wetlands with no mitigation measures associated with making the lines more visible to birds. However, the existing powerlines will not traverse wetlands to the same extent as the proposed alignment.

Comment 6g. Request to delete statement on page 53.

Response: Comment noted. The change has not been made.

Comment 6h. The mitigation should be for impacts to 3000 acres of wetlands and 3400 acres of uplands due to noise, air and runoff pollution.
Response: Mitigation associated with the preferred alternative includes mitigation for significant noise impacts, mitigation for air quality impacts, and mitigation for habitat loss (wetland and upland). The determination of acreage needed for wetlands mitigation was based on replacing habitat units; this methodology was determined in consultation with the USFWS, COE, EPA, FAA, and State DWR.

Comment 6i. Table 2 shorebird habitat loss needs correction.

Response: Comment noted, the Table has been corrected. The corrected Table is included in this FEIS.

Comment 6j. Recommendation that a more gradual slope than 3:1 be provided from mud-flats and marsh to open water to provide for more shorebird habitat.

Response: The design of the wetlands mitigation site has been changed to enlarge the mudflats so that there will be no net loss of shorebird habitat; therefore, the 3:1 slope has not been changed.

Comment 6k. Recommendation that something other than angle-iron be used in the by-pass canal so that rusting does not occur.

Response: Angle Iron is a common structure used throughout the water system in the area. The rust from an angle iron structure in the mitigation site would be insignificant given the water in the canals at present comes from the runoff from streets and other non point sources in Salt Lake County. However, the maintenance of the control structures is an element of the mitigation management plan.

Comment 6l. Establish a two million dollar trust fund for long term management of mitigated wetlands.

Response: A trust fund will be one alternative considered for the long term management of the wetlands mitigation site.

7. St. Francis Xavier School

Comment 7a. Issue of safety impacts to St. Francis Xavier School due to air traffic operations from the new runway.

Response: Several operational measures have been put in place since (but not as a result of) the 1987 midair collision over St. Francis Xavier School. These include the installation of a Terminal Control Area (TCA), installation of Mode C transponders in aircraft operating within the TCA, and the implementation of the Traffic Collision Avoidance System (TCAS). These measures and others have increased the safety of operations in and around Salt Lake City International Airport through the direct control of aircraft, information on the altitude of aircraft, and information in the cockpit of commercial service aircraft which alerts the pilot if other aircraft are nearby. Operations off of the new runway will not present a safety hazard to St. Francis Xavier School. Information on the safety issue was discussed with this commenter individually in a meeting May 12th, 1992.

Comment 7b. Issues of Salt Lake City Airport Authority or FAA rerouting of economic impacts to the school as a result of a 1987 airplane collision.

Response: This issue was discussed with the commenter in a meeting May 12th, 1992. The issue is beyond the scope of this environmental analysis.

8. McKay Burton and Thurman

Comment 8a. Danger of bird strikes to airplanes using the new runway considering the Rudy Gun Club plans to attract more ducks, geese, swans, pelicans and birds.

Response: The EXEA discusses the typical flight patterns and altitudes of both aircraft and birds in the vicinity of the Airport. In addition, a Wildlife Management Plan was prepared by the SLCAA and is included in Appendix VII of the EXEA. The Plan identifies specific management measures and operational procedures that the SLCAA undertakes to reduce potential bird-aircraft strike hazards. The EXEA presents the SLCAA bird control program and identifies numerous actions that are taken as necessary, to make airport property less attractive for bird use. The program includes daily monitoring of bird activities, issuing pilot advisories, bird dispersal, using bioacoustics and pyrotechnics, modifying bird habitat, and controlling bird food sources. The Wildlife Management Plan also includes provisions for the Airport Authority to make operational changes in runway use. This is accomplished by alternating runway use for arrivals or departures, or closing specific runways if hazards are determined to exist that can not be controlled by routine measures. The analysis indicates that aircraft presently overfly many wetland areas at altitudes higher than typical bird flights. The analysis indicates that relatively few bird strikes occur at SLCA. The analysis concludes that the Wildlife Management Plan and bird control program as implemented by SLCAA has been successful in minimizing bird strike hazards. The analysis indicates that operations on the proposed new runway will be similar to those on existing runways. The environmental analysis does not indicate a quantifiable increase in bird strike incidence as a result of the proposed new runway.
9. Carleton DeTar

Comment 9a. Potential impact to the new runway from flooding caused by the rising Great Salt Lake.

Response: The environmental analysis adequately discusses the possible effects of the Great Salt Lake on the airport if the lake rises. The analysis does not indicate that there is a significant threat by the fluctuating level of the Great Salt Lake to the airport. Project designs indicate that runway pavements will be similar in elevation as existing facilities. Proposed elevations will vary between 4221 feet and 4226 feet. The highest recorded level of Great Salt Lake is 4212 feet. Pumps and canal improvements on Great Salt Lake are intended to control the water elevation at an elevation of 4208 feet. The proposed project design is believed to provide reasonable protection from possible varying lake level.

Comment 9b. The entire development area must be considered a potential wetland because in ten years flooding may inundate the area.

Response: Flooding itself does not create a wetland nor cause its classification as a wetland. In fact, flooding of the Great Salt Lake has destroyed many acres of wetlands in the past. The classification of the wetland acreage in the DEIS/FEIS is satisfactory.

10. U.S. Soil Conservation Service

Comment 10a. No comment.

11. National Oceanic and Atmospheric Administration

Comment 11a. There are no geodetic control survey monuments in the proposed project area.

Response: Comment noted.

12. U.S. Department of Interior, Office of Environmental Affairs

Comment 12a. There should be a guarantee of water at the mitigation site by contract, deed, or water right recorded in place prior to project construction.

Response: The design of the wetland mitigation site includes the water budget necessary to establish and maintain the wetland mitigation site. The 404 permit will require that adequate water be available for the establishment and maintenance of the wetland mitigation site. The FAA grant would include an assurance that the conditions of the 404 permit be met. The wetlands mitigation is one of the first items scheduled to be funded in the project construction.

Comment 12b. A non-profit organization should be considered as a potential wetland mitigation site monitoring entity.

Response: A non-profit organization will be considered as a potential wetland mitigation site monitoring entity.

Comment 12c. Recommendation that impacts on mineral resources be discussed in the same manner as in the January 1992 SLCIA Master Plan Update.

SLCAA has no January 1992 Master Plan, we assume the commenter is referring to the January 1992 EXEA which was made a part of the DEIS and therefore were presented in the environmental analysis.

Comment 12d. There should be a discussion of the availability of construction materials and the impact to other customers. Also the ability of local aggregate producers to supply the proposed construction materials should be addressed.

Response: The runway design project is nearly complete and there has not been any indication of resource constraints.

Comment 12e. All flowing wells on airport property should be capped to reduce the waste of ground water resources.

Response: There are both costs and benefits of capping the flowing wells on airport property. Airport operations will consider the comment. There are no plans to cap all wells on airport property at this point in time.

13. Wasatch Front Regional Council

Comment 13a. The vehicle miles traveled and total air operations are essentially proportional to public demand for commercial air service and are relatively independent of the alternatives under consideration. We concur with the assessment that an overall improvement in air quality leading toward attainment of NAAQS at SLCIA is likely when comparing the Preferred Alternative with the No-Project Alternative.

Response: Comments noted.


Comment 14a. Concerned about the wetland impact downstream. There is a need for Surplus Canal/Goggins Drain structure and a 404 permit should be denied unless it's put in.

D-12 246

D-13 247
Response: The environmental analysis indicated that the runway and related facilities will be designed to minimize the impacts to the surrounding property and wetlands. Detention basins with oil/water separators will be constructed to maintain water quality and to regulate the flow of storm water runoff. All facilities will be constructed in accordance with the permits issued by state and local regulatory agencies. The design will also include facilities that are necessary to prevent flooding of airport property. The benefits of reconstructing the Goggin Drain flood control gates or making other improvements will be considered in the final design of the proposed project.

Comment 14b. As a mitigation measure, wetlands should be developed on private duck clubs rather than purchase a new mitigation site.

Response: This was an alternative considered early in the environmental analysis but rejected due to logistical problems in terms of effectively managing the replacement habitat units and ensuring their long term protection on a variety of local private duck clubs in the area.

Comment 14c. The mitigation site should be managed by duck clubs.

Response: This is still being considered an option for the long term management of the wetlands mitigation site.

15. Northpoint Fur and Reclamation Co.

Comment 15a. The Northpoint Fur and Reclamation Co. demands full and complete compensation to the extent that they are adversely impacted by the project.

Response: Comment noted. The environmental analysis does not indicate that the Northpoint Fur and Reclamation Co. would be significantly impacted by the proposed project. Therefore no mitigation is required.

16. Moyle and Draper

Comment 16a. Notice of correct land ownership in Sections 24, 23, 13 and 14 west of the airport. Concerned about potential impacts to this property and mitigation for any impacts.

Response: Comment concerning land ownership noted. The environmental analysis indicates that transmission lines will be relocated through this property. Acquisition of property rights will be necessary to provide the right-of-way for the transmission lines. Mitigation for the required property rights will be in accordance with the Uniform Relocation and Real Property Acquisition Act.

Comment 16b. How will alternative access be provided to the property if 4000 West Street will be closed. Will the property be condemned as a result of loss of access?

Response: The environmental analysis indicates that there is not a recorded right-of-way or agreement which allows access to the property from 4000 West Street. Limited permission to cross Airport owned property has been voluntarily offered in the past by SLCAA. The SLCAA will continue to permit limited restricted access through airport owned property, provided security and operational requirements are satisfied. Whether or not discontinuing access by the Airport Authority would be considered, condemnation of the property is a legal issue which can not be addressed within the scope of this environmental analysis. Compensation for any property acquired as a result of this project will be in accordance with applicable laws.

Comment 16c. What will be the effect of the transmission lines on the property?

Response: Property rights will need to be acquired to relocate the transmission lines on the property. Compensation for any easements or fee title rights which are acquired will be in accordance with the Uniform Relocation and Real Property Acquisition Act. The effect on existing uses will be considered in the determination of compensation as required by the Act. The effect on existing uses will also be dependent on the specific rights which are acquired.

Comment 16d. What will be the effect of drainage and availability of water to this property?

Response: The environmental analysis does not indicate that the proposed project will affect legal water rights owned by adjacent property owners. Water for the specified property largely comes from the Surplus Canal. All drainage and canals that will be affected by the proposed project are on airport property. Any drainage canals or ditches which are on airport property that supply water to other users will remain in service.

Comment 16e. What are the consequences of noise on the potential land uses of this property prior to 2006?

Response: The environmental analysis indicates that there will be a general westward shift in noise patterns. While noise exposure to the specified property is expected to have a short term increase when the proposed runway becomes operational, the increase in noise level is compatible with the present and known future uses. The specified property is zoned for agricultural uses and is comprised largely of wetlands which are used for hunting. No known change in the use of the property are expected prior to 2006. Present local ordinances and zoning prohibit uses that are incompatible with such as agriculture, water recreation, fishing, resource
production and extraction are compatible uses with noise levels as high as an in some cases exceeding 80 DNL. The potential land uses of the specified property are consistent with local zoning ordinances and expected noise impacts.

17. Parsons Behle and Latimer

Comment 17a. What will be the timing of the purchase of the Florence Gillmor property at the wetland mitigation site?

Response: The option of placing spiral vibration dampeners on the transmission line in the midspan of the 345KV shield wire in addition to marker balls is being considered in the mitigation design of the transmission wires. The option of placing spiral vibration dampeners on the 138 KV shield wire in lieu of the marker balls is also being considered in the mitigation design.

D-16

Comment 18d. The document only addresses mitigating COE jurisdictional wetlands and not others.

Response: The mitigation design is based on balancing losses with gains in terms of habitat units. This concept was presented by USFWS and accepted by DWQ (the commenter), EPA, and the COE as the preferred method of identifying the appropriate compensation for wetland loss. The document does not only address COE jurisdictional wetlands.

Comment 18e. Excess habitat units should not be considered mitigation for future projects.

Response: The COE will take into consideration the comment in the 404 permit decision.

Comment 18f. The Corps should not approve the 404 permit until there is legally binding documentation committing the necessary water for wetlands mitigation.

Response: The water needed to create and sustain the wetlands mitigation site is incorporated into the overall design which is a part of the 404 permit application. Corps permit approval will be conditioned upon meeting the commitments identified in the permit. The FAA grant would include an assurance that the conditions of the 404 permit be met. The wetlands mitigation is one of the first items scheduled to be funded in the project construction. There are no plans to secure water rights prior to an environmental finding or permit decision.

Comment 18g. There should be the capability to draw-down water in the wetland mitigation design to control cattails.

Response: The design will allow for the draw-down of water and the issue will be addressed in the wetland mitigation management plan.

Comment 18h. Concern about the long-term management of the mitigation site.

Response: The 404 permit will be conditioned upon the acceptability of a long term management plan being adopted and implemented within a specified time period. Also, the FAA grant assurances will be conditioned upon an acceptable management plan being implemented.

Comment 18i. There is a need for more detailed information on wetlands monitoring and maintenance before the plan is accepted.

Response: The 404 permit will be conditioned upon any needed monitoring and maintenance associated with the mitigation site. Therefore no additional details are necessary prior to a decision.

D-17
Comment 18j. SLCAA and FAA should fund the construction and development phase of wetlands mitigation and should establish a trust fund for long-term maintenance.

Response: If the Preferred Alternative is constructed, the SLCAA and FAA will be responsible for funding the construction and development of required mitigation. An acceptable long-term management plan will be a condition of permit approval and made a part of FAA grant assurances.

19. U.S. Environmental Protection Agency

Comment 19a. The EPA is requesting 2:1 wetland mitigation instead of the 1.47:1 ratio of replacement which is part of the 404 permit application.

Response: The method for determining the ratio of replacement wetlands was determined in consultation with the USFWS, EPA, COE, FAA, and State DWR. The agreed upon method quantifies the impacts in terms of habitat units and adequately balances the wetland losses with the gains.

Comment 19b. There should be no banking of excess habitat units at the mitigation site.

Response: The comment will be considered in the 404 permit decision.

Comment 19c. The wetlands mitigation water requirement should be 1450 instead of 580 acre-feet per year to compensate for loss by evaporation.

Response: The water requirements for the wetlands mitigation design is based upon water budget calculations which reflect the water needed to provide adequate flow-through to prevent botulism and allow for evaporation as well as other needs. The most recent water budget calculations, shown in Table 6 of the mitigation design, indicate that only 860 acre-feet per year are required for evaporation. Additional water will be used to fill the ponds and will continually flow through the system to prevent botulism. The water which passes through the system will not be consumed by the mitigation site and will be made available for other users down stream.

Comment 19d. Recommendation for an independent biological consultant to monitor the implementation of the wetlands mitigation plan.

Response: Comment noted.

Comment 19e. Reassess the need for accommodating hubbing activities at SLCAA in light of the development of the new Denver International Airport and Front Range Airport.

Response: Hubbing activity at Denver International Airport is not directly related to the hubbing activities at SLCAA. Delta Air Lines is the source of the hubbing activity at SLCAA and does not have a hub at a Denver airport. Front Range Airport development is related to proposed cargo operations and does not directly affect operations at SLCAA.

Comment 19f. Wetland mitigation commitments should be specified rather than options presented.

Response: Approval of a 404 permit will be conditioned upon the acceptability of specific commitments or options by the COE.

Comment 19g. The 404 permit obligations should be combined with the FAA grant obligations. This practice will be followed if the preferred alternative is implemented.

Response: The FAA’s standard practice is to incorporate needed environmental mitigation including 404 permit conditions into the grant assurances.

Comment 19h. The wetland mitigation site design should incorporate scattered small water pockets to provide additional shorebird habitat.

Response: The wetlands mitigation design will incorporate additional mudflats to increase shorebird habitat.

Comment 19i. Where will dredged material in settling ponds be disposed?

Response: The material will be disposed in a manner and location which meets State and Federal regulations consistent with needed permits associated with the project.

Comment 19j. The FEIS should contain a statement that State standards for water quality will be maintained.

Response: The State Division of Water Quality has responded to the 404 permit application and has recommended that specific Best Management Practices (BMP) be incorporated into the permit approval. The commitment toward meeting and maintaining water quality standards will be a part of the contractual and regulatory obligations associated with the NPDES (UPDES) and 404 permit approval as well as the grant assurances.

Comment 19k. What is the status of centralized de-icing facilities?
Response: SLCAA has installed a new treatment facility to treat water contaminated with de-icing agents. Treatment facilities will be considered to accommodate any aircraft de-icing activities not performed in the existing collection area.

Comment 191. The results of the new air quality modeling should be included in the FEIS.

Response: The results of the new air quality monitoring have been incorporated into the FEIS under the air quality section.

Comment 19m. The revised air quality analysis for the FEIS needs to provide the latest vehicle inspection inputs into the Mobile emissions factor model.

Response: The revised modeling effort was undertaken with both EPA and State Air Quality advise and the latest vehicle inspection inputs were incorporated.

Comment 19n. SLCAA should consider zoning vacant land to the 60 DNL as non-residential. Also, the FEIS should reflect the local land use authorities' intent, if any, to downzone in areas that are now noise impacted but will no longer be impacted in the future due to a decrease in the extent of the contours.

Response: There is no intent to change the zoning in any way that would result in significant noise impacts to new residences. No zoning changes are planned which permit residential uses in areas now impacted by the 65 DNL contour prior to those significant impacts being reduced. There are no zoning changes planned which would prohibit residential uses based upon the 60 DNL contour. However, Salt Lake City's existing Land Use Policy Plan and related zoning ordinances already restrict residential uses beyond the 65 DNL contour based on an analysis of high noise impact areas.

20. Pacific Power/Utah Power

Comment 20a. This commenter recommended several wording changes under Section 3 of the DEIS concerning the Alternatives associated with the powerline alternatives.

Response: While the suggestions are concurred with, the changes are only incorporated into the FEIS by way of this section.

Comment 20b. Suggested changes to the transmission line mitigation including the use of 9 inch rather than 12 inch balls and the use of all yellow rather than alternating yellow and red/orange balls.

Response: This commenter and the USFWS were consulted with regarding this comment since the recommended mitigation was part of the Section 7 Biological Opinion response. USFWS concurred with the use of all yellow balls stating that orange had only been recommended for aviation. Aviation marking is not needed. USFWS presented the following mitigation options:

- Mark the 345KV shield wire with 5 -9 inch balls per span or 12 inch Balls spaced no farther than 150 feet apart or 9 inch Balls at the same spacing as the 12 inch balls with the addition of a spiral vibration dampener (SPV) along the mid span area between balls 2 and 1, and, 2 and 3.

- Mark the 138KV shield wire with 12 inch balls no farther than 150 feet apart. 5 -9 inch balls no farther than 150 feet apart, or a spiral vibration dampener.

Comment 20c. The relocation of the transmission lines will not limit hunting near the corridor unless the airport authority requires it.

Response: Comment noted.

21. Air Transport Association

Comment 21a. The Preferred Alternative will meet future airport demand and will result in improved operating efficiencies during both VMC and IMC weather conditions. This improvement in efficiency will be a significant benefit to the estimated 11 million annual enplaned passengers that are forecasted to use SLCAA by the year 2005.

Response: Comment noted.

22. Edie Trimmer

Comment 22a. The wetlands mitigation site monitoring should include habitat gains or losses.

Response: The mitigation plan does include a program to monitor habitat gains and losses.

Comment 22b. All developments proposed by the City of Salt Lake should be incorporated together in an analysis of cumulative impacts.

Response: All documented projects of significance, proposed by Salt Lake City, to be completed within five years have been considered during the analysis process to the extent required by 40CFR1508.25.

23. Bonneville School Concerners Club

Comment 23a. Concerned about unburnt jet fuel impacts.

Response: The environmental analysis indicates that air pollutants will be lower under the Preferred Alternative than under the No-
Project Alternative. The State of Utah Divisions of Air Quality and Water Quality have issued approval orders and letters of reasonable assurance indicating that applicable air and water quality standards will be satisfied. The environmental analysis identifies that the water which feeds the wetlands and insect populations comes from the urban stormwater runoff system for Salt Lake County. This stormwater system collects runoff from most streets and developed areas within the county and contains oils and grease before reaching the airport. The environmental analysis does not indicate that the proposed project would have a significant contribution to the presence of petroleum in the waters which serve insect populations.

Comment 23b. Concerned about potential bird-aircraft strike hazards.

Response: The EXEA discusses the typical flight patterns and altitudes of both aircraft and birds in the vicinity of the Airport. In addition, a Wildlife Management Plan was prepared by the SLCAA and is included in Appendix VII of the EXEA. The Plan identifies specific management measures and operational procedures that the SLCAA undertakes to reduce potential bird-aircraft strike hazards. The EXEA presents the SLCAA bird control program and identifies numerous actions that are taken as necessary, to make airport property less attractive for bird use. The program includes daily monitoring of bird activities, issuing pilot advisories, bird dispersal using bioacoustics and pyrotechnics, modifying bird habitat, and controlling bird food sources. The Wildlife Management Plan also includes provisions for the Airport Authority to make operational changes in runway use. This is accomplished by alternating runway use for arrivals or departures, or closing specific runways if hazards are determined to exist that cannot be controlled by routine measures. The analysis indicates that aircraft presently overfly many wetland areas at altitudes higher than typical bird flights. The analysis concludes that the Wildlife Management Plan and bird control program as implemented by SLCAA has been successful in minimizing bird strike hazards. The analysis indicates that operations on the proposed new runways will be similar to those on existing runways. The environmental analysis does not indicate a quantifiable increase in bird strike incidence as a result of the proposed new runway.

Comment 24a. The new runway meets future airport demand and significantly reduces delays.

Response: Comment noted.

25. Carol Werner

Comment 25a. The FEIS should estimate future needs disregarding the Delta hub and the impacts of deregulation to get a more accurate estimate of operations.

Response: The Delta Hub and deregulation exist for the foreseeable future and therefore the forecasts reflected these factual conditions.

Comment 25b. It is doubtful that the adult wildlife species will be able to nest and rear their young anywhere else.

Response: USFWS, State DNR, COE, EPA, FAA, and SLCAA as well as the Audubon Society and others have been actively participating in a process which will result in a mitigation site which will produce habitat of equal value as that lost due to the project impacts.

Comment 25c. Concerned about the impacts of removing 10,000 acres of habitat from productive habitat.

Response: The environmental analysis does not indicate that 10,000 acres of productive habitat will be lost. The mitigation plan adequately compensates for the habitat losses resulting from the proposed project.

26. Washington Elementary School, first grade students

Comment 26a. Why is the runway needed?

Response: The purpose and need for the runway is described in the EXEA, DEIS, and FEIS. The primary need is to construct a facility which allows for simultaneous independent instrument approaches. The need for the proposed facility was described to this group of commenters in a visit to the school on May 11th, 1992.

Comment 26b. How will the wetland and biotic community impacts be mitigated.

Response: Mitigation for wetland and Biotic Communities is described in the DEIS and FEIS as well as the 404 permit application. The primary focus of the mitigation is to replace the habitat loss. Further information was provided to this group of commenter at their school on May 11th, 1992.

27. Utah Association of Conservation Districts

Comment 27a. Concern for the consideration of soils suitability, control of erosion and management of soils during construction, and water quality impacts as well as potential for flooding impacts, and ecosystems.
Comment 30a. Statement that the impact on existing water quality of Great Salt Lake will be minimal with the implementation certain measures specified in attachment A of their letter and the applicable Best Management Practices.

Response: These special conditions and Best Management Practices will be incorporated into the grant assurances for the project and are incorporated into the FEIS as mitigation measures for water quality impacts.

Comment 30b: Certification that pursuant to 401(a)(1) of the Federal Water Pollution Control Act that any discharge resultant from the project will comply with applicable State water quality standards and, to the best of the State's knowledge, will comply with the applicable provisions of Section 301, 302, 303, 306, and 307 of said Act.

Response: Comment noted.

Comment 31a. Concern for the guarantee that an adequate amount of water will be available for the establishment and maintenance of the wetlands mitigation site. Also concern for the timing of the wetlands mitigation.

Response: The water needed to create and sustain the wetlands mitigation site is incorporated into the overall design which is a part of the 404 permit application. Corps permit approval will be conditioned upon meeting the commitments identified in the permit. The FAA grant would include an assurance that the conditions of the 404 permit be met. The wetlands mitigation is one of the first items scheduled to be funded in the project construction.

Comment 31b. Statement that once mitigation is completed, the public be allowed access to the site.

Response: Any restrictions on public access will be a part of the long term management plan for the site.

Comment 32a. An NPDES and Groundwater Discharge Permit will be needed and treatment measures needed to achieve required compliance may be necessary.

Response: Comment noted.

Comment 32b. The drainage from all delicing areas should be captured and pretreated prior to discharge into the sanitary sewer system.

Response: SLCAA has installed a new treatment facility to treat water contaminated with de-icing agents. Treatment facilities will be considered to accommodate any aircraft de-icing activities not performed in the existing collection area.

Additional Comments from Commenters which presented issues at the public hearing

33. Fred Lewis

Comment 33a. Concerned about the water quantity impacts on downstream users.

Response: Please refer to the response to comments 14a and 16d.

Comment 33b. Concerned about noise impacts on duck clubs.

Response: The noise analysis and land use sections of the EXEA and FEIS as well as Appendix F of the FEIS address this issue. No land use incompatibility related to noise on the agriculturally zoned land used by duck clubs has been identified.

Comment 33c. Concerned about the potential the bird/aircraft strike hazard.

Response: The EXEA discusses the typical flight patterns and altitudes of both aircraft and birds in the vicinity of the Airport. In addition, a Wildlife Management Plan was prepared by the SLCAA and is included in Appendix VII of the EXEA. The Plan identifies specific management measures and operational procedures that the SLCAA undertakes to reduce potential bird-aircraft strike hazards. The EXEA presents the SLCAA bird control program and identifies numerous actions that are taken, as necessary, to make the airport property less attractive for bird use. The program
includes daily monitoring of bird activities, issuing pilot advisories, bird dispersal using bioacoustics and pyrotechnics, modifying bird habitat, and controlling bird food sources. The Wildlife Management Plan also includes provisions for the Airport Authority to make operational changes in runway use. This is accomplished by closing specific runways if hazards are determined to exist that cannot be controlled by routine measures.

Comment 4b. The DEIS should have dealt with the inadequacy of a single international airport serving the entire State of Utah.

34. Clarence Wonocott

Comment 34a. Concern about water control and the Goggin Drain structure.

Response: Please refer to the response under Comments 4n, 4p, 9a, 14a, for a discussion of this issue.

Comment 34b. Concern about bird/aircraft strike hazard.

Response: The EXEA discusses the typical flight patterns and altitudes of both aircraft and birds in the vicinity of the Airport. In addition, a Wildlife Management Plan was prepared by the SLCAA and is included in Appendix VII of the EXEA. The Plan identifies specific management measures and operational procedures that the SLCAA undertakes to reduce potential bird-aircraft strike hazards. The EXEA presents the SLCAA bird control program and identifies numerous actions that are taken, as necessary, to make the airport property less attractive for bird use. The program includes daily monitoring of bird activities, issuing pilot advisories, bird dispersal using bioacoustics and pyrotechnics, modifying bird habitat, and controlling bird food sources. The Wildlife Management Plan also includes provisions for the Airport Authority to make operational changes in runway use. This is accomplished by closing specific runways if hazards are determined to exist that cannot be controlled by routine measures.

Comment 4b. The DEIS should have dealt with the inadequacy of a single international airport serving the entire State of Utah.

35. Ron Phillips

Comment 35a. Concern about compensation for adverse impacts.

Response: All mitigation associated with significant impacts resulting from the preferred alternative have been identified in this FEIS.

Comment 35b. Concern about noise impacts on duck clubs.

Response: Please see response to Comment 33b.

36. Clifford Heber

Comment 36a. Concern about low flying aircraft and the resultant noise impacts to West Valley City.

Response: The noise analysis section of this FEIS and Appendix F of this FEIS address noise impacts, their significance, and any mitigation required.

Comment 36b. The SLCAA should consider using Tooele Valley Airport as an alternative for landing aircraft in poor weather.

Response: The Alternatives Section of the EXEA and Section 3.0 of this FEIS discuss the alternatives evaluated. Utilizing other existing airports was evaluated.
May 27, 1992

Mr. Steve Domino
Salt Lake City Airport Authority
AMF Box 22084
Salt Lake City, Utah 84122

RE: Final Response to EPA and FAA concerns about the Air Quality Analysis for SLCIA Master Plan Update XEA

Dear Mr. Domino:

Three major concerns have been expressed concerning the air quality analysis for the Airport XEA: 1) emissions estimates for the alternatives, 2) the carbon monoxide (CO) concentration analysis, and 3) supplemental air quality analysis that was done using ISC. Each of these subjects will be addressed in order below.

**Emissions Estimates**

Preferred Alternative Emissions, 1996

Dorothy Rogers (Utah Bureau of Air Quality) pointed out apparent errors in our estimates for aircraft emissions for 1996 under the No Project case and provided estimates of her own. She is correct in identifying the error, and my double-checking of the estimates confirms that her revised numbers are correct as well. The error dates as far back as the first draft EA submitted to the Airport Authority. That draft includes an appendix table (then known as Table III-6) that shows the duration of idle and taxi modes of the landing-takeoff cycle for use in calculating taxi/idle emissions. Under the No Project case, Year 1996, the sum of time spent idling (15 minutes) and the time spent taxiing (10 minutes) should have been 25 minutes rather than 15. The incorrect sum of 25 minutes then was used to calculate idle/taxi emissions under the No Project case for Year 1996. While this arithmetic error was corrected in subsequent versions of the appendix table, corresponding revisions in the emissions estimates themselves were not done.

The correct idle/taxi emissions can be estimated by multiplying the estimates for the Preferred Alternative (Year 1996) by a factor of 1.56 (which is equal to the ratio of 0.5 minutes, average idle/taxi time under No Project, to 16 minutes, average idle/taxi time under the Preferred Alternative). The incremental change in aircraft emissions estimates was then carried over to revise the total emissions estimates. With the correct estimates, the following revisions to the report follow.
1) Exhibit 4.6-7: the emissions under "Aircraft" should be revised as follows:

<table>
<thead>
<tr>
<th>Aircraft</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>8.1</td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>1.9</td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>4.0</td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>0.3</td>
</tr>
<tr>
<td>Particulates</td>
<td>0.5</td>
</tr>
</tbody>
</table>

The revised analysis also indicates emissions from lower EPA Fuel Authority under the NO Project. The Preferred Alternative includes emissions from Lockheed storage vehicles and refilling vehicles under CO and O$_3$ factors. For example, the revised CO emissions for aircraft are shown in the table above. The revised analysis, however, does make use of revised background concentration estimates and updated emission factors.

2) The text on page 106, paragraph three, second sentence, should be revised to read: A comparison of SLClA emissions under the Preferred Alternative (Exhibit 4.6-4) with SLClA emissions under the No Project Alternative (Exhibit 4.6-7) reveals that emissions under the Preferred Alternative would be lower than emission under No Project in 1996 and also in 2006. This revision also addresses one of the major comments by EPA which stated that the FAA could not find the Preferred Alternative in conformance with the federal Clean Air Act Amendments if emissions of CO and O$_3$ precursors under the Preferred Alternative would be higher than those under the No Project Alternative given the non-attainment status of the region with respect to CO and O$_3$. The revised emissions estimates show that the Preferred Alternative would generate lower CO and O$_3$ precursor emissions in 1996 as well as in 2006.

Fuel Storage and Handling HC Emissions Estimates

One of the EPA comments states that the emissions analysis does not take into account the hydrocarbon (HC) emissions from such sources as refueling of aircraft, refueling of ground service vehicles, and refilling emissions and breathing losses from underground storage tanks. However, the emissions shown in the emissions tables under the column labeled "Fuel Storage" were calculated based on the total volume of fuel pumped at SLClA (to aircraft, to Airport Authority vehicles, and to ground service vehicles) and an emissions factor of 4.01 lbs. of HC per 1,000 gallons pumped. Thus, the emissions shown under "Fuel Storage" were intended to include emissions from "Fuel Handling", as well. It was expected that the emissions factor applied to the total fuel pumped at SLClA conservatively estimated HC emissions from fuel storage and handling since most of the fuel arrives at SLClA directly by underground pipeline from the refinery to Lockheed storage facilities thereby minimizing HC emissions at the fuel delivery stage of the fuel storage and handling cycle.

CO Concentration Analysis

EPA comments on the CO concentration analysis questioned the estimates for the background CO concentrations at SLClA, the use of the dispersion model CALINE4 for estimating traffic CO concentrations, and the use of MOBILE3 emissions factors. A revised CO analysis was performed to address these issues. Updated CO background concentrations and updated MOBILE4 vehicle emission factors were provided by the Utah Bureau of Air Quality and were used as input for the revised CO concentration analysis. The MOBILE4.1 factors provided by the Utah Bureau of Air Quality were calculated assuming the existence of the Inspection and Maintenance Program (IMP) as well as a smog anti-tampering program (ATP) that currently operates in Salt Lake and Davis Counties. CALINE4 was used once again as described below.

Use of CALINE4 Computer Model to Estimate Roadside CO Concentrations

With respect to which computer model is appropriate for use in estimating roadside CO concentrations, the model used for the XEA, CALINE4, is an appropriate model since there are no signalized intersections to model which would have justified using the model recommended by EPA. It had been EPA's assertion that another model would be more appropriate than CALINE4 for modeling signalized intersections, but since there are none, CALINE4 was again used for the revised analysis discussed in this memo. The revised analysis, however, does make use of revised background concentration estimates and updated emission factors.

While there are no signalized intersections to model at SLClA which would justify using a different computer model, there is still the technical problem of how to model the effect of the load-and-unload lane along Outer Terminal Loop Drive (OTLTD). This lane poses a modeling problem because vehicles do stop there briefly, similar to an intersection, but the other parameters needed for an intersection analysis are missing, such as cycle time, stop-line distance, etc. Thus, the technical problem comes from the fact that CALINE4 assumes a steady emissions rate (which corresponds to a given average, steady speed) along a given link, while in reality, motor vehicles pull over to this lane at any point along its length and stop for a brief period of time. During this stop, some vehicles sit and idle while most turn off their engines.

To adapt CALINE4 to this situation, an emissions estimate for the load-and-unload lane was made assuming that all of the vehicles traveling on OTLTD pull over to the load-and-unload lane at some point and that one-half of these vehicles sit and idle for two minutes while the other half turn off their engines. (This scenario is conservative enough that hot-start emissions from those that turn off their engines and then re-start them can be ignored.) This emissions estimate is in terms of grams per hour based on a peak-volume hour of traffic and a MOBILE4.1 idling emissions rate in terms of grams per vehicle-hour.

CALINE4 requires an emissions factor in terms of grams per mile. To convert the idling/turned off emissions estimate to an emissions factor in terms of grams per mile, the emissions estimate (grams per hour) was divided by the traffic volume assigned to that lane and the total distance of the load-and-unload lane (700 feet, or 0.1326 miles). Given that, in reality, vehicles can pull over to the load-and-unload lane at any point along its length, the modeling theory is that as long as the amount of CO generated along the load-and-unload lane is the same, the downwind concentration attributable to that lane does not depend on whether the vehicles stop and park briefly (and move out of the lane) or move at a steady, slow rate over the entire distance of that lane. The emissions factor for the load-and-unload lane calculated in this manner and used as input to CALINE4 ensures that the dispersion modeling result reflects an equivalent amount of CO during the peak hour.
Revised CO Concentration Estimates at SLCIA

The CO concentration analysis was re-done at a more detailed level than was originally done for the XEA. The existing case scenario reflects the conditions at the Airport as they existed in 1987-1988. The two future cases (1996 and 2006) take into account the following substantial changes in motor vehicle circulation at the Airport that have occurred since that time. These changes include the construction of an additional lane to the OTLD (adding to the effective service volumes that can be accommodated on these roads), the consolidation of car rental offices into the new parking garage (thereby eliminating car rental shuttle trips), the construction of pedestrian bridges between the terminals and the new parking garage (increasing the effective service volumes on Inner and Outer TLD), the construction of additional lanes on South Cross Road (increasing the effective service volume of that road), the construction of an additional lane on Northbound Access Road, south of South Cross Road (increasing the effective service volume), the construction of overpasses where South Cross Road intersects with Northbound Access Road and Southbound Access Road, and the reconfiguration of employee parking from west of terminal two to an area between Northbound Access Road (NBAR) and 3700 West Road (thereby redistributing employee trips away from TLD and onto 3700 West Road and South Cross Road).

The results of the revised CO concentration analysis are shown in Exhibit 4.6-6 (revised). The estimates shown in Exhibit 4.6-6 (revised) reflect a local motor vehicle traffic CO component (estimated using CALINE4), an area-wide background CO component (estimated to be 1.20 ppm, one-hour average, and 5.00 ppm, eight-hour average) and an aircraft-related CO component (estimated using the ISC computer model).

The local motor vehicle traffic CO concentration estimates reflect changes in the traffic volumes that would be generated by Airport activities. It was assumed that traffic volumes on Airport roads would increase in proportion to the predicted increase in the annual number of passengers who would begin and end their air travel at SLCIA. The estimates shown in the table should be considered worst-case in that they reflect worst-case meteorological assumptions, including a wind speed of 1.0 meter per second and F stability, and that they reflect average weekday, peak-month, traffic volumes.

As shown in Exhibit 4.6-6 (revised), CO concentrations are estimated to have exceeded the eight-hour standard in 1988 in the vicinity of the Terminal buildings along TLD. By 1996, CO concentrations are expected to decline due to the lower average emission rates for motor vehicles in 1996 compared with those of 1988 and due to changes in circulation patterns and improved vehicle capacity on the road network that has occurred since 1988. The net effect of lower emission rates and improved circulation at the Airport would offset the growth in motor vehicle traffic generated by the Airport. While 1996 CO concentrations would be considerably less than those for 1988, excesses of the eight-hour average ambient standard are still expected to occur during worst-case meteorological conditions. Since the motor vehicle traffic generated under the Preferred Alternative would be essentially the same as under the No Project Alternative (see page 174 of the XEA), the CO concentrations under either Alternative would also be essentially the same.

Exhibit 4.6-6 (revised): Worst-case Carbon Monoxide Concentrations at SLCIA (All Alternatives in 1996 and 2006) /a/b

<table>
<thead>
<tr>
<th>Location</th>
<th>Averaging Period</th>
<th>CO Concentration (ppm)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Terminal 1</td>
<td>1 hr.</td>
<td>26.8</td>
</tr>
<tr>
<td>(alongside Inner TLD)</td>
<td>8 hr. /c/</td>
<td>14.2</td>
</tr>
<tr>
<td>Northbound Access Road</td>
<td>1 hr.</td>
<td>15.4</td>
</tr>
<tr>
<td>(at South Cross Road overpass)</td>
<td>8 hr. /c/</td>
<td>7.0</td>
</tr>
</tbody>
</table>

/a/ Worst-case CO concentration estimates include the sum of worst-case estimates from motor vehicle traffic (estimated using CALINE4 with MOBILE4.1 emission factors), from aircraft operations (estimated using ISC), and from background sources (estimated provided by Utah Bureau of Air Quality). Background sources estimated to generate a maximum background concentration of 12.0 ppm, one-hour average, and 5.0 ppm, eight-hour average for all three analysis years.

/b/ MOBILE4.1 emission factors used as input to CALINE4 were calculated assuming an ambient temperature of 25 degrees Fahrenheit, high altitude conditions; emissions mix of 20.6% cold start, 52.7% hot stabilized, and 27.3% and U/M and ATP inputs. Worst-case meteorology was assumed for the traffic CO estimates, including a wind speed of 1.0 meter per second, F stability, a standard deviation of wind bearing of 10 degrees, and a worst-case wind direction. Aircraft CO estimates made using ISC are derived from actual meteorological data taken at the Airport.

/c/ For motor vehicle-related CO, the eight-hour average concentration was derived from the peak-hour CO estimate by applying a 0.7 persistence factor.

NOTE: Underlined values represent predicted violations of the national ambient CO standard. The national ambient standard for CO is 35 ppm, one-hour average, and 9 ppm, eight-hour average. A violation occurs where these standards would be exceeded more than once per year.

component (estimated using ISC) in 2006 is estimated to be 0.6 ppm, eight-hour average, at that receptor location and that the second highest eight-hour average component from aircraft would be 0.4 ppm. Keeping the traffic component and background concentrations the same as for the highest worst-case estimate, but adding the second highest possible aircraft CO component, the second highest CO concentration (traffic plus aircraft plus background) in 2006 at that location would be 9.0 ppm, which is equal to, and not in excess of, the national standard. Since there would be only one predicted excess of the national standard during the year, that one excess would not be a violation of the national standard.

Since the revised analysis reveals that CO concentrations at SLCIA would drop and that no violations would occur by 2006, the Preferred Alternative would appear to satisfy the applicable CO requirements of the Clean Air Act Amendments.

Off-Site Effects on Ambient Concentrations of NO$_2$

For the purposes of determining whether the Preferred Alternative would conform with Utah Bureau of Air Quality requirements, annual average NO$_2$ concentrations were estimated under existing conditions, No Project (1996) and Preferred Alternative (1996) using the Industrial Source Computer model (ISC). The results of this modeling effort are shown in the following table. As shown in the following table, the national annual average standard of 100 micrograms per cubic meter (ug/m$^3$) for NO$_2$ would not be exceeded under either future scenario. The values shown in the table correspond to the highest values calculated for receptors located on SLCIA property. Thus, off-site effects would be less than those shown in the table. In 2006, NOx emissions are expected to be higher than in 1996, however, the percentage increase that is expected (about 30% as shown on page 104 of the Expanded EA) would not be expected to cause a violation of the national annual average standard. The Utah Bureau of Air Quality was provided with the entire set of input data used in the ISC analysis.

<table>
<thead>
<tr>
<th>Scenario</th>
<th>Concentration (ug/m$^3$) /a/</th>
<th>Background</th>
<th>SLCIA increment</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Existing</td>
<td>37</td>
<td>4</td>
<td>41</td>
<td></td>
</tr>
<tr>
<td>No Project</td>
<td>37</td>
<td>29</td>
<td>66</td>
<td></td>
</tr>
<tr>
<td>Preferred</td>
<td>37</td>
<td>15</td>
<td>52</td>
<td></td>
</tr>
</tbody>
</table>

/a/ Estimated using ISC dispersion model and actual meteorological data from SLCIA. The values shown represent the highest values obtained for receptor locations on SLCIA property.

SOURCE: Environmental Science Associates, Inc
MEMORANDUM

To: Barbara Johnson, Federal Aviation Administration
From: Marcia Gibbs, ESA

Regarding: Table of Air Quality Emissions
Date: June 8, 1992

Barbara, below is the summary table requested by Howard Segal, showing a comparison of air quality emissions of each of the criteria air pollutants for existing (1988, 1996) (build and no build), and 2006 (build and no build).

Please let me know if you need any additional information.

SUMMARY OF EMISSIONS AT SALT LAKE CITY INTERNATIONAL AIRPORT:
1988, 1996 (Build and No Build), 2006 (Build and No Build)

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Carbon Monoxide</td>
<td>20.6</td>
<td>19.5</td>
<td>21.4</td>
<td>22.0</td>
<td>23.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hydrocarbons</td>
<td>4.7</td>
<td>4.1</td>
<td>4.5</td>
<td>4.2</td>
<td>4.6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Nitrogen Oxides</td>
<td>4.0</td>
<td>5.5</td>
<td>5.8</td>
<td>7.2</td>
<td>7.4</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sulfur Dioxide</td>
<td>0.4</td>
<td>0.4</td>
<td>0.5</td>
<td>0.4</td>
<td>0.5</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Particulates</td>
<td>1.0</td>
<td>1.5</td>
<td>1.5</td>
<td>2.0</td>
<td>2.0</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


Sincerely,

Marcia Gibbs
Project Manager
United States Department of the Interior

FISH AND WILDLIFE SERVICE
FISH AND WILDLIFE ENHANCEMENT
UTAH STATE OFFICE
10TH ADMINISTRATION BUILDING
1740 WEST 1100 SOUTH
SALT LAKE CITY, UTAH 84116-3410

October 10, 1991

Barbara Johnson
Environmental Planner
Federal Aviation Administration
Denver Airports District Office
5440 Roslyn Street, Suite 300
Denver, Colorado 80216-6062

Dear Ms. Johnson:

This Biological Opinion responds to your October 29, 1990, request for formal consultation with the Fish and Wildlife Service (Service) pursuant to Section 7 of the Endangered Species Act of 1973, as amended (Act). Consultation was initiated on November 1, 1990, following receipt of a U.S. Department of Transportation, Federal Aviation Administration letter dated October 29, 1990, submitting the Revised Environmental Assessment.

At issue are the impacts of the construction of a third north-south commercial air carrier runway and the rerouting of a transmission line corridor that traverses the proposed runway site from northeast to southeast may have an effect on the Bald eagle (Haliaeetus leucocephalus) and American peregrine falcon (Falco peregrinus anatum), both of which are Federally listed endangered species.

This Biological Opinion was prepared using information contained in the September 24, 1990, Revised Salt Lake City International Airport (SLCIA) Expanded Environmental Assessment prepared by Environmental Science Associates, Inc., the final Draft of the Airport Master Plan Update for Salt Lake City International Airport prepared by TRA Airport Consulting (April, 1988), and the Bird-Aircraft Strike Hazard Plan for SLCIA (Revised December 27, 1989). Additional information was obtained from existing files at the Service’s Salt Lake State Office.

BIological Opinion

Based on the best scientific and commercial information currently available, it is our Biological Opinion that the proposed construction of the additional runway and the rerouting of the existing transmission line corridor is not likely to jeopardize the continued existence of the bald eagle or peregrine falcon.

Project Description

The new runway would parallel the existing north/south training runways and would be situated about 6,300 feet west of Runway 16R-34L. The proposed runway and taxiways would be 12,000 feet long. A larger area, about 14,000 feet by 1,600 feet, would be altered directly by activities associated with site preparation, such as dewatering and runway and taxiway construction.

Construction would necessitate relocating portions of the Surplus and North Point Canals, the Goggin Drain, and existing Utah Power and Light transmission lines. In addition, the construction of east/west trending taxiways, about 4,200 feet long, would be necessary to connect the new runway with the terminals. Revision of local drainage channels, both natural and man-made, would be the first step in construction. These revisions would assist in ground dewatering.

A series of check dams would be required, and a surcharging program would probably be required for at least 18 months. This is a process whereby additional uncompacted material is placed temporarily in an area to be paved, to force water from beneath the area and cause settlement in advance of construction. On the assumption of an elevation of 4,225 feet above mean sea level for the runway, approximately 6 million cubic yards of fill material would be necessary for surcharging and construction of the new runway system.

This material would most likely consist of clean borrow from off-site sources (the off-site fill would meet state quality standards).

In addition to runway construction the Preferred Alternative would entail construction of an additional terminal unit, expanded concourses, reorganization of parking facilities including construction of a four-level parking structure, and pavement of an additional apron to serve the terminal area. Although 4000 West Street would be relocated during construction, access would remain open during construction. The street would be undergrounded where it crosses proposed taxiway areas. This alternative would require some re-routing of 5600 West Street. The alternative would also require the re-routing of a transmission line the traverses the proposed runway site from northeast to southwest.

Under the No-Project Alternative, existing SLCIA facilities would be upgraded; however, no new runway would be built. Upgrades would include features such as high-speed exit taxiways and improvements in instrumentation.

Basis for Opinion

Species Account

On March 11, 1967, the Service determined the Bald eagle was endangered throughout most of its historic range in the contiguous United States west of the Mississippi River with the exception of the States of Washington and Oregon. The American peregrine falcon was first listed in 1970 as endangered throughout its range. Because of their wide range, no critical habitat has been identified or listed for either species (U.S. Fish and Wildlife Service, 1990).
Bald Eagles.

Bald eagles are currently not known to nest in northern Utah, but are a wintering resident suspected of summering in northern Canada (U.S. Fish and Wildlife Service, 1983). The birds begin to arrive in the general area in October and November. Their numbers may vary though out the period of their stay during the winter months. They generally can be observed roosting in large cottonwood trees adjacent to the Great Salt Lake and other large trees in canyon areas to the east of the lake.

Roost areas are known to occur to the northeast, east and southeast of the lake. One of the most popular roost sites is to the southeast of the lake and in close proximity of the proposed project site, approximately two miles northeast of the northern terminus of runway 16R-34L. Over the past several winter seasons, over 100 eagles have been observed at one time at this site in the large trees near the Jordan River and Cudahy Lane. Smaller numbers have been noted roosting in other areas to the north. As it has been highly suspected, these birds are drawn to the area by the abundance of fish found in the brackish water shallows of the lake and waterfowl that have been crippled during the hunting season and managed to survive till preyed upon. Some small mammals found on the upland areas adjacent to the lake and shallow marsh areas may also contribute to their diet.

Birds are known to range out as far as 15 Kilometers from their roosts during these periods of foraging (Keister, G. P. and R.G. Anthony, 1983). The birds generally remain in the area until they begin their northern migration in early March.

Foraging in the Jordan River area appears related to recent flooding there. Flooded farmland has created habitat for common carp (Cyprinus carpio) escaped from highly saline waters of the Great Salt Lake that has inundated their fresh and brackish water habitat around the periphery of the lake. In turn, the carp have become stranded in shallow areas and have attracted foraging eagles. Another major factor in the distribution of wintering bald eagles entails freezing patterns. Bald eagles require areas of free water for foraging. As winter develops and areas around the Great Salt Lake freeze, the Great Salt Lake eagle population may disperse to other parts of Utah to seek of suitable habitat. Thus, patterns of wetland use around the Great Salt Lake by eagles may vary from year to year with variations in climatic factors and salinity gradients, both of which can affect freezing. The birds reassemble in the Great Salt Lake area during late February and early March prior to their migration north (Federal Aviation Administration, 1990).

Peregrine Falcon

The American peregrine falcon is known from areas around the Great Salt Lake. Historically, the bird was reported nesting here but, until recently, nesting had declined seriously. A clutch of three, or more often four, eggs are laid by late April or early May. Both sexes incubate, although the male shares less of that duty and provides most of the prey. Incubation last 33 days.

The young remain in the area several weeks after fledging in mid-June to mid-July, during which time they are fed and defended by both adults (U.S. Fish and Wildlife Service, 1984).

Beginning in 1979, the Utah Division of Wildlife Resources (UDWR) has placed six "hack" towers in various locations around the Great Salt Lake (Walters, 1988). The most recent placement was 1987. Hack towers are structures 40 to 50 feet high, topped by boxes in which month-old artificially hatched birds are placed until they learn to fly and hunt. The ultimate aim of nanking is the re-introduction of peregrine falcons into the wild. Wildlife managers hope that the falcons will eventually take up nesting in canyon areas along the Wasatch Front. So far, many of the birds appear to have returned to their hack towers, and use these as nest sites. In past years, nests on four out of five towers have produced young; eggs were lost when a fifth tower fell in high winds. Two additional towers have since been constructed, bringing the total number of hack towers to seven in 1990.

One of the seven hack towers placed around the Great Salt Lake is about two miles northwest of the existing SLCIA terminal area. This tower site, like others around the Great Salt Lake, was chosen for its relative distance from other towers, its closeness to wetlands, and its location at an elevation above rising lake levels (Revised Salt Lake City International Airport (SLCIA) Expanded Environmental Assessment, 1990). This tower was one of the three successful towers that were used by returning birds during the past year, 1990. Though nesting use was attempted at other towers in 1990, their reason for being unsuccessful has not been fully determined as of this date.

One pair of birds, nesting downtown on a ledge on the ninth floor of the Hotel Utah, is also known to forage in the general area of SLCIA. Over the past several years they have successfully fledged ten out of the twelve birds hatched. During the 1991 nesting season, the pair relocated to a west facing cliff face approximately one mile north of the hotel and were successful in fledging two additional birds, bringing the total to 12.

Peregrine falcons reside in the Salt Lake area from about March through October. During the winter, the birds appear to migrate to the San Francisco Bay Area (Walters, 1988). During the winter, the Salt Lake hack towers could be used by migrants from elsewhere for perching and roosting.

Peregrine falcons forage over large areas, particularly where there are open water bodies, marshes, and shorelines. While birds may range over wide areas, however, hunting may occur in a few selected places in that range (U.S. Fish and Wildlife Service, 1982). Dietary analysis in the Salt Lake area suggest that the falcons prey on upland as well as wetland bird species. In one study, over 30 different prey species, including pigeons, mourning doves, western meadowlarks, avocets, stilts, and other shorebirds were identified (Walters, 1988). Falcons generally obtain prey by attacking the birds from above or chasing them from behind (U.S. Fish and Wildlife Service, 1982).
One must consider the overall loss of 1.120 acres of habitat, both upland and wetlands together, as both are essential in the productivity of the prey base for these two species. While the uplands provide nesting, escape and a source of food for raptors, the wetlands and small mammal species, the various wetland regimes also provide these essential necessities as well as broad areas for many of the upland nesting birds preyed upon by falcons and eagles. The wetlands also provide habitat for the common carp (Carassius carpio), a major food source for the wintering bald eagle population.

Though the total acreage, aside of the 1.120 acres, within the proposed SLCIA construction area boundary, would not be totally lost to production on the present facility, it would be significantly reduced. Upland areas remaining after all airport related facilities are completed and in place would experience a much reduced productivity due to disturbance from noise and other human activity associated with maintenance and operations of the airport.

Relocation of the high voltage transmission lines to the north and west of the existing and new facilities is a potential hazard to these two species and other birds that may fly through the area especially during the spring and fall migration seasons. Though raptors are considered to have a much better eyesight than other birds, when in pursuit of a prey species around the lines or support towers their attention could be distracted to the prey and a collision could occur.

Under the preferred alternative, the relocation of the transmission lines would place the existing facilities to the north in and over an area more dominated by wetlands than uplands. This would require the construction of permanent and access roads for construction as well as maintenance during the life of these facilities. The wetlands in this area are closer to the main body of the Great Salt Lake and consist of a more permanent open water regime than those uplands where they are more likely to be used by eagles foraging for carp and crippled waterfowl during the winter and early spring seasons.

Cumulative Effects

Cumulative Effects are those effects of future non-federal (State, local government, or private) on endangered and threatened species or critical habitat that are reasonably certain to occur during the course of a Federal activity subject to consultation. Future Federal actions are subject to the consultation requirements established in Section 7 of the Act and, therefore, are not considered cumulative to the proposed action.

The action area associated with this proposed development is the Salt Lake City International Airport, which encompasses approximately 7,300 acres of land of which two-thirds exist as a developed facility in its present state. The Salt Lake City International Airport is owned by the Salt Lake City Corporation and is operated by the Salt Lake City Airport Authority. The surrounding lands are basically privately owned. The east side of the airport is primarily residential, while to the south and southwest consist of light industry and commercial. The north and northwest sides of the airport are open agricultural lands used for grazing and some minor parcels are in crop production.

The cumulative impacts that would occur are those associated with the construction of the airport runway and airport associated facilities; the long term operation of these facilities; loss of the prey base habitat; bird collisions with the transmission lines and towers; electrocution; and loss of use of the peregrine hawk tower located to the west of the proposed runway.

Construction, maintenance and operation of these facilities will result in the loss of the wetlands and uplands that are presently in an undisturbed state. Location and operation of these facilities will require the filling, leveling and restructuring of uplands and wetlands that are now used for foraging and the production of prey species. These lands will be lost to these uses for the life of the project.

The loss of the prey base due to private and commercial development has and will continue to be a going issue now and into the future. Due to location, terrain and Federal ownership of lands, expansion for housing and commercial development is essentially restricted to the private lands to the west and northwest of Salt Lake City. Unless restrictive measures such as zoning against future development, or the acquisition of these lands for wildlife is implemented, it is a reasonable expectation that wildlife and the prey base it provides for eagles and falcons will be lost from these lands.

Lands providing a prey base for bald eagles and peregrine falcons are basically restricted to that and similar areas around the Great Salt Lake as described previously in this section. In Salt Lake County, these lands are located primarily to the north and west of the SLCIA and consist of less than 40,000 acres of mixed uplands and wetlands with wetlands increasing in size and numbers as one approaches the Great Salt Lake. Salt Lake County is approximately 483,840 acres in size.

The peregrine falcon would forage over most of the 40,000 acre area for prey while the bald eagle would forage the wetlands areas more adjacent to the Great Salt Lake proper since their primary diet is fish and crippled waterfowl. Unrestricted private and commercial development of these lands will eventually eliminate most of the prey base area for the peregrine falcon and somewhat reduce it for the wintering population of bald eagles.

Development of the additional runway at SLCIA under the Preferred Alternative would require relocation of an existing overhead transmission line corridor that crosses the proposed airport expansion area. Relocation of this corridor to the north and west would encroach further into the wetlands and higher quality prey base area for both the bald eagle and peregrine falcon than at their present location, thus increasing the likelihood of bird collisions far above the present level.

While both species are known to have a greater eyesight than their potential prey, their attention may be distracted to the chase and away from the structures and lines. Also, the proposed relocation of these lines to the
north and west will also increase the likelihood of other birds colliding with these structures. If the bird is not killed outright, it would fall to the ground or water only to flounder around. Such occurrence thus could attract the attention of a falcon or eagle thus again presenting a potential collision and/or electrocution problem.

The Preferred Alternative for the proposed additional runway would bring this feature to within less than one mile of the existing hack tower. Aircraft noise from the existing operation of the airport does not appear to be a detriment to the attractiveness of this structure by falcons seeking a nesting site or eyrie. However, construction and use of the proposed runway upon completion would be within one mile of the hack tower thus making the structure less attractive due to its close location and noise from incoming arrivals and departing aircraft.

Much of the following discussion is taken from Ohlendorff, et al. (1981). Birds of prey (raptors) are electrocuted by power lines because of two interactive factors: 1) the distribution, size, behavior and other biological aspects of raptors, and 2) the design of electric structures. Large size is the most crucial factor which predisposes certain raptors to electrocution. Between 70 and 80 percent of all raptor mortalities along electric distribution lines are eagles, especially golden eagles.

Up to 98% of known mortality among golden eagles at power lines involves immature or subadult birds, even though the population is composed only of 30-35% birds in this age group. "One would expect this mortality rate to be similar in bald eagles in the same age class." The disproportionate susceptibility of immature and subadults to electrocution involves several factors; none is more important than flying and hunting experience. Most mortality occurs when birds are landing or taking flight or their wings or feet come in contact with a conductor. It is expected that young falcons would be subject more to the collision factor than electrocution. Newly fledged birds do not have the strength or the agility of adults and thus will be subjected to a higher mortality rate due to collision when flying in the vicinity of the transmission lines. Also, due to the greater appetite of young, they are likely to forage and prey on other bird species that have collided with the lines and are floundering on the ground or in close proximity.

INCIDENTAL TAKE

Section 9 of the Act, as amended, prohibits any taking (to harass, harm, pursue, hunt, shoot, wound, kill, trap, capture or collect, or attempt to engage in any such conduct) of listed species of fish or wildlife without specific exemption. Harm is further defined to include significant habitat modification or degradation that results in death or injury to listed species by significantly impairing behavioral patterns such as breeding, feeding, or sheltering. Under the terms of Section 7(b)(4) and 7(a) 2 of the Act, taking that is incidental to and not intended as part of the agency action is not considered a prohibited taking provided that such taking is in compliance with this incidental take statement.

Based on field observations by the U.S. Fish and Wildlife Service (Service) and by documents submitted for the Services' review by the Federal Aviation Administration and Salt Lake City International Airport Authority, the Service anticipates the following take could occur as a result of the proposed expansion of the airport.

The location of the proposed airport runway would be less than one mile from the existing peregrine hack tower. Though the hack tower is considered an artificial eyrie, usage of the structure by an adult pair of birds did occur during 1990. This pair of adults was credited with fledging 4 young peregrines.

Construction of the airport runway may cause the abandonment (harass) of this eyrie by returning pairs to this site. Such abandonment would be caused by human and mechanical activity and during construction and after runway usage begins. Also, relocation and construction of new towers and transmission lines may also result in the abandonment of this eyrie. However, once these structures and lines are in place, it is expected that intrusions into this area would be restricted to inspection and maintenance of the relocated facilities. Thereby, it is concluded that the production of four peregrine falcon young would be lost from this eyrie during the first year of construction. It is expected the adults would seek out an alternative eyrie site along the cliffs of the Wasatch in the year following the start of construction. However, potential or existing eyrie sites may already be occupied and thereby not be available to the disposed pair of falcons.

The existing location of the lines are far enough to the southeast of the hack tower that they do not appear to present a hazard to foraging peregrines or their newly fledged young and wintering bald eagles. Also, the present location of these facilities do not cross or are in close proximity to the most probable foraging areas. Relocation of this corridor to the north, depending on distance, would place this facility in the more desirable foraging areas and thereby, increase the opportunity for bird collisions within these areas and towers and/or electrocution. Collisions will occur while chasing prey and/or foraging for crippled prey species that have previously collided with the lines or towers and have fallen to the ground.

Though raptors do have a much better eyesight than their prey species, during a chase or while foraging, their concentration is on the prey, thus increasing the possibility of a collision. The Service would expect to see a higher mortality rate with newly fledged falcons who are just beginning to hunt for themselves and lack the flight experience found in adult birds.

Power lines that cross unfrozen open water areas that are inhabited by carp would present a problem to the wintering bald eagles that are out fishing from the roost sites. Though the primary diet of this species is fish, they will forage for other species of animal life and include it in their diet. Attempts to take prey found below or in close proximity of the lines could be very detrimental to individual and sub-adult birds.

Accurate counts of these mortalities would be difficult to predict; and collect, since various other ground predators and scavengers are likely to
haul injured and dead birds to other areas to feed upon or cache to be used as a meal at a later date. It would only be by chance that one would find the injured or carcass of the birds in question. Thereby, due to the uncertainty of finding the injured or dead birds, it is expected that one bald eagle would be lost to collision with the lines and towers or electrocuted each year after construction.

The measures described below are nondiscretionary, and must be undertaken by the agency or made a binding condition of any grant or permit issued to the applicant, as appropriate.

REASONABLE AND PRUDENT MEASURES

The Service believes that the following reasonable and prudent measures are necessary and appropriate to minimize the incidental taking authorized by the Biological Opinion:

1. Measures shall be taken to prevent peregrine falcons from being harmed by any project-related activity.
2. Measures shall be implemented to mitigate for take of peregrine falcon and bald eagle from electrocution and/or power line collision.
3. Loss of upland and wetland foraging and prey base habitat shall be mitigated on adjacent lands to the north and west of the airport.

TERMS AND CONDITIONS

In order to be exempt from the prohibitions of Section 9 of the Act, the Federal Aviation Authority must ensure that the Salt Lake City Airport Authority complies with the following terms and conditions, which implement the reasonable and prudent measures described below:

1a. The existing hack tower shall be left in place until October 1 of the year prior to the beginning of any construction or power line relocation.
1b. The hack tower shall be moved to a location approximately one mile to the west or northwest of the present location. Site location and construction shall meet with the approval of the Fish and Wildlife Service and Utah Division of Wildlife Resources.
1c. The existing or new structure shall be in place and ready for occupancy by February 1 following the date of removal.
2b. To reduce bird collisions with high voltage lines (> 115kV), each ground or static line will be marked with 12 inch red and yellow aviation marker balls spaced at no less than 150 feet between balls on each line. To increase the apparent density of marker balls, place the first yellow ball on the first ground (static) wire 100 feet from the first relocated tower and then alternate with red and yellow at appropriate distance. On the second ground (static) wire place the first red ball 150 feet from the tower and then alternate with yellow at the appropriate distance. Ball marking shall extend the full length of the relocated lines.
3a. Discussion to mitigate for prey base habitat loss will continue until a satisfactory agreement has been reached with the U.S. Fish and Wildlife Service and Utah Division Wildlife. Such agreement will consider upland and wetland impacts resulting from runway construction and power line relocation.

CONSERVATION RECOMMENDATIONS

Section 7(a)(1) of the Act directs Federal agencies to utilize their authorities to further the purposes of the Act by implementing conservation programs for the benefit of endangered and threatened species. Conservation recommendations have been defined as Service suggestions regarding discretionary agency activities to minimize or avoid adverse effects of a proposed action on listed species or critical habitat, or regarding development of information. The recommendations provided here relate only to the proposed action and do not necessarily represent complete fulfillment of the agency's Section 7(a)(1) responsibility for these species.

1. Disturbed uplands within the airport boundary should be revegetated immediately upon completion of construction and left as open space.
2. Vegetation should consist of species that are indigenous to the area and provide nesting cover for ground nesting birds.
3. Consideration be given to deed lands acquired for mitigating foraging and prey base habitat losses to a wildlife trust agency for perpetual management for the purpose for which they were acquired and developed.
4. If underground placement of these facilities is a realistic alternative to the relocation of the above ground transmission lines, this alternative should be pursued. Such an alternative would eliminate the potential of a collision or electrocution of all birds as well as eagles and falcons along this stretch of the transmission corridor with the towers and/or lines, particularly in foggy and overcast weather.

CONCLUSION

This concludes formal consultation on the Salt Lake City International Airport. As required by 50 CFR 402.16, reinitiation of formal consultation is
is required if: 1) the amount or extent of incidental take is reached, 2) new information reveals effects of the agency action that may impact listed species or critical habitat in a manner or to an extent not considered in this opinion, 3) the agency action is subsequently modified in a manner that causes an effect to a listed species or critical habitat that was not considered in this opinion, and 4) a new species is listed or critical habitat designated that may be affected by the action.

The U.S. Fish and Wildlife Service appreciates the assistance and cooperation of your staff throughout this consultation process. If we can be of further assistance, please contact Robert Freeman or me at 801-524-5630 or FTS 588-5630.

Sincerely,

[Signature]

Clark D. Johnson
Assistant Field Supervisor

LITERATURE CITED


Mr. Domino  
January 28, 1992
Page 2

2. The approved installations shall consist of the following new equipment:
   A. One (1) 18,000 gallon automotive fuel tank
   B. One (1) runway

This AO only deals with the items listed in condition #1.

3. Visible emissions from the ground service vehicles shall not exceed 20% opacity. Visible emissions from mobile sources and intermittent sources shall use procedures similar to Method 9, but the requirement for observations to be made at 15 second intervals over a six minute period shall not apply. Any time interval with no visible emissions shall not be included.

4. The 18,000 gallon automotive fuel storage tank and the 40,000 barrel aviation fuel storage tanks shall be of the submerged fill type.

5. The 18,000 gallon automotive fuel storage tanks shall be fitted with pressure/vacuum vents to control the release of VOC. The valves shall be sized to handle 4 oz. water column positive pressure and 2 oz. water column vacuum.

6. No volatile organic liquid stored in either of the two 40,000 barrel aviation fuel storage tanks shall have a true vapor pressure, at actual storage temperature, in excess of 0.24 kPa (0.035 psia). The owner/operator of these vessels shall maintain a record of the volatile organic liquid (VOL) stored, the period of storage, and the maximum true vapor pressure of the VOL stored during the respective storage period. These records shall be made available to the Executive Secretary or his representative upon request, and shall include a period of two years ending with the date of the request.

7. The annual throughput of fuel shall not exceed the following amounts without prior approval in accordance with R446-l-3-1, UAC:
   a. 550,000 gallons of automotive fuel (gasoline) per 12-month period for the 18,000 gallon automotive fuel tank
   b. 326 million gallons of aviation fuel per 12-month period for the entire facility. The entire facility consists of two (2) 40,000 bbl, two (2) 30,000 bbl and two (2) 5,000 bbl aviation fuel storage tanks.

Compliance with the annual limitations shall be determined on a rolling 12-month total. On the first day of each month a new 12-month total shall be calculated using the previous 12 months. Records of throughput shall be kept for all periods when the plant is in operation. Records of throughput shall be made available to the Executive Secretary upon request, and shall include a period of two years ending with the date of the request. Throughput shall be determined by flow measurements on the tanks. Records of throughput shall be kept on a daily basis.

January 28, 1992

Steven L. Domino  
Planning and Environment Manager  
Salt Lake City International Airport  
Salt Lake City, Utah 84112

Re: Approval Order for Construction of a New Air Carrier Runway, Replacement of Four Atmospheric Fuel Storage Tanks With a Single Tank and Increase Annual Throughput of Existing Aviation Fuel Tanks  
Salt Lake County CDS AI WA NSPS

Dear Mr. Domino:

The above-referenced project has been evaluated and found to be consistent with the requirements of the Utah Air Conservation Rules (UACR) and the Utah Air Conservation Act. A 30-day public comment period was held and all comments received were evaluated. The conditions of this Approval Order (AO) reflect any changes to the proposed conditions which resulted from the evaluation of the comments received. This air quality AO authorizes the project with the following conditions and failure to comply with any of the conditions may constitute a violation of this order:

1. The Salt Lake City Airport, located in Salt Lake City, shall construct and operate the proposed runway according to the information submitted in the Notice of Intent dated June 21, 1990 and additional information submitted to the Executive Secretary dated September 13, 1990 and October 7, 1991.

The Airport shall also replace two 12,000 gallon underground tanks and two 12,500 gallon above ground tanks with an 18,000 gallon atmospheric fuel storage tank according to the information submitted in the Notice of Intent dated October 23, 1990.

The Airport shall also increase the total annual throughput for the two 40,000 barrel aviation fuel tanks approved in DAGE-392-90 from 90 million gallons of aviation fuel to 174 million gallons annual throughput according to the information submitted in the Notice of Intent dated July 12, 1990.

A copy of this Approval Order shall be posted on site and shall be available to the employees who operate the air emission producing equipment. All employees who operate the air emission producing equipment shall receive instruction as to their responsibilities in operating the equipment in compliance with all of the relevant conditions.
8. The 18,000 gallon automotive fuel storage tank shall be loaded and unloaded using a vapor balance system in which the air (containing VOCs) displaced by the incoming liquid is piped back into the unloading vessel and returned to the loading terminal.

9. The sulfur content of any fuel oil burned shall not exceed 0.50% by weight as determined by ASTM Method D-4294-89 or approved equivalent. The sulfur content shall be tested if directed by the Executive Secretary.

10. Fugitive dust emitted from the construction of the new runway shall be minimized according to the control and/or operating procedures of R446-1-4.5.2 UAC and R446-1-4.5.3 UAC.

11. In addition to the requirements of this AO, the following requirements of 40 CFR 60, NSPS Subpart Kb apply to the installation of the fuel storage tanks:

A. 40 CFR 60.116b (a) and (b) - This requirement applies to the 18,000 gallon automotive fuel storage tank.

B. 40 CFR 60.116b (b) and (d) - This requirement applies to the two 40,000 barrel aviation fuel storage tanks.

12. In the event that the State Implementation Plan (SIP) fails to achieve the National Ambient Air Quality Standards (fine particulate, oxides, and carbon monoxide) and SIP changes must be generated, the owner/operator shall comply with any new conditions issued by order of the Utah Air Quality Board. Also, if the PSD increments are exceeded, the owner/operator shall comply with any plan promulgated by the Utah Air Quality Board to eliminate the exceedance.

13. All records referenced in this AO or in an applicable NSPS or NESHAPS, which are required to be kept by the owner/operator, shall be made available to the Executive Secretary or his representative upon request.

14. All installations and facilities authorized by this AO shall be adequately and properly maintained. The owner/operator shall comply with R446-1-3.3 and 4.7, UAC. R446-1-3.5, UAC addresses emission inventory reporting requirements. R446-1-4.7, UAC addresses unavoidable breakdown reporting requirements. The owner/operator shall calculate/estimate the excess emissions whenever a breakdown occurs. The sum total of excess emissions shall be reported to the Executive Secretary for each calendar year no later than January 31 of the following year.

15. The Executive Secretary shall be notified in writing upon start-up of the installation, as an initial compliance inspection is required. Eighteen months from the date of this AO the Executive Secretary shall be notified in writing of the status of construction/installation if construction/installation is not completed. At that time the Executive Secretary shall require documentation of the continuous construction/installation of the operation and may revoke the AO in accordance with R446-1-3.1.5.

Any future modifications to the equipment approved by this order must also be approved in accordance with R446-1-3.1.1, UAC.

This AO in no way releases the owner or operator from any liability for compliance with all other applicable federal, state, and local regulations including the Utah Air Conservation Rules.

Annual emissions for this source (the entire facility including emissions from mobile sources are calculated at the following values for 1996 after completion of the runway):

A. 638 tons/yr for Particulate
B. 512 tons/yr for PM10
C. 137 tons/yr for SO2
D. 2052 tons/yr for NOx
E. 1236 tons/yr for VOC
F. 7294 tons/yr for CO

Annual emissions for this source (the entire facility excluding emissions from mobile sources and including fugitive emissions are calculated at the following values for 1996 after completion of the runway):

A. 13.8 tons/yr for Particulate
B. 12.5 tons/yr for PM10
C. 2.2 tons/yr for SO2
D. 5.2 tons/yr for NOx
E. 88.2 tons/yr for VOC
F. 60.1 tons/yr for CO

These calculations are for the purposes of determining the applicability of PSD and nonattainment area major source requirements of the UACR.

Sincerely,

F. Burnell Corsham, Executive Secretary
Utah Air Quality Board

cc: EPA Region VIII, Mike Owens
Salt Lake City/County Health Department
Mr. Steven L. Domino  
Salt Lake City Airport Authority  
AMF Box 22084  
Salt Lake City, Utah 84122

RE: SLC Airport New Runway Storm Water Pretreatment Facility Certification

Dear Mr. Domino:

We have reviewed a conceptual proposal, prepared by Bryce Taggart of your office, describing the expansion of the airport, including the referenced project. We responded to this proposal in our letter dated November 20, 1990. On December 11, 1990 we received your letter requesting a written evaluation of the referenced project.

At this time we are reasonably assured that, after our review and approval of the final plans and specifications, the project will be located, designed, constructed and operated in compliance with applicable water quality standards.

We have not received or reviewed information concerning wetlands. It is our understanding that the Army Corps of Engineers is presently reviewing wetland issues concerning the proposed expansion of the airport. We can only issue a water quality certification to the Corps of Engineers after reviewing the 404 permit application.

Should you have any questions, please contact Lyle Stott at 338-6146.

Sincerely,

Don A. Ostler, P.E., Director  
Bureau of Water Pollution Control

LWS.rvg

cc: Salt Lake City-County Health Department

January 11, 1991
SALT LAKE CITY INTERNATIONAL AIRPORT

UPDATED NOISE SECTION OF EXPANDED ENVIRONMENTAL ASSESSMENT

HMMH Report No. 291770
17 March 1992

Kate M. S. Larson
Ted M. Baldwin

Submitted to:
SALT LAKE CITY AIRPORT AUTHORITY
AMF Box 22084
Salt Lake City, Utah 84122

Submitted by:
HARRIS MILLER MILLER & HANSON INC.
429 Marrett Road
Lexington, MA 02173
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This document updates the noise section of the Expanded Environmental Assessment and noise contours for Salt Lake City International Airport (SLC). The information presented may be used by the Federal Aviation Administration (FAA) in their preparation of the Draft Environmental Impact Statement. Chapter 2 presents a summary of the data used as inputs to the Integrated Noise Model (INM), including maps of prototypical flight tracks and tables of aircraft operations, runway usage, and flight track usage. Chapter 3 discusses and illustrates the existing and future noise conditions. Three Alternatives for each of the years 1996 and 2006 are examined; they are the No-Project Alternative, in which the projected fleet mix is assumed to operate on the existing runways only, the Preferred Alternative, in which a new runway parallel to and 6,155 feet to the west of the existing Runway 16R/34L is assumed to be in use, and the Close-In Alternative, in which a new runway parallel to and 5,800 feet to the west of the existing Runway 16R/34L is assumed to be in use.
2. NOISE MODELING METHODOLOGY

HMMH developed the noise exposure contours included in this document using the Integrated Noise Model (INM), Version 6.9, and updated aircraft profiles specifically provided by the FAA to correct for airport elevation.

Use of the model requires several inputs. These inputs fall into two principal categories: (1) aircraft noise and performance data, and (2) aircraft operational data.

2.1 Noise and Performance Data

For this study, the FAA provided takeoff performance profiles specific to SLC's elevation of 4226 feet, which are equivalent to the profiles in the soon-to-be-released INM Database 10. Standard INM Database 9 noise curves, which identify how loud specific aircraft types are at different distances from the point of concern - distances ranging from 200 to 35,000 ft, were used in conjunction with the updated profiles for departure flights. The profiles specify the aircraft's thrust, speed, and altitude at a series of distances from the start of takeoff roll. For arrival flights, a standard three-degree glide slop approach was assumed and no special profiles were required.

An aircraft's performance on departure is affected by its takeoff weight. Stage length - the distance an aircraft is scheduled to fly - is often used as a surrogate for weight, because takeoff weight is largely dependent on fuel load, which in turn is generally a function of stage length. The Airport Authority provided departure operations data separated by stage length categories. For modeling purposes, all operations by a specific aircraft type were modeled at the highest stage length listed.

2.1 Operations Data

Operational inputs describe activity at the airport during the period of interest. Required operational inputs include the following:

- runway utilization rates;
- prototypical flight track descriptions;
- flight track utilization rates;
- level and mix of aircraft operations;
- day-night split of operations (by aircraft type), and
- physical description of the airport layout.

Automated Radar Terminal Service (ARTS) data for a sample of days in May, June, and October, 1991, provided current and accurate flight track descriptions and information on runway and flight track utilization rates. From a sample of approximately 12,000 flights, HMMH produced the set of tracks and corresponding usage rate tables to be included in the model. SLC Air Traffic Control Tower (ATCT) personnel then confirmed and made minor corrections to these data, which became the basis of the Existing Conditions noise model.
Table 2.1 Runway Utilization: Existing Conditions and No-Project Alternative

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Table 2.2 Runway Utilization: Preferred and Close-In Alternatives

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SALT LAKE CITY
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Figure 2.1
Runway 16R
Departure Flight Tracks
Existing Runway Configuration

SCALE in feet
0 ft 5000 ft 10000 ft

North

HARRIS MILLER MILLER & HANSON INC.
Figure 2.2
Runway 16R
Arrival Flight Tracks

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SCALE
0 5000 10000

HARRIS MILLER MILLER & HANSON INC.
Figure 2.3
Runway 34L
Departure Flight Tracks
Existing Runway Configuration
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Figure 2.4
Runway 34L
Arrival Flight Tracks
Existing Runway Configuration

SCALE

0 5000 16000

HARRIS MILLER MILLER & HANSON INC.
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Figure 2.5
Runway 16L
Departure Flight Tracks
Figure 2.6
Runway 16L
Arrival Flight Tracks

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SCALE in feet
0 5000 10000

HARRIS MILLER MILLER & HANSON INC.
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Figure 2.7
Runway 34R
Departure Flight Tracks
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Figure 2.8
Runway 34R
Arrival Flight Tracks
Figure 2.9
Runways 14 and 32
Departure Flight Tracks

Note: These Runways not used by jet aircraft

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SCALE in feet

0 2000 4000 6000 8000 10000 12000 14000 16000

HARRIS MILLER MILLER & HANSON INC.
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Figure 2.10

Runways 14 and 32
Arrival Flight Tracks

Note: These Runways not used by jet aircraft
ATCT personnel indicated that aircraft assignment in the Preferred and Close-In Alternatives between the new runway and the existing Runway 16R/34L will be based on the direction to which departures are destined or from which arrivals originated. Straight-in arrivals will be assigned the existing runway, while downwind arrivals and arrivals from the west will be assigned the new runway. Departures with initial eastward or straight-out headings will takeoff from the existing runway, while those turning westward or executing reversals will use the new runway. Figures 2.11 through 2.14 illustrate this assignment split. Figure 2.11 shows the arrival assignment split between the existing Runway 16R/34L and the new runway in the Preferred Alternative and Figure 2.12 shows the departure assignment split between those runways. Figures 2.13 and 2.14 portray the arrival and departure assignment splits between the existing Runway 16R/34L and the new runway in the Close-In Alternative.

ATCT personnel also indicated that no fundamentally different flight paths would be developed for use in either new runway alternative. The possibility of instituting an arrival procedure which would place aircraft in a downwind pattern to the east of the airport was examined and discarded, they said, and the procedure has been deemed not feasible.

2.2.3 Flight Track Utilization

Tables 2.3 and 2.4 present the flight track utilization rates for the existing and new runway configuration scenarios, respectively. The five categories of aircraft in each of these tables match the categories in Tables 2.1 and 2.2. Some flight tracks coincide exactly but bear different names, such as 6RD5 and 6RDJ, for reasons relating to model technicalities.
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 2.11

Preferred Alternative: 16R/34L vs New Runway Arrival Flight Tracks
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 2.12

Preferred Alternative: 16R/34L vs New Runway Departure Flight Tracks
SALT LAKE CITY
INTERNATIONAL AIRPORT

Figure 2.13
Close-In Alternative:
16R/34L vs New Runway
Arrival Flight Tracks
SALT LAKE CITY
INTERNATIONAL AIRPORT

Figure 2.14

Close-In Alternative:
16R/34L vs New Runway
Departure Flight Tracks
### Table 2.3 Existing and No-Project Alternative Flight Track Utilization Rates

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<td>6LD1 20</td>
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<td>6R02</td>
<td>32 6R0B 8</td>
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<tr>
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<td>6LD1 20</td>
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<td>32 6R0B 8</td>
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<td>32 6R0B 8</td>
</tr>
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<td>6LD0 25</td>
<td>6LD1 20</td>
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<td>2</td>
<td>320</td>
<td>40</td>
<td>6R02</td>
<td>32 6R0B 8</td>
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**Table 2.4 Preferred and Close-In Alternatives Flight Track Utilization Rates, cont.**

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<th>AIRCRAFT TYPE</th>
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<th>36L</th>
<th>16L</th>
<th>34R</th>
<th>14</th>
<th>32</th>
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<th>NEW 34</th>
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<td>6LAB 10</td>
<td>6RA1 10</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
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<td>6LAB 10</td>
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<td></td>
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<td>6LAB 10</td>
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<td></td>
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<td>6LAB 10</td>
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<tr>
<td>6LA6 45</td>
<td>6LAB 10</td>
<td></td>
<td></td>
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<td>6LA7 45</td>
<td>6LAB 10</td>
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<td>6LA8 45</td>
<td>6LAB 10</td>
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</tr>
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<td>6LA9 45</td>
<td>6LAB 10</td>
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<td>6LA10 45</td>
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Table 2.5 Modelled Aircraft Fleet Mix Summary

<table>
<thead>
<tr>
<th>Year</th>
<th>Air Carriers</th>
<th>GA/Cop Jets</th>
<th>Turboprops</th>
<th>Piston</th>
<th>Military</th>
<th>TOTAL</th>
</tr>
</thead>
<tbody>
<tr>
<td>1991</td>
<td>156,698</td>
<td>3,811</td>
<td>51,377</td>
<td>86,812</td>
<td>5,001</td>
<td>303,699</td>
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<tr>
<td>1996</td>
<td>180,598</td>
<td>4,095</td>
<td>55,261</td>
<td>91,345</td>
<td>5,205</td>
<td>336,504</td>
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<tr>
<td>2006</td>
<td>239,086</td>
<td>4,730</td>
<td>64,079</td>
<td>101,426</td>
<td>5,205</td>
<td>414,526</td>
</tr>
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</table>

2.4 Aircraft Operations

The Salt Lake City Airport Authority provided the data on the level and mix of aircraft operations in the base year (1991) and forecast year cases (1996 and 2006) which were input to the noise model. A summary of these data, which are the result of the revised forecast prepared in December, 1991, by the Salt Lake City Airport Authority and approved by the FAA, appears as Table 2.5, above. The TOTAL column at the right side of the table includes all annual operations except for helicopter flights, which were not included in the model. Table 2.6 lists the aircraft modeled in the 1991 case, grouped by aircraft category, as in the previous tables, and separated by arrivals and departures as well as daytime and nighttime operations. Tables 2.7 and 2.8 list the operations input data for the 1996 and 2006 cases in the same format, respectively. The numbers of operations given are for the average annual day.

All departures for a given aircraft type were modelled as one stage length, generally the highest stage length scheduled for that aircraft. The modelled stage length is listed next to the INM aircraft name in the tables.

The INM database contains noise data for 81 specific aircraft. The 1991, 1996, and 2006 fleet mix data for all civilian aircraft were supplied by the Airport Authority. Each aircraft type was then matched with the appropriate INM aircraft name based on FAA approved equivalence listings.

The forecast of yearly operations lists an estimate of 5000 yearly operations by military aircraft for 1991, and 5200 operations for both forecast years (1996 and 2006). The average daily numbers of operations by military aircraft are thus 13.70 and 14.25 for the present and future cases, respectively. Assuming ten percent of those operations at night and equal numbers of arrivals and departures, one arrives at the results listed in the tables.

\(^1\) Nighttime is defined as 10:00 pm to 7:00 am.
### Table 2.7 1996 Average Daily Aircraft Operations

<table>
<thead>
<tr>
<th>AIRCRAFT TYPE</th>
<th>ARRAIVALS</th>
<th>DEPARTURES</th>
<th>TAKEOFF STAGE MODELS</th>
<th>OPERATIONS BY TYPE</th>
</tr>
</thead>
<tbody>
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<td></td>
<td>DAY</td>
<td>NIGHT</td>
<td>DAY</td>
<td>NIGHT</td>
</tr>
<tr>
<td>AIR CARRIER</td>
<td>737/17</td>
<td>737/300</td>
<td>737/82</td>
<td>737/9</td>
</tr>
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<td></td>
<td>30.04</td>
<td>31.67</td>
<td>31.67</td>
<td>63.34</td>
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<td></td>
<td>737/300</td>
<td>41.40</td>
<td>43.26</td>
<td>43.26</td>
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<tr>
<td></td>
<td>737/82</td>
<td>3.60</td>
<td>3.76</td>
<td>3.76</td>
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<tr>
<td></td>
<td>737/9</td>
<td>2.39</td>
<td>2.53</td>
<td>2.53</td>
</tr>
<tr>
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<td>737/17</td>
<td>31.36</td>
<td>33.25</td>
<td>33.25</td>
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<td>737/27</td>
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<td>0.36</td>
<td>0.36</td>
</tr>
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<td></td>
<td>757/3F</td>
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<td>58.88</td>
<td>58.88</td>
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<tr>
<td></td>
<td>757/6F</td>
<td>13.73</td>
<td>14.10</td>
<td>14.10</td>
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<tr>
<td></td>
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<td></td>
<td>MD80</td>
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<td>737/200</td>
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<td></td>
<td>L1011</td>
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### Table 2.8 2006 Average Daily Aircraft Operations

<table>
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<tr>
<th>AIRCRAFT TYPE</th>
<th>ARRIVALS</th>
<th>DEPARTURES</th>
<th>TAKEOFF STAGE MODELS</th>
<th>OPERATIONS BY TYPE</th>
</tr>
</thead>
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<td></td>
<td>DAY</td>
<td>NIGHT</td>
<td>DAY</td>
<td>NIGHT</td>
</tr>
<tr>
<td>AIR CARRIER</td>
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319
According to Utah Air National Guard personnel, the only military aircraft based at SLC are ten KC135E aircraft (retired commercial Boeing 707 airliners re-engined with JT3D-3B engines). All military operations were modelled as KC135Es. As there is no specific listing for the KC135E present in the INM data base, all military operations were modelled as INM type 707/QN (Boeing 707s with JT3D engines).

3. NOISE CONTOURS

3.1 Ldn Contours

Computer generated noise contours for the 1991 calendar year at SLC are depicted in Figure 3.1. The predicted contours for the 1996 and 2006 No-Project Alternative cases are presented in Figures 3.2 and 3.3, respectively. Figures 3.4 and 3.5 portray the predicted noise exposure area for the Preferred Alternative in 1996 and 2006, and Figures 3.6 and 3.7 contain the Close-In Alternative contours for 1996 and 2006, respectively. The contours are presented for Ldn values 65 dBA and above, in 5 dBA increments.

3.2 Noise/Land Use Compatibility

According to airport noise compatibility planning guidelines in Federal Aviation Regulation Part 150 (FAR Part 150), all land uses are normally compatible with noise levels less than 65 Ldn. When noise levels exceed 65 Ldn, various types of land uses, including residential uses, become incompatible. Commercial and manufacturing activities are more tolerant of higher noise levels, but become incompatible when specified noise levels are exceeded (80-85 + Ldn).

To determine noise impacts to off-airport land uses, noise exposure maps for the 1991 Existing Conditions Case and projected contours for 1996 and 2006 of each alternative were developed using the data and procedures described in this report. The noise exposure maps identified areas subjected to noise levels of 65, 70, 75 and 80 Ldn. Table 3.1 lists the noise exposure area in acres for each set of noise contours. The values in Table 3.1 reflect the total noise exposure area including impacts both on and off airport property.

Table 3.1 Total Noise Impacted Area

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<thead>
<tr>
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<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>65-70</td>
<td>11960.0</td>
<td>7766.0</td>
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<td>10156.8</td>
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<td>10380.8</td>
<td>4147.2</td>
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<td>3980.0</td>
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<td>1696.0</td>
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<td>75-80</td>
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<tr>
<td>80-85</td>
<td>1990.4</td>
<td>858.4</td>
<td>198.4</td>
<td>1011.2</td>
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<td>902.4</td>
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<tr>
<td>85+</td>
<td>582.4</td>
<td>379.2</td>
<td>32.0</td>
<td>146.4</td>
<td>25.6</td>
<td>198.4</td>
<td>25.6</td>
</tr>
<tr>
<td>TOTAL</td>
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<td>14957.6</td>
<td>5491.2</td>
<td>19571.2</td>
<td>6681.6</td>
<td>19744.0</td>
<td>6649.6</td>
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</tbody>
</table>

Table 3.2 lists the off-airport noise exposure area in acres for each set of noise contours. The land use compatibility analysis is confined to areas off airport property within the contours.
Figure 3.1, page 2
1991
Base Case
Ldn Contours
North of Airport
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.2, page 1

1996
No-Project Alternative
Ldn Contours
South of Airport
Figure 3.2, page 2

1996
No-Project Alternative
Ldn Contours
North of Airport
SALT LAKE CITY
INTERNATIONAL AIRPORT

Figure 3.4, page 1

1996
Preferred Alternative
Ldn Contours
South of Airport
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.4, page 2

1996
Preferred Alternative
Ldn Contours
North of Airport
Figure 3.5

2006
Preferred Alternative
Ldn Contours

SALT LAKE CITY
INTERNATIONAL AIRPORT
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.6, page 1

1996
Close-In Alternative
L/A Contours
South of Airport
Figure 3.6, page 2
1996
Close-In Alternative
Ldn Contours
North of Airport
Figure 3.7
2006
Close-In Alternative
Ldn Contours
Land uses within the noise contours were identified through analyses of aerial photographs taken in 1991, existing land use maps, and a windshield survey conducted in January, 1992. Land uses were identified according to the basic classification system in the Standard Land Use Coding Manual (SLUCM) and were then grouped into more generalized categories depending on their sensitivity to noise levels. To simplify the land-use compatibility analysis, commercial services, industrial and manufacturing uses were grouped into a single land use category.

The following sections discuss the existing off-airport land uses within the 65 \( L_{dn} \) and greater noise contours. The analysis describes the impacts for the 1991 Existing Conditions Case and for each alternative - Preferred, Close-In and No-Project - in both forecast years.

### Table 3.2 Off-Airport Noise Impacted Area

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<tr>
<th></th>
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</tr>
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<td>1708</td>
<td>9043</td>
<td>1350</td>
<td>9062</td>
<td>1515</td>
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<td>79</td>
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<td>5</td>
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<tr>
<td>75-80</td>
<td>1184</td>
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<td>214</td>
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<td><strong>1355</strong></td>
<td><strong>17630</strong></td>
<td><strong>1520</strong></td>
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</table>

### 3.2.1 1991 Existing Conditions

Under existing conditions, the total noise contour area for SLC encompasses about 21,978 acres of which 5,871 acres are on airport property. The 16,105 acres (25.16 square miles) located off airport property and within the 65 \( L_{dn} \) and greater contours form the basis of the following land use analysis.

Overall, the area within the contours is typical of suburban development patterns, with areas of high-density use as well as large expanses of undeveloped areas. The most highly developed areas are located in Salt Lake City and West Valley City. Most development within the contours occurs between 1300 South Street and 2400 South Street. Figure 3.8 shows the land-use development pattern within the 1991 Existing Conditions contours. The noise contours primarily enclose areas directly to the north and south of the airport.

The type and extent of land uses within each contour interval for the Existing Conditions is presented in Table 3.3. Most of the area within the contours - about 10,642 acres - is exposed to noise levels between 65 and 70 \( L_{dn} \). Smaller areas off-airport are exposed to increasingly higher noise levels - 4,251 acres are within the 70-75 \( L_{dn} \) contour interval, 1,184 acres are within the 75-80 \( L_{dn} \) contour interval and 28 acres are within the 80 \( L_{dn} \) contour. The 28 acres of land exposed to noise levels equal to or greater than 80 \( L_{dn} \) is owned by the Salt Lake City Airport Authority although it is not enclosed by the official airport boundary.
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.8
1991 Base Case
Existing Conditions
Ldn Contours and Land-Use
Table 3.3 Land Use Types By Noise Contour Interval: Existing Conditions

<table>
<thead>
<tr>
<th>Contour Interval $L_{dn}$</th>
<th>Land Use (Acres)</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
<th>Undeveloped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 - 70</td>
<td></td>
<td>48</td>
<td>1129</td>
<td>9465</td>
<td>10642</td>
</tr>
<tr>
<td>70 - 75</td>
<td></td>
<td>9</td>
<td>628</td>
<td>3614</td>
<td>4251</td>
</tr>
<tr>
<td>75 - 80</td>
<td></td>
<td>0</td>
<td>53</td>
<td>1131</td>
<td>1184</td>
</tr>
<tr>
<td>80 +</td>
<td></td>
<td>0</td>
<td>0</td>
<td>28</td>
<td>28</td>
</tr>
<tr>
<td>Total</td>
<td></td>
<td>57</td>
<td>1810</td>
<td>14238</td>
<td>16105</td>
</tr>
</tbody>
</table>

Most of the existing impact area is located within the geographic limits of Salt Lake County. A small portion of the 65 $L_{dn}$ contour (just northwest of the area under the label "2200 W." on Figure 3.8) crosses the Jordan River into Davis County. However, no developed areas within Davis County are enclosed in the contours, and impacts greater than 65 $L_{dn}$ do not occur in Davis County. Two municipalities, Salt Lake City and West Valley City, as well as portions of unincorporated Salt Lake County, are affected by noise levels 65 $L_{dn}$ and greater.

The portions of unincorporated Salt Lake County that are within the noise contours are north of the Airport. The area is generally comprised of vacant land which is zoned for agricultural uses. Much of the land is open water or wetlands and is owned by a variety of duck clubs, including the Rudy Gun Club, Harrison Reclamation Company, and the Utah Duck Club. The primary use of this wetland area is seasonal duck hunting. Non-wetland areas in this vicinity are also largely undeveloped and are used for livestock grazing and other agricultural purposes.

Of the 16,105 acres of off-airport land within the noise envelope, nearly 14,238 acres is undeveloped land. Developed areas within the contours consist primarily of commercial services, industrial, and manufacturing land-uses which account for 1,810 acres of the noise impact area. Most (1,129 acres) of the commercial and manufacturing land-uses are within the 65-70 $L_{dn}$ contour interval. An additional 628 acres of commercial and manufacturing uses are exposed to 70-75 $L_{dn}$, while only 53 acres of manufacturing land-uses are exposed to noise levels above 75 $L_{dn}$.

Portions of both Salt Lake City and West Valley City are enclosed by the noise contours. The majority of the noise exposure area occurs in Salt Lake City with areas subjected to
noise levels within the 65, 70, and 75 $L_{eq}$ contours. Salt Lake City land uses within the contours are primarily vacant, agricultural, or manufacturing/industrial uses. Of the 1,810 acres of manufacturing/industrial uses within the contours, 1,542 acres are in Salt Lake City. 

Of these, about 961 acres are exposed to noise levels between 65 and 70 $L_{eq}$, 628 acres are in the 70-75 $L_{eq}$ contour interval and 53 acres are subject to noise above 75 $L_{eq}$. In West Valley City, 548 acres are within the existing impact area and are exposed to noise levels between 65 and 70 $L_{eq}$. About 268 acres are developed as commercial, manufacturing and industrial uses. The remaining area is presently undeveloped land which is zoned for future compatible industrial uses. No residential land uses within West Valley City are in the limits of the noise envelope and no area of West Valley City is exposed to contours above 70 $L_{eq}$.

Of the entire noise envelope, approximately 57 acres are residential land uses, encompassing sixty residences. Five of the residences are located south of the airport among large sections of undeveloped agricultural land. The remaining fifty-five are dispersed north of the airport along 2200 North Street and along a two mile strip of 2200 West Street, between 1700 North Street and Cudahay Lane. The residences occur as a result of zoning which allows farm related dwellings in agricultural zones. Fifty-four of the residences within the noise envelope are exposed to noise levels between 65 and 70 $L_{eq}$, forty-nine to the north of the airport and five to the south. The other six impacted residences are located between the 70 and 75 $L_{eq}$ contours, north of the airport along 2200 North Street.

In addition to approximately 13 seasonal recreational cabins, one permanent caretaker’s dwelling is located at the Rudy Gun Club. The club is located in unincorporated Salt Lake County within the 65 $L_{eq}$ contour and just outside of the 70 $L_{eq}$ contour. The seasonal cabins remain vacant throughout most of the year and are considered to be compatible land uses.

The 1992 average persons-per-household for Salt Lake County is 2.98. The estimated resident population within the Existing Conditions contours is 182 persons. Two additional residences (with estimated population of 6 persons) within the contours are a part of the old Buena Vista community. These are within the 75 $L_{eq}$ contour and are located on property owned by the Airport Authority. The two residences were purchased in accordance with the Uniform Relocation Act as an element of the Part 150 Noise Compatibility Program implemented by Salt Lake City Airport Authority. The people currently inhabiting them chose not to relocate under that program. These residences are therefore not counted as impacted under this or any of the future scenarios.

Other than the residences noted above, no noise-sensitive land uses are within the existing noise contours.

3.2.2 No-Project Alternative

Table 3.4 shows the distribution of the noise impacts by land use type within each contour interval for the No-Project Alternative for the projected 1996 and 2006 time periods. The analysis assumes no growth or change in the existing land use development pattern.

<table>
<thead>
<tr>
<th>Contour Interval $L_{eq}$</th>
<th>1996 Land Use (Acres)</th>
<th>2006 Land Use (Acres)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Residential</td>
<td>Commercial/Industrial</td>
</tr>
<tr>
<td>65 - 70</td>
<td>22</td>
<td>174</td>
</tr>
<tr>
<td>70 - 75</td>
<td>4</td>
<td>242</td>
</tr>
<tr>
<td>75 - 80</td>
<td>0</td>
<td>26</td>
</tr>
<tr>
<td>80 +</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>Total</td>
<td>26</td>
<td>1442</td>
</tr>
</tbody>
</table>

In 1996, the No-Project Alternative will result in less acreage within the noise contours than the existing conditions. The total area of the contours that is off of airport property will decrease from 16,105 acres in 1991 to 9,463 acres in 1996, and to 1,787 acres by the year 2006. Noise impacts off-airport are lower than existing conditions within every noise contour interval.

Under the No-Project Alternative, about 6,599 acres outside of SLCIA property would be exposed to noise levels between 65-70 $L_{eq}$ in 1996. Within the 70-75 $L_{eq}$ contour interval, 2,561 acres would be impacted, while only 303 acres would fall within the 75-80 $L_{eq}$ contour interval. No impacts greater than 80 $L_{eq}$ would occur off airport under this alternative. By 2006 only 1,787 acres of land off of the airport would be within the noise envelope. Most of
the impacted area (1,708 acres) would be within the 65-70 $L_{dn}$ contour interval. However, 79 acres of land would be exposed to 70-75 $L_{dn}$. Noise levels above 75 $L_{dn}$ would be completely contained on Airport-owned property. Figures 3.9 and 3.10 show the land uses impacted by the noise contours for the No-Project Alternative in 1996 and 2006 respectively.

Most (7,995 acres) of the off-airport land within the 1996 contours is undeveloped or agricultural land. An additional 1,442 acres are in commercial and industrial development. Of these, 1,174 acres are within the 65-70 $L_{dn}$ noise contour interval, 242 acres are in the 70-75 $L_{dn}$ interval and 26 acres are exposed to noise above 75 $L_{dn}$. Only 26 acres of land are residential uses; 22 acres are in the 65-70 $L_{dn}$ contour interval and 4 acres are in the 70-75 $L_{dn}$ interval.

In 1996, under the No-Project Alternative, a total of 28 residences will continue to be within the 65 $L_{dn}$ or greater contour. The five residences south of the Airport that are presently within the 65 $L_{dn}$ contour will continue to be impacted. By 1996, noise impacts on residences north of the airport will be reduced slightly. Twenty-three residences north of the airport will still be within the noise envelope. Twenty of these will be exposed to noise levels between 65 and 70 $L_{dn}$. The other three will remain in the 70-75 $L_{dn}$ noise exposure area. The estimated population within the 1996 contours under this alternative is 83 persons.

In 1996 the No-Project Alternative will result in less total acreage within the noise contours than under existing conditions. However, some of the benefits to residential land-uses north of the airport that would be obtained sooner under the Preferred or Close-In Alternatives would not be realized until year 2006 in the No-Project scenario.

Assuming no changes to existing land-use development patterns, the off-airport noise-impacted land in 2006 will be primarily undeveloped and agricultural land (1,607 acres), of which 1,536 acres will be between the 65 and 70 $L_{dn}$ contours and 71 acres will be in the 70-75 $L_{dn}$ contour interval. 167 acres of commercial/industrial uses will be in the 65-70 $L_{dn}$ contour interval with an additional 8 acres exposed to noise levels between 70 and 75 $L_{dn}$. Five acres of land will be in residential uses with three residences in the 65-70 $L_{dn}$ contour interval. The total estimated population in the 2006 No-Project scenario contours is nine persons.

By 2006, a contraction of the entire noise envelope is expected. Smaller total areas north and south of the SLCIA would be impacted by aircraft noise. The contours along the eastern Airport boundary will contract slightly, and the contours along the western Airport boundary would be largely unaffected.

3.2.3 Close-In Alternative

Table 3.5 shows the distribution of the noise impacts by land use type within each contour interval for the Close-In Alternative. The table also shows the land use impacts for the projected 1996 and 2006 time periods. The following analysis assumes no growth or change in the existing land use development pattern.
SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.10
2006 No-Project Alternative Land Contours and Land-Use

LEGEND
- RESIDENTIAL
- COMMERCIAL INDUSTRIAL
- VACANT AGRICULTURAL

SCALE

Great Salt Lake

HARRIS MILLER MILLER & HANSON INC.
SALT LAKE CITY AIRPORT AUTHORITY
SALT LAKE CITY
INTERNATIONAL AIRPORT

Figure 3.10
2006 No-Project Alternative
Ldn Contours and Land-Use

LEGEND
- RESIDENTIAL
- COMMERCIAL INDUSTRIAL
- VACANT AGRICULTURAL

SCALE

HARRIS MILLER MILLER & HANSON INC.
SALT LAKE CITY AIRPORT AUTHORITY

341
In 1996, about 9,043 acres outside of SLCIA property would be exposed to noise levels between 65 and 70 $L_{dn}$ within the 70-75 contour range. 3,083 acres would be impacted, while only 214 acres would fall within the 75-80 $L_{dn}$ interval. No impacts greater than 80 $L_{dn}$ would occur off airport under this alternative. In 2006, the Close-In Alternative would result in significantly less total acreage within the noise contours than under existing conditions. Off-airport noise impacts are reduced in every noise contour interval. By 2006 only 1,355 acres of land off of the airport would be within the noise envelope. Figures 3.11 and 3.12 show the land use development patterns within the contours for the 1996 and 2006 Close-In Alternative respectively.

Most (11,348 acres) of the off-airport land uses within the 1996 contours is undeveloped or agricultural land. An additional 970 acres is in commercial and industrial development; 776 of which are within the 65-70 $L_{dn}$ noise contour interval. 145 are in the 70-75 interval and 49 are exposed to noise above 75 $L_{dn}$.

The Close-In Alternative has the same impacts on residential uses as the Preferred Alternative. In the 1996 case, only 22 acres of land are in residential uses. 19 of these are in the 65-70 $L_{dn}$ contour interval and 3 are in the 70-75 interval. The five residences south of the airport that are presently within the 65 $L_{dn}$ and greater contour would remain impacted. However, when the proposed runway opens, noise impacts on three residences south of the airport would increase from the 65-70 $L_{dn}$ interval to the 70-75 $L_{dn}$ interval. The increased impact on the three residences would be considered significant. Noise impacts on all of the residences north of the airport would be reduced under this scenario. Six residences along 2200 North Street which presently experience noise levels greater than 70 $L_{dn}$ will be reduced to between 65 and 70 $L_{dn}$. Also, the forty-nine residences along 2200 West Street which are presently within the 65 $L_{dn}$ contour would no longer be impacted.

In 1996, under the Close-In Alternative, a total of 11 residences (6 north, 5 south) would still be within the 65 $L_{dn}$ or greater contours. The estimated population within the 1996 contours is 33 persons.

Assuming no growth of the 1991 land uses, the off-airport noise-impacted land in 2006 will be primarily undeveloped and agricultural land (1,180 acres). 174 impacted acres are expected to be in commercial/industrial uses; 169 acres would be in the 65-70 $L_{dn}$ contour interval while only five acres of commercial land would be between 70-75 $L_{dn}$. Only one acre of impacted land will be residential. Two residences (with an estimated population of 6 persons) are expected to be within the 65-70 $L_{dn}$ contour interval in 2006.

### Table 3.5 Land Use Types By Noise Contour Interval: Close-In Alternative

<table>
<thead>
<tr>
<th>Contour Interval $L_{dn}$</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
<th>Undeveloped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 - 70</td>
<td>19</td>
<td>176</td>
<td>8248</td>
<td>9043</td>
</tr>
<tr>
<td>70 - 75</td>
<td>3</td>
<td>145</td>
<td>2935</td>
<td>3083</td>
</tr>
<tr>
<td>75 - 80</td>
<td>0</td>
<td>49</td>
<td>165</td>
<td>214</td>
</tr>
<tr>
<td>80 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>970</strong></td>
<td><strong>11348</strong></td>
<td><strong>12340</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contour Interval $L_{dn}$</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
<th>Undeveloped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 - 70</td>
<td>1</td>
<td>169</td>
<td>1180</td>
<td>1350</td>
</tr>
<tr>
<td>70 - 75</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>75 - 80</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td><strong>174</strong></td>
<td><strong>1180</strong></td>
<td><strong>1355</strong></td>
</tr>
</tbody>
</table>

In 1996, which is to the approximate opening year of the proposed runway, the Close-In Alternative will result in less total acreage within the noise contours than under existing conditions. The impact area off airport property will be reduced from 16,105 acres in 1991 to 12,340 acres in 1996, and to 1,355 acres by the year 2006. The total area within the 70-75 $L_{dn}$ contour interval increases slightly under the 1996 Close-In Alternative because of the westward movement of aircraft to the new runway. The increase in impacted land however, is limited to airport property.

Although the Close-In Alternative results in a reduction of the total acreage impacted by the contours, some land not presently within the existing 1991 contours will be impacted by the 1996 contours. Much of the new impact area will occur on SLCIA property. As with the Preferred Alternative, noise contours will expand to the west because of the development of the proposed runway and less off-airport land will be impacted than is impacted in existing conditions. No incompatible land uses are expected with the adjacent industrial development in the International Center, to the west of the airport. Noise impacts to recreational uses north of the Airport will be slightly lower than in the existing 1991 conditions. A net noise benefit from this Alternative is expected because the noise envelope would expand to the west on lands vacant or in agricultural use, as it retracts from the north and south over developed properties.
FIGURE 3.11
1996 Close-In Alternative
Land Contours and Land-Use

SALT LAKE CITY INTERNATIONAL AIRPORT

Report No. 291770

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SALT LAKE CITY INTERNATIONAL AIRPORT

Figure 3.12
2006 Close-In Alternative Ldn Contours and Land-Use
Under this scenario, smaller total areas north and south of the SLCLA would be impacted by airport noise. Noise impacts to recreational uses north of the Airport will be reduced significantly. Noise contours along the eastern and western Airport boundary will mostly be confined to airport property.

3.2.4 Preferred Alternative

Table 3.6 shows the distribution of the noise impacts by land use type within each contour interval for the Preferred Alternative for the projected 1996 and 2006 time periods. The following analysis assumes no growth or change in the existing land use development pattern.

In 1996, which is the estimated opening year of the proposed runway, the Preferred Alternative will result in less total noise-impacted acreage than the existing conditions. The impact area of airport property will decrease from 16,105 acres in 1991 to 12,630 acres in 1996, and to only 1,520 acres by the year 2006. It should be noted that although the total area of the 70-75 Ldn contour increases slightly under the 1996 Preferred Alternative, the area off airport property within the 70-75 Ldn contour actually decreases. The increase in the overall contour interval area is a result of a westward shift of aircraft activity to the proposed runway and is limited to airport property.

The westward shift of activity is reflected in the shape of the noise contours. Although the Preferred Alternative results in a net reduction of the total acreage impacted by the contours, some land not presently within the existing 1991 contours will be located inside the future case contours. Much of the new impact area will occur on SLCLA property, and less total land off of the airport will be impacted under the Preferred Alternative than occurs in existing conditions. No incompatible land uses are expected with the adjacent industrial development in the International Center, to the west of the airport. Noise impacts to recreational uses north of the Airport will be slightly lower than existing 1991 conditions. A net noise benefit from this Alternative is expected because the noise distribution would expand to the west on lands vacant or in agricultural use, whereas it would retract from the developed lands to the north and south of the airport.

In the 1996 case, about 9,062 acres outside of SLCLA property would be exposed to noise levels between 65 and 70 Ldn. Within the 70-75 Ldn contour interval, 3,119 acres would be impacted while only 449 acres would fall within the 75-80 Ldn contour interval. No impacts greater than 80 Ldn would occur off airport.

Figure 3.13 shows the land use development patterns within the 1996 Preferred Alternative contours. Most of the off-airport land uses within the contours (11,645 acres) is undeveloped or agricultural land. An additional 963 acres is in commercial and industrial development, of which 755 acres of the commercial/industrial impacts are within the 65-70 Ldn noise contour interval, 168 acres are in the 70-75 Ldn interval and 40 acres are exposed to noise above 75 Ldn. The Preferred Alternative would have the same residential impacts as the Close-In Alternative. Only 22 acres of residential land are impacted by noise under this scenario; 19 acres are in the 65-70 Ldn contour interval and the remaining 3 acres are in the 70-75 Ldn interval.

### Table 3.6 Land Use Types By Noise Contour Interval: Preferred Alternative

<table>
<thead>
<tr>
<th>Contour Interval Ldn</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
<th>Undeveloped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 - 70</td>
<td>19</td>
<td>755</td>
<td>8288</td>
<td>9062</td>
</tr>
<tr>
<td>70 - 75</td>
<td>3</td>
<td>168</td>
<td>2948</td>
<td>3119</td>
</tr>
<tr>
<td>75 - 80</td>
<td>0</td>
<td>40</td>
<td>409</td>
<td>449</td>
</tr>
<tr>
<td>80 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>22</strong></td>
<td><strong>963</strong></td>
<td><strong>11645</strong></td>
<td><strong>12630</strong></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Contour Interval Ldn</th>
<th>Residential</th>
<th>Commercial/Industrial</th>
<th>Undeveloped</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>65 - 70</td>
<td>1</td>
<td>181</td>
<td>1333</td>
<td>1515</td>
</tr>
<tr>
<td>70 - 75</td>
<td>0</td>
<td>5</td>
<td>0</td>
<td>5</td>
</tr>
<tr>
<td>75 - 80</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>80 +</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>1</strong></td>
<td><strong>186</strong></td>
<td><strong>1333</strong></td>
<td><strong>1520</strong></td>
</tr>
</tbody>
</table>

The five residences south of the Airport that are presently impacted will continue to remain so. However, when the proposed runway opens, noise impacts on three residences south of the airport will increase from the 65-70 Ldn interval to the 70-75 Ldn interval. The increased impact on the three residences would be considered significant. Noise impacts on all of the residences north of the airport will decrease under this scenario. Six residences along 2200 North Street which are presently exposed to levels greater than 70 Ldn will be located between the 65 and 70 Ldn contours, and the forty-nine residences along 2200 West Street which are presently within the 65 Ldn contour will no longer be impacted.
In 1996 under the Preferred Alternative, a total of 11 residences (6 north, 5 south) will still be within the 65 L<sub>dn</sub> or greater contours. The estimated population within the 1996 contours is 33 persons.

In 2006, the Preferred Alternative will result in significantly fewer acres within the noise contours than under existing conditions. Off-airport noise impacts are reduced in every noise contour interval and only 1,520 acres of land off of the airport would be within the noise envelope. Figure 3.14 shows the land use development patterns within the 2006 Preferred Alternative contours.

Assuming no change to 1991 land uses, the 2006 contours will encompass primarily undeveloped and agricultural land (1,333 acres). 186 impacted acres are expected to be in commercial/industrial uses; 181 acres would be in the 65-70 L<sub>dn</sub> contour interval while only five acres would be between 70 and 75 L<sub>dn</sub>. Only one acre of impacted land will be residential. Two residences (with an estimated population of 6 persons) are expected to be within the 65-70 L<sub>dn</sub> contour interval in 2006.

Under this scenario, smaller total areas north and south of the SLCIA would be impacted by airport noise. Noise impacts to recreational uses north of the Airport will be reduced significantly. Noise contours along the eastern and western Airport boundary will mostly be confined to airport property.

3.2.5. Summary
The No-Project Alternative would result in lower overall noise conditions at and around SLCIA. The master plan of vacant lands indicates that future development will be limited to compatible uses. Therefore no changes to local zoning are necessary for this alternative.

While the Close-In Alternative would expand the noise envelope over vacant lands west of SLCIA, overall noise conditions would improve significantly at and around SLCIA. The impacts of this alternative are very similar to those of the Preferred Alternative. Three residences not presently in the 70-75 L<sub>dn</sub> contour interval would be within it under this alternative. This is considered a significant impact. Development of vacant lands will be limited to compatible uses, and therefore no changes to local zoning are necessary for this alternative.

The Preferred Alternative, like the Close-In Alternative, would expand the noise envelope over vacant lands west of SLCIA, and overall noise conditions would improve significantly at and around SLCIA. The reduction in total area of the noise envelope largely offsets the westward expansion under the Preferred Alternative. The exposure of residential uses decreases, although it is not eliminated, with the westward shift of noise contours. The eligible residences that would otherwise be within the noise contours of the Preferred Alternative will be relocated according to the procedures identified in the SLC FAR PART 150 Noise Compatibility Program. The master plan of vacant lands indicates that future development will be limited to compatible uses, and most of the undeveloped land within the noise contours is zoned for future industrial development. Therefore no changes to local zoning are necessary.
Figure 3.14
2006 Preferred Alternative
Land Contours and Land-Use

Great Salt Lake

SALT LAKE CITY
INTERNATIONAL AIRPORT

LEGEND
- RESIDENTIAL
- COMMERCIAL
- INDUSTRIAL
- VACANT
- AGRICULTURAL

SCALE

0 6000 12000

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SALT LAKE CITY AIRPORT AUTHORITY

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3.3 Comparison of Alternatives

Model inputs for the Existing Conditions case, the 1996 No-Project Alternative case and the 2006 No-Project Alternative case differ only by the existing and forecast fleet mixes. As the replacement of Stage 2 certified aircraft by newer, quieter Stage 3 certified aircraft takes place, the noise exposure area will shrink in size. The 1996 fleet mix assumes partial replacement, while the 2006 fleet mix assumes complete replacement, as required by the Aviation Noise and Capacity Act of 1990 as promulgated in revisions to FAR Part 91.

Between the two project alternatives (Preferred and Close-In) for each of the forecast years, noise exposure differences are due only to the placement of the new runway, as all other modelling assumptions are identical. Noise exposure differences between the No-Project and the new runway alternatives for each of the forecast years result from the different uses of runways and flight tracks which are assumed to be implemented following the construction of an additional runway. Sections 2.2.1 and 2.2.2 discuss the Close-In and Preferred Alternatives' runway and flight track usage assumptions, as presented by ATCT personnel.

3.4 Mitigation

The Airport Authority's procedure for acquiring homes within noise impacted areas is established in the 1987 FAR Part 150 Noise Compatibility Program (NCP). The implementation procedure for the NCP indicates that permanent residential areas exposed to noise impacts $70 \text{ L}_{10}$ and greater are eligible for acquisition. Consistent with the Noise Compatibility Program of the FAR Part 150 Study, all permanent residences having a noise impact of $70 \text{ L}_{10}$ or greater will be acquired in accordance with the Uniform Relocation Assistance and Real Property Acquisition Act.
APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

OMB APPROVAL NO. 0702-0036
Expires 30 June 1992

APPLICATION FOR DEPARTMENT OF THE ARMY PERMIT

NAME AND ADDRESS OF APPLICANT
Salt Lake City Airport Authority
Steve Domingo
AHF Sec 320C
Salt Lake City, Utah 84122
Telephone no: During business hours

NAME AND ADDRESS OF APPLICANT

The Bear-Brown Group
T. Mark Oliver
P.O. Box 4219
Park City, Utah 84060
Telephone no: During business hours

STATEMENT OF AUTHORIZATION: I hereby designate and authorize T. Mark Oliver to act in my behalf as my agent in the proceeding of this permit application and in the event any approval, supplemental information in support of the application.

SIGNATURE OF APPLICANT

DATE

3-16-92

DIRECTIONS REGARDING ACTIVITY

1. Discharge of Effluvial Water Material

2. Purpose

3. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

4. APPLICATION NUMBER (To be assigned by Corps)

5. NAME, ADDRESS, AND TITLE OF AUTHORIZED AGENT

6. WATERBODY AND LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED

7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED

8. ADDRESS

9. STREET, ROAD, ROUTE OR OTHER DESCRIPTIVE LOCATION

10. ISSUING AGENCY

11. TYPE APPROVAL

12. IDENTIFICATION NO.

13. DATE OF APPLICATION

14. DATE OF APPROVAL

15. DATE OF DENIAL

16. Signature of Applicant

The application must be signed by the person who desires to undertake the proposed activity (applicant) or it may be signed by a duly authorized agent of the statement in (12) has been filed out and signed.

18. U.S.C. Section 1001 provides: Whoever, in any manner within the jurisdiction of any department or agency of The United States knowingly and willfully falsifies, conceals, or covers up by any trick, scheme, or device a material fact or makes any false, fictitious or fraudulent statement or representations or makes or uses any false writing or document knowing same to contain any false, fictitious or fraudulent statement or entry, shall be fined not more than $10,000 or imprisoned not more than five years, or both.

Revised by OR (FPA) 3-20-92

SEE ATTACHMENT A

BEST COPY AVAILABLE

PROOFREAD: CEOM 353
Application for Department of the Army Permit
Salt Lake City International Airport
March 16, 1992

4a. ACTIVITY:
To place clean fill material and perform excavation within jurisdictional wetlands for the construction of a new runway, associated taxiways, support and maintenance facilities, new terminals, concourses and associated tarmacs and relocate portions of the Surplus Canal. The project includes relocation of Utah Power & Light (UPL) overhead, high voltage transmission lines.

4b. PURPOSE:
To allow the expansion of the SLCIA and to provide the necessary airfield capacity needed to accommodate forecasted growth of private, commercial and military aircraft. The proposed expansion would accommodate the short and long term needs of the airport by constructing an additional runway with instrument landing systems to allow simultaneous independent operation during IFR conditions. The project includes expanding the need for support and maintenance facilities and relocating UPL powerlines. The SLCIA is the only commercial airport in Utah that can accommodate the entire fleet mix of certified aircraft. It serves as a major transportation hub for the intermountain area. As the Salt Lake valley and the intermountain region continue to grow, so must the SLCIA to satisfy the demands of local and regional users. The UPL powerlines must be relocated to prevent aircraft-runway navigational aid interference and to satisfy Federal Aviation Administration (FAA) requirements.

4c. DISCHARGE OF DREDGED OR FILL MATERIAL:
Approximately 2,672,500 cubic yards of clean fill material will be placed within jurisdictional wetlands for the construction of the proposed expansion of the SLCIA including runways, taxiways facilities and Surplus Canal relocation. Approximately 48,900 yards of clean fill material will be placed within jurisdictional wetlands for the relocation of the UPL powerlines. The project will directly impact 275.3 acres and indirectly impact 63.6 acres for a total wetlands impact of 338.9 acres.

5. NAMES & ADDRESSES OF ADJOINING PROPERTY OWNERS, LESSORS, ETC.
The following property owners lie to the west and north of the proposed expansion activity.

<table>
<thead>
<tr>
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<tbody>
<tr>
<td>Charles F. Gillmore</td>
<td>P.O. Box 130</td>
</tr>
<tr>
<td></td>
<td>Oakley, UT 84055-0130</td>
</tr>
<tr>
<td>Salt Lake County</td>
<td>2001 South State Street, # H 4500</td>
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<tr>
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<tr>
<td>Bow Valley Development</td>
<td>1675 North 200 West, #4</td>
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<td></td>
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<tr>
<td>Edward L. Gillmore</td>
<td>3819 South 2000 East</td>
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<td>Walker Bank &amp; Trust Co., TR</td>
<td>P.O. Box 30169</td>
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<tr>
<td></td>
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<tr>
<td>Harrison Reclamation Co.</td>
<td>P.O. Box 17783</td>
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<td></td>
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<td>The Rudy Reclamation Co.</td>
<td>777 East 2100 South</td>
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<td>Utah Duck Club</td>
<td>1532 East 8255 South</td>
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<td>451 South State # 345</td>
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<tr>
<td>Mama D'Angelo, Inc.</td>
<td>50 West Broadway, #1200</td>
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<tr>
<td>OEC-Diaisonics, Inc.</td>
<td>384 North Wright Brothers Drive</td>
</tr>
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<td>Salt Lake City, UT 84116</td>
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</tbody>
</table>

6. WATER BODY & LOCATION ON WATERBODY WHERE ACTIVITY EXISTS OR IS PROPOSED
Wetlands near the southern boundary of the Great Salt Lake and east of the Surplus Canal.
7. LOCATION ON LAND WHERE ACTIVITY EXISTS OR IS PROPOSED:
The proposed SLCIA airport expansion is located west and north of the existing airport facilities. The proposed project site is within Salt Lake City, Salt Lake County, the State of Utah (zip code 84122). The proposed airport expansion and UPL powerline relocation is located in parts of Sections 17, 18, 19, and 30, Township 1 North, Range 1 West, and Sections 13, 24 and 25, Township 1 North, Range 2 West, Salt Lake Base and Meridian.

9. LIST OF ALL APPROVALS, CERTIFICATIONS, DENIALS FROM FEDERAL, STATE, LOCAL AGENCIES FOR ANY STRUCTURES, CONSTRUCTION, DISCHARGES OR ACTIVITIES DESCRIBED IN THIS APPLICATION:

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<td>3/28/91</td>
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<td>Approval Order</td>
<td>DAQE-09292</td>
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SECTION 404 PERMIT APPLICATION DESCRIPTION

INTRODUCTION

The Airport Master Plan Update (Salt Lake City International Airport, SLCIA, December 1988), forecasts a 4% increase in annual airport operations between 1988 and 2006. In order to handle this large increase in operations, several development options were explored to address logistical, economic, safety and engineering concerns. As a result, an Final Expanded Environmental Assessment (XEA), Environmental Sciences Associates (ESA, January 1992) was prepared to present, discuss and evaluate the affects of providing additional runways and support facilities.

Of the various options considered and evaluated in the XEA for accommodating this increased demand, only one option, construction of a new runway, was determined to be practicable on the basis of the variety of logistic, economic, and engineering criteria. That alternative would be a new 12,000 foot transport category runway and access taxiways parallel to and about 6155 (revised in XEA from the 6300 feet initially selected) feet west of existing Runway 16R-34L. Construction of the new runway would be paralleled with expansion of land-side and airfield facilities such as terminals, concourses, hangers, parking and service aprons.

During preparation of the XEA, a range of seven on-site alternatives were evaluated for the project. As examples, the Close-in alternative (Alternative 1A) would locate the new runway 5800 feet to the west of existing runway 16R-34L along with associated taxiways, new terminals, concourses and support facilities. The No-Project Alternative would require existing runways to accommodate new growth until saturation occurs. Terminals and other facilities would be expanded.

Based upon detailed evaluation of the alternatives presented in Draft XEA, a variation of the Preferred Alternative (Alternative 1.A.1) was selected as the most practicable option to minimize wetland impacts and accommodate forecasted aviation growth. This alternative is located 6155 feet west of existing runway 16R-34L, approximately 145 feet east of the location discussed for the Preferred Alternative. The powerline location was also moved to the east 150 feet which reduced wetland impacts from this component.

The project proposed in this application (6155 feet west of the existing runway 16R-34L) is planned to accommodate the short and long term identified needs. The central focus of the expansion is a new 12,000 foot, north-south aligned paved runway with an instrument landing system to allow simultaneous independent operation during IRD conditions. Immediately east of this runway,
two north-south aligned taxiways are proposed. These two taxiways connect the runway with existing and proposed airfield, terminal and support facilities. The taxiways via two east-west aligned taxiways east-west taxiways also connect the new facilities with existing runways east of the present airport terminals. North of these two east-west taxiways, support and operations facilities storage, hangars, maintenance, air-traffic control tower, etc.) are proposed. This area is presently used for this purpose but the size and numbers of facilities at this location will be increased.

To accommodate this expansion, several canals and 4000 West Street will need to be relocated. The Surplus Canal, the North Point Consolidated Canal and the "little" Coggin Drain will be realigned further to the west before flowing northward and reconnecting. The relocation of 4000 West will, in part, be below grade adjacent to the north-south taxiways. It will tie back into its present alignment north of the proposed northern support facilities.

The SLCIA proposal requires the relocation of approximately 4.9 miles of Utah Power & Light’s (UPL) north-south backbone transmission line system. This transmission corridor is necessary to maintain UPL’s system reliability and serve as the primary source for delivering electricity to communities north of the Salt Lake valley. Due to the importance of this transmission corridor to Utah Power and the citizens along the Wasatch Front, as well as potential interference with airport operations, relocation options have been extensively reviewed. Lines need to be situated in a safe location which provides year round, all-season access to the lines for construction and necessary maintenance and to satisfy FAA regulatory requirements. Realignment of existing access is required to retain the ability to keep the lines in service during all weather conditions.

Various powerline relocation routes were considered and included in the XEA document. The selected route is located west and north of the new runway and meets FAA glide slope and navigational aid interference requirements. During the XEA public review period, concerns were raised by resource and regulatory agencies resulted in two additional evaluations including an eastern routing around the airport and a western variation of the selected route. Neither of these proposed alternative areas were found to be practical as additional wetlands impacts and substantially greater costs (west side) or impracticability due to interference with existing FAA traffic control facilities, future potential line extensions, FAA and UPL’s resource requirements and other considerations resulted in the final proposal. The access road and peninsulas would each directly impact about 6.0 acres of wetlands.

The transmission line corridor route presented here is approximately 4.9 miles in length. The corridor is located west and south to the proposed runway and as close to the airport as possible within FAA guidelines. The route was designed in a more westerly alignment from previously proposed routes due to interference with proposed FAA navigational instrumentation. This alternative has been approved by the FAA as navigationally acceptable and would not negatively impact airport operations.

The transmission line corridor will require a 300-foot wide right-of-way. Four towers will be placed on each earthen fill peninsula spaced about 600 feet apart. The peninsulas will be connected by a permanent all weather access road. The peninsulas are required for line construction and maintenance. The top of the peninsulas would be constructed to an elevation of about 4212.0 feet or 1.5 to 2.0 feet above existing ground elevations (or controlled high water line). A minimum of 1.5 to 2.0 feet of fill material is required to create a stabilized working area for equipment handling loads of 35 to 40 tons.

Peninsulas are located within span length tolerances, to avoid wetlands where possible. Final location adjustment of the peninsulas resulted in a reduction of wetland impacts from 31.5 acres to 30.5 acres from previously considered alignments. This relocation resulted in a direct wetlands impact of 6.0 acres due to fill.

Relocation of the transmission corridor as proposed, also included construction of a permanent, all weather, 25-foot wide access road to a top elevation of about 4215.0 feet. The proposed road connects each peninsula and is located along the western and northern edge of the right-of-way. The straight road as proposed provides minimum, safe, stable access for heavy equipment and large loads during construction. The all weather road is also designed to provide emergency maintenance access, as well as ice protection for the vulnerable transmission towers. Should the Great Salt Lake rise or line maintenance be required, the proposed road would provide the necessary ice protection and maintenance access. About two miles of road would directly impact jurisdictional wetlands.

By modifying the tower peninsulas and access road placement, approximately 13 acres of jurisdictional wetlands would be directly impacted. These modifications reduce wetland impact by five acres from the original proposal. The access road and peninsulas would each directly impact about 6.0 and 7.0 acres of wetlands, respectively.

The anticipated schedule for completion of the runway component of the project is 1995. The first phase of construction will be the realignment of the Surplus and North Point canals and the Little Coggin Drain in 1992-1993. Site grading and drainage will be the second phase of construction in 1993-1994. The third phase of construction will be airfield paving and electrical work during 1995. The fourth phase of the project will be the runway paving and illumination in 1995.

Directly impacted wetlands (fill or excavation within a wetland) total 262.3 acres for the runway component of the project and 13.0...
acres for the powerline relocation component of the project for a total direct impact of 275.3 acres. Indirectly impacted wetlands (wetlands no longer artificially flooded) total 63.6 acres (all are related to the runway component of the project). Total project direct and indirect impacts to wetland is 338.9 acres. The attached impacts sheets and discussion of proposed modifications to wetlands identify the short and long term needs of the SLCIA airport.

The following drawings present wetland impacts relating to the runway and associated development followed by wetland impact sheets relating to the powerline relocation. An associated narrative quantifies acreages and describes the nature of the wetland impacts due to the proposed project.

**RUNWAY WETLAND IMPACT SHEET DESCRIPTIONS**

**Wetland Impact Sheets 1, 2 & 3**

Wetland Impact sheets 1, 2 and 3 show two mudflat wetlands that encompass about 25.4 acres and are located in the northwest corner of the SLCIA property. These wetlands are surrounded by saline playas and isolated saline meadows and will be indirectly impacted by the proposed airport expansion. These two wetlands obtain their water from a man-made channel located to the southwest along the property line as indicated on sheet 3. In order to be consistent with SLCIA's BASH (bird-aircraft strike hazard) policy, these wetlands will no longer be artificially flooded by the duck clubs to minimize the quantity of birds that frequent the area. To prevent water from flowing into these wetland areas, existing culverts will be removed and a berm will be constructed on SLCIA property with clean fill material with a top-of-berm elevation of about 4212.0. Existing berms and dikes along the wetlands will prevent water from other sources from entering these wetlands. The proposed berm will not be placed in a wetland (the UPL powerline access road does cross through this wetland, see UPL Sheet 9). Natural precipitation will be the only source of water for these wetland areas after the berm is constructed.

**Wetland Impact Sheets 4, 5, 6 & 7**

Much like Wetland Impact sheets 1, 2 and 3, sheets 4, 5, 6 and 7 show a wetland consisting of 38.2 acres of mudflats. The wetland is encompassed mostly by saline plains and playas and some saline meadow. The wetland will only be indirectly impacted since it will no longer be artificially flooded by the duck clubs to minimize the quantity of birds that frequent the area. No fill material is required in this wetland area. With the wetland being void of any artificial water inflow, it will assist the SLCIA in maintaining its BASH policy.

**Wetland Impact Sheet 8**

Wetland Impact sheet 8 shows a portion of a 68.7 acre open water area that will be directly impacted by the placement of fill material to prevent water from accumulating within the runway safety area and protection zone, consistent with the airport's BASH policy. In addition, a perimeter road used by airport personnel for maintenance purposes, as well as access by FAA personnel for ILS (Instrument Landing System) monitoring and maintenance are proposed for this area. The localizer is located at the extreme northern end of the runway safety area. On the southern most portion of the sheet, the localizer pad (part of the ILS) has been
placed per the latest FAA guidelines. The finished elevation of the pad will be 4218.0. The impacted open water areas on this sheet will require a fill of 67,200 cubic yards with the fill depths up to seven feet. The wetland is bordered by saline plains on the north and east.

**Wetland Impact Sheet 9**

Wetland Impact sheet 9 shows the northeastern portion of the 68.7 acre open area shown on sheet 8. The wetland is bordered by saline plains on the north and east. The wetland is directly impacted by the proposed aircraft holding area at the end of the taxiways, the grading of the overrun and runway safety areas and fill needed to prevent standing water on the site. The holding area was located in this position to allow for aircraft to by-pass one another for takeoffs, thus minimizing possible departure traffic congestion. The grading in the overrun and runway safety areas will help maintain the BASH policy of the SLCIA, as well as added safety for any possible missed landings. The aircraft holding area will have a finished surface elevation of about 4219.0. The finished surface elevation will require a fill of 113,700 cubic yards to construct with fill depths up to seven feet.

**Wetland Impact Sheet 10**

Wetland Impact sheet 10 shows the southern portion of the 68.7 acre open water area shown on sheets 8 and 9. This open water area will be directly impacted by fill material needed for the runway and glide slope platform (part of the ILS) to the south, the runway safety zone and overrun grading to the north and by the fill needed to prevent standing water on the site (part of the BASH policy). The glide slope antenna platform area required by FAA is located approximately 1,000 feet south of the threshold (north end of runway). The glide slope platform must be maintained as a flat surface to ensure that electronic signals from the antenna are not reflected in any way. The northern portion of the runway safety zone will be at an elevation of about 4218.0 while the threshold of the runway will have a finished elevation of about 4221.0. These finished elevations will require a fill of about 327,100 cubic yards with fill depths up to nine feet.

**Wetland Impact sheets 11**

Wetland impact sheet 11 shows the western continuation of the 68.7 open water area discussed on sheets 8, 9 and 10, as well as the northern portion of a 21.1 acre saline meadow, saline marsh and open water wetland to the west. The open water on the eastern part of sheet 11 will be directly impacted by fill material needed for the runway protection zone and runway overrun grading, the airport perimeter road and to prevent standing water from occurring on the approach end of the runway. This fill ensures the wetland will no longer be artificially flooded. Fill material required for this area will be about 33,100 cubic yards with fill depths up to four feet. Fill will be placed to an elevation of about 4212.0 and will slope upwards to the east.

The 23.1 acre meadow, marsh and open water wetland area along the airport boundary will be filled to prevent water and other wetland vegetation from serving as a bird attractant. This filling complies with the airport's BASH policy. A berm-fill material would be placed at the northern end of this wetland area to prevent water from flowing onto the site. About 29,200 cubic yards of fill material is required with fill depths up to three to four feet.

**Wetland Impact Sheet 12**

Wetland Impact sheet 12 shows two separate wetland (open water) areas that are flooded by the duck clubs. The northern wetland area is part of the 68.7 acre open water complex shown on impact sheets 8, 9 and 10. This open water area continued onto sheets 13 and 14. Both open water areas are surrounded by saline plains and saline flat and plays. The northern wetland area will be directly impacted by fill material needed for the proposed runway expansion including taxiways "x" and "y" and aircraft holding area. The finished elevation for these areas will be about 4219.5 and will require a fill of 27,500 cubic yards with fill depths of up to six feet. The wetland on the western portion of this sheet will be directly impacted by taxiway "y" and the runway shoulder. The impact will require a fill of about 16,300 cubic yards with fill depth of up to six feet. The runway shoulder grading will consist of 1:5 cross slope then down at a 4:1 slope to finished grade.

**Wetland Impact Sheet 13**

Wetland Impact sheet 13 shows a 26.3 acre open water area with saline flats and plays to the south. This open water area will be directly impacted by the placement of fill material required for the runway glide slope platform and slope grading. The runway's finished elevation in the open water area will be about 4221.5. The fill required to construct the proposed improvements will be about 195,600 cubic yards. Fill depths of up to eight feet will be required in the southern portion of this open water area. Fill will also be placed from the western edge of the runway shoulder to the western edge of the impacted wetland to comply with the SLCIA BASH policy.
Wetland Impact Sheet 14

Wetland Impact sheet 14 shows two wetland areas east of the airport boundary. The northern area is a continuation of the 23.1 acre open water-marsh complex shown on sheet 11. The smaller wetland area to the southeast is part of a 26.3 acre open water area shown on sheets 12 and 13. To prevent water from entering and ponding on the northern wetland area, fill material and a berm will be required to comply with the airport's BASH policy. Water presently enters this area via channels at the southern end (and northern end). Fill material will be placed to an elevation of 4212.0 with about 38,400 cubic yards and fill depths up to about four feet.

The wetland area shown on the southeastern portion of the sheet is the western portion of the 26.3 acre open water that will be directly impacted by fill material. This open water also necessitates filling to comply with the SLCIA's BASH policy. This fill activity will require about 20,000 cubic yards with fill depths of up to four feet.

Wetland Impact Sheets 15 and 16

Wetland Impact sheet 15 shows a 2.7 acre saline marsh wetland (eastern portion of the sheet) that is bordered by the existing Reclamation Ditch to the north and saline meadows to the east and west. This sheet also shows the northern portion of a 14.2 acre marsh wetland that is continued onto sheet 16. It is bordered by saline meadow to the east and west and saline plains to the south.

These two wetlands will be directly impacted by fill material required for the placement of the north airport support area. This support area includes an ATCT (Air Traffic Control Tower) and supporting services, needed cargo storage, aircraft hangers and airport operation services. These services are identified in the SLCIA Master Plan (December 1988). The finished elevation of fill in these wetlands range from 4216.0 to 4217.0.

The fill required for sheet 15 is about 19,100 cubic yards with fill depths up to 2.5 feet. The fill required within wetlands shown on sheet 16 is about 57,300 cubic yards with fill depth of up to about 3.5 feet.

Wetland Impact Sheet 17

Wetland Impact sheet 17 shows direct impacts on two separate saline meadow wetlands. The northern wetland is about 5.7 acres, the southern wetland is about 0.1 acres and both are surrounded by saline plains. The proposed airport development in this area includes the construction of 4000 West Street and airport operation service and support areas. The finished surface elevation for the support areas is about 4214.5 and the profile of 4000 West Street varies from 4212.0 to about 4224.1. The required fill in the northern wetland is about 25,400 cubic yards and the required excavation is about 3,500 cubic yards. Up to four feet of cut and up to six feet of fill is required. The southern wetland area will require a fill of about 700 cubic yards with a fill depth of five feet.

Wetland Impact Sheet 18

Wetland Impact sheet 18 shows a 3.3 acre wetland that is part saline meadow (south) and a marsh (north) that will be directly impacted. This wetland area is bounded by the North Point Canal to the east and saline plains elsewhere. This wetland area requires fill material for proposed taxiways "x" and "y" along with associated fill slopes. The finished surface elevation of taxiway "x" will be about 4224.7 and about 4223.0 for taxiway "y". The fill required to construct the new taxiways in the wetland area is about 47,500 cubic yards with fill depths of up to about 10 feet. Fill slopes on the side of the taxiways will be constructed using a 4:1 slope.

Wetland Impact Sheet 19

Wetland Impact sheet 19 shows two wetlands that will be directly impacted by the proposed runway expansion. The small, 0.5 acre, wetland east of North Point Canal is a saline marsh. This wetland is bordered by saline meadow on the east and saline plains on the north and south. It will be impacted by the placement of fill material for a tarmac area adjacent to a new terminal. The surface elevation of the tarmac area will be 4225.0 and will require a fill of about 12,200 cubic yards with fill depths of up to 12 feet.

The large wetland is part of an 86.5 acre saline meadow wetland that is bordered by the existing North Point Canal to the northeast and saline plains elsewhere. Fill material will directly impact 35.0 acres of this wetland for taxiways "x" and "y", the runway shoulder, 4000 West Street, and the airport service road. The surface elevation of the taxiway and the runway is about 4223.0 to 4225.0. The new 4000 West Street and service road will have a surface elevation of about 4220.0. Fill requirements for these improvements is about 262,500 cubic yards with fill depths of up to 11 feet.

Wetland Impact Sheet 20

Wetland Impact sheet 20 shows part of the western portion of the 86.5 acre wetland shown on sheet 19. This portion of the wetland is mostly saline meadow with some saline flats and plains to the
Wetland Impact Sheet 25

Wetland Impact sheet 25 shows portions of two wetlands. The northern one is the runway portion of the 26.3 acre saline flat and playa that continues onto sheet 27. Both wetlands are surrounded by saline plains and saline meadows. The wetland areas shown on this sheet will be directly impacted by fill material needed for the new runway and taxiways "x" and "y". The finished surface elevation of the runway centerline will be about 4225.0, taxiway "x" about 4225.2, and taxiway "y" about 4223.2. The required fill for the northern wetland will be 167,100 cubic yards with fill depths up to 11 feet. The fill required for the southern wetland will be about 76,100 cubic yards with fill depths up to nine feet.

Wetland Impact Sheet 26

Wetland Impact sheet 26 shows an 8.4 acre wetland that is saline meadow on the north and saline flat and playa to the south. The wetland will be directly impacted by fill material for the proposed tarmac area and terminal building. The finished surface elevation of the tarmac area will be about 4225.0 and will require a fill of about 146,900 cubic yards with a fill depths up to 10 feet.

Wetland Impact Sheet 27

Wetland Impact sheet 27 shows three separate wetlands being directly impacted by the proposed runway. The wetland located to the northeast is the southern portion of the wetland shown on sheet 26. It is impacted by fill needed for the tarmac area. Fill quantities within the wetland area are about 47,000 cubic yards with fill depths up to nine feet.

The wetland shown of the northern portion of the sheet is a continuation of the 6.7 acre wetland shown on sheet 25. It is directly impacted by fill material needed for taxiway "x" and by excavation for 4000 West Street. The construction of the runway within the wetland requires about 27,500 cubic yards and excavation of about 10,800 cubic yards for 4000 West Street. Fill depths will be up to 10 feet and about 17 feet of excavation for 4000 West Street.

The southern saline flat and playa wetland is part of a 15.8 acre wetland that continues south onto sheets 29, 30 and 31. This wetland is directly impacted by fill material needed for taxiways "x"and "y". The runway will have a finished surface elevation of about 4225.8. The construction of these taxiways will require a fill of about 61,500 cubic yards in the wetland. The depths of fill will be up to nine feet.
Wetland Impact Sheet 28

Wetland Impact sheet 28 shows a 13.6 acre saline flat and playa wetland surrounded by saline plains and saline meadow. It will be directly impacted by the tarmac area, a new terminal concourse and the airport's southern support facilities. The elevation of the tarmac area will be about 4225.0 and the impacted wetland area will require about 215,400 cubic yards of fill material to construct these improvements. Fill depths will be up to 10 feet.

Wetland Impact Sheet 29

Wetland Impact sheet 29 shows two wetland areas that are directly impacted by the proposed airport expansion. The eastern, 5.9 acre wetland is a saline meadow and is bordered by saline flats and playas to the west and is adjacent to the existing North Point Canal to the west. This wetland will be impacted by fill material for the same tarmac area shown on sheet 28 and by the airport's southern operations support area. The finished elevation in this area will be about 4225.0 and the wetland area will require about 81,900 cubic yards of fill material. Fill depths will be up to nine feet.

The wetland to the west is a continuation of the 15.8 acre wetland shown on sheet 27. This wetland will be directly impacted by fill material needed for taxiways "x" and "y". The finished surface elevation of taxiway "y" will be about 4223.0 and taxiway "x" will be at about 4223.5. The fill required in the impacted area will be about 70,700 cubic yards and will have fill depths of up to eight feet.

Wetland Impact Sheet 30

Wetland Impact sheet 30 shows a continuation of the 15.8 acre wetland shown on sheets 27 and 29. This wetland will be directly impacted by the southern end of taxiway "x", an aircraft holding area and the airport perimeter service road. The finished elevation of taxiway "x" will be about 4221.5, the aircraft holding area about 4221.0, and the perimeter road will be at about 4220.0. The fill required within the impacted wetland area will be about 22,600 cubic yards with fill depths of up to five feet.

Wetland Impact Sheet 31

Wetland Impact sheet 31 shows the southern portion of the 15.8 acre wetland shown on sheets 27, 29 and 30 as well as a 0.8 acre saline meadow wetland. The northern wetland area will be directly impacted by fill material needed to grade the area out to a relatively smooth surface.

The southern wetland 0.8 acre will be directly impacted by the construction of the relocated "little" Goggin Drain and maintenance road. The finished elevation within the wetland area will be at about 4224.0 and will require a fill of about 2,600 cubic yards. Fill depths will be about two to three feet.
This sheet illustrates the beginning of the relocation of the powerlines at its southern limit. UPL will tie into existing lines at this location and proceed along the identified alignment. No wetland impacts are proposed in the area covered by this sheet.

No wetland impacts are proposed on this sheet. The powerlines will span both the Surplus Canal and the North Point Canal.

Approximately 0.7 acres of wetland impacts are proposed on this sheet. This impacts results from the placement of fill material for 730 feet of maintenance road along the western edge of the right-of-way. In addition wetland impacts will occur from the placement of a tower peninsula. About 2,200 cubic yards of fill are needed in the wetlands.

Approximately 3.2 acres of wetland impacts are proposed as a result of placing fill material needed for 3,000 feet of maintenance road and the equivalent of three and a half tower peninsulas. About 12,000 cubic yards of fill material are needed in the wetland areas.

The southern portion of this sheet overlaps with the northern portion of sheet 4. Due to increased stress and needed working space, the angle point peninsula requires a 100 foot width in contrast to the typical 50 foot wide peninsula. The placement of fill material in wetlands results in approximately 5.0 acres of impact from six tower peninsulas and 3,600 feet of maintenance road. North of the existing dike, the maintenance road follows the alignment of existing duck club roads. About 20,000 cubic yards of fill material are needed for this portion of the powerline relocation. As many drainage structures as is necessary will be installed in the maintenance road to allow water from flowing freely from one side of the road to the other.

The placement of fill material for the equivalent of four tower peninsulas and 1,300 feet of maintenance road will impact about 2.0 acres of wetland. The east-west maintenance road is placed along existing roads (dikes) to minimize impacts. About 7,500 cubic yards of fill material are needed for the peninsulas.

Sheet 7 shows the continuation of the east-west alignment. Also shown is where the "extension" of the proposed centerline of the new runway would intersect the relocated powerline. The placement of fill material for about 120 feet of maintenance road and parts of about one and a half peninsulas impact about 0.8 acres of wetland. About 2,600 cubic yards of fill material will be placed in wetland areas. The alignment of the maintenance road varies within the right-of-way to minimize wetland impacts.

No wetland impacts are proposed for this sheet. Sheet 8 shows the eastern most reach of the powerline relocation where four support towers are required. In the middle of this sheet, two of the relocated four powerlines tie into UPL's existing system.

The placement of fill material for about 1,100 feet of maintenance road and two tower peninsulas impact about 1.3 acres. Approximately 4,600 cubic yards of fill material will be placed in the wetland for the maintenance road and towers.
RUNWAY AND TAXIWAY PROFILES
SALT LAKE CITY INTERNATIONAL AIRPORT

APPLICANT:
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SALT LAKE CITY, UTAH 84122
(801) 575-2400

AGENT:
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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
RUNWAY AND TAXIWAY TYPICAL SECTIONS
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE
VICINITY OF THE
GREAT SALT LAKE
SALT LAKE CO., UTAH

383
TYPICAL BERM SECTION ALONG WEST AIRPORT BOUNDARY

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 7
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH

SEE SHEET 8
WETLAND IMPACT SHEET 27

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 30

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH

SEE SHEET 31

WETLAND IMPACT SHEET 31

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH

SEE SHEET 29
AREAS OF CORPS JURISDICTION

1. OPEN WATER
2. SALINE MARSH
3. SALINE MEADOW
4. SALINE FLATS AND PLAYAS
5. SALINE PLAINS

CORPS JURISDICTIONAL WETLANDS
SALT LAKE CITY INTERNATIONAL AIRPORT
CENTRAL SECTION
AREAS OF CORPS JURISDICTION

1. OPEN WATER
2. SALINE MARSH
3. SALINE MEADOW
4. SALINE FLATS AND PLAYAS
5. SALINE PLAINS

CORPS JURISDICTIONAL WETLANDS

SALT LAKE CITY INTERNATIONAL AIRPORT

SOUTHERN SECTION
WETLAND IMPACT SHEET 3

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 8
SECTION A-A

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 9  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 10  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 11  SECTION A-A

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 12   SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 13  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 14
SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
CARGO STORAGE SUPPORT AREA

WETLAND

FUTURE GRADE

EXISTING GROUND

FILL MATERIAL

WETLAND IMPACT SHEET 15 SECTION A-A

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 16
SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 17
SECTION A-A
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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
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SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 19  SECTION A-A
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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 20  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
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WETLAND IMPACT SHEET 21  SECTION A-A
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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 22
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WETLANDS IN THE VICINITY OF THE
GREAT SALT LAKE
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WETLAND IMPACT SHEET 23  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 25  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 26  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 27  
SECTION A-A  
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE  
VICINITY OF THE  
GREAT SALT LAKE  
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 28  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE
VICINITY OF THE
GREAT SALT LAKE
SALT LAKE CO., UTAH
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SECTION A-A  
SALT LAKE CITY INTERNATIONAL AIRPORT  

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE  
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 30

SECTION A-A

SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
WETLAND IMPACT SHEET 31  SECTION A-A
SALT LAKE CITY INTERNATIONAL AIRPORT

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WETLANDS IN THE VICINITY OF THE GREAT SALT LAKE
SALT LAKE CO., UTAH
SALT LAKE CITY INTERNATIONAL AIRPORT

UTAH POWER AND LIGHT
AIRPORT RELocations
JANUARY 9, 1992
SHEET 3

SALT LAKE CITY INTERNATIONAL AIRPORT

UTAH POWER AND LIGHT
AIRPORT RELocations
JANUARY 9, 1992
SHEET 4
# MITIGATION PLAN FOR WETLAND LOSSES RESULTING FROM THE EXPANSION OF THE SALT LAKE CITY INTERNATIONAL AIRPORT

**Prepared for:**
Salt Lake City Airport Authority  
Salt Lake City, Utah

and

U. S. Army Corps of Engineers  
Bountiful, Utah

**Prepared by:**
The Sear-Brown Group  
Park City, Utah

**March 13, 1992**

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I. INTRODUCTION

The purpose of this mitigation plan is to provide compensation for impacts to jurisdictional wetlands resulting from the expansion of the Salt Lake City International Airport (SLCIA) to include a new runway and associated support facilities. Wetlands on the proposed airport expansion site are discussed with respect to impact acreages and reduction in wildlife habitat value due to the project. A plan, including specific criteria for the creation and maintenance of wetlands on a nearby mitigation site, is presented. The acreage including banking by habitat type and the wildlife habitat value of the proposed mitigation wetlands are projected, and a comparison is made between the wildlife habitat value to be developed on the mitigation site and the wildlife habitat value lost on the expansion site.

A. Project Description

1. Project summary

The Salt Lake City International Airport (SLCIA), located in northwest Salt Lake City, Utah (Figures 1 and 2), is proposing to expand its operations by building a new runway, associated taxiways, concourses and related support and maintenance facilities. This new runway will be located west of existing airport facilities (Figure 3). Planning aspects of this new expansion are described in detail in the SLCIA’s Airport Master Plan Update, December 1988. Specific information regarding this project is presented in the SLCIA’s Master Plan Update, Expanded Environmental Assessment (XEA), January 1992.

This major expansion is required to meet SLCIA’s short and long term needs (20 years ±). The central focus of the expansion is a new 12,000 foot, north-south aligned paved runway. Immediately east of
this runway, two north-south aligned taxiways are proposed. These two taxiways connect the runway with existing and proposed storage and support facilities north of the present airport terminals via two east-west aligned taxiways. These east-west taxiways also connect the new runway with the existing runways east of the present airport terminals. North of these two east-west taxiways, support and operations facilities (e.g., storage, hangars, maintenance, air traffic control tower, etc.) are proposed. This area is presently used for this purpose but the size and numbers of facilities at this location will be increased.

To accommodate this expansion, several canals and 4000 West Street will need to be relocated. The Surplus Canal, the North Point Consolidated Canal and the "little" Goggin Drain will be realigned further to the west before flowing northward and reconnecting with their current alignment. The relocation of 4000 West will, in part, be below ground adjacent to the north-south taxiways. It will tie back into its present alignment north of the proposed northern support facilities.

This expansion will also require the relocation of about 4.9 miles of Utah Power and Light's (UPL) high voltage, overhead power transmission lines. Presently, these lines run southwest-northeast through the expansion site. The proposal is to relocate the north-south alignment further to the west (west of the SLCIA's western property line) and then angle eastward to tie into UPL's existing alignment. This relocation, including distances from runway, is required by the Federal Aviation Administration (FAA) to prevent interference with aircraft navigational systems.

As a result of SLCIA's proposed expansion, approximately 338.9 acres of jurisdictional wetlands will be directly or indirectly impacted. Wetlands on the expansion site are somewhat typical of the wetlands that surround the Great Salt Lake. The runway expansion will impact open water, saline marsh, mudflat/playa and saline meadow wetland community types. Wetland impacts result from fill activities, excavation and no longer allowing areas to be artificially flooded by the local duck clubs and adhering to the SLCIA's Bird Aircraft Strike Hazard (BASH) policy. BASH attempts to reduce bird attractants around the runways to minimize collisions of aircraft and birds.

2. Alternatives analysis

Numerous off site and on site alternatives were reviewed in order to document that the proposed action is the only alternative that satisfies the needs and meets the objectives of the SLCIA when considering logistics, technology and costs (see XEA discussion on Alternatives Analysis). These alternatives were also reviewed with regard to the Environmental Protection Agency's (EPA) 404 (b) (1) guidelines.

Four off site alternatives were considered. These alternatives ranged from 1) relocating the entire airport operation and expanding at that location, 2) building at another location and leaving the existing SLCIA intact, 3) shifting general aviation to another regional airport and 4) shifting expected increases in air carrier aviation to another regional airport. None of these alternatives provide practicable solutions to the needs of the SLCIA.

Seven on site alternatives were explored including a no-action alternative. The remaining on site alternatives explored various options including 1) placing a north-south runway 6,300 feet west of the existing runway later reduced to 6,155 feet, 2) placing a north-south runway 5,800 feet west of the existing runway, 3) placing a northwest-southeast runway west of the Airport's western property line, 4) placing an east-west runway that intersects the northern end of the existing 12,000 foot runway, 5) placing a runway 3,000 feet east of the existing 12,000 foot runway (which would be just
east of the shorter north-south runway) and 6) placing a north-south runway north and east of the present 12,000 foot runway.

3. Selection of preferred alternative

Of these alternatives, placing a parallel runway 6,155 feet west of the existing 12,000 foot runway provided solutions to all of SLCIA's short and long term needs. This alternative also minimizes the amount of wetlands that will be impacted. To avoid and minimize wetland impacts further, the runway was shifted eastward approximately 145 feet (revised from 6,300 feet), see XEA discussion on this alternative). The Section 404 permit application uses this alternative (Alternative 1.A.1) as the activity to permit. This mitigation plan is also prepared on the basis of the wetland impacts that result from this runway placement and its associated development plan.

B. Need for Mitigation

1. Section 404 regulations

Wetlands are defined as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs and similar areas" (33 CFR 328.3). In 1972, amendments to the Federal Water Pollution Control Act included Section 404 and stated that the U.S. Army Corps of Engineers (Corps) is to administer the permitting of 404 activities, the EPA and Corps are to develop guidelines and that the EPA has veto power over the Corps. The Clean Water Act of 1977 under Executive Order 11990 orders federal agencies to protect wetland resources to preserve and enhance the natural and beneficial values of wetlands in carrying out the agencies responsibilities.

Section 404 requires that a 404 permit be obtained from the Corps for the placement of dredge or fill material in wetland areas. Section 404(b)(1) requires that various development alternatives be explored to demonstrate that the proposed action avoids and minimizes wetland impacts. It is presumed that non-water dependent activities can be situated to upland sites. It must be demonstrated that a proposed action is the least environmentally damaging practicable alternative considering costs, technology and logistics in light of overall project purposes.

To offset the impact to wetlands that cannot be avoided or impacted, replacement of the lost wetland acreages (or functions and values) must occur. Compensatory mitigation is required when unavoidable impacts remain after avoidance and minimization. The agencies preference is to replace both the types of habitats and the functions and values lost on the project site. This mitigation plan addresses both of these issues.

2. Jurisdictional wetlands on expansion site

To determine the extent and type of wetlands present on the proposed expansion site, Salt Lake County Mapping Units maps and the U.S. Fish and Wildlife Service's (FWS) National Wetland Inventory maps were reviewed. After such review, it was determined that neither of the maps was adequate for this project. The Corps required that a formal, on site wetland delineation be conducted to determine the type and amount of jurisdictional wetlands present on the expansion site using the Corps of Engineers Wetlands Delineation Manual (January 1987). The findings of this 1988 delineation are described in Survey of Wetlands and Waterbodies in the Vicinity of Salt Lake City International Airport. (ESA, 1989). The results of this delineation are presented in Figures 4a, 4b, and 4c. The Corps has
verified and agreed with this delineation. The vegetation communities present on the site include open water, saline marsh (both are Corps jurisdictional), saline meadow, saline flat and playa (some are jurisdictional and some are not) and saline plain (non-jurisdictional).

3. Replacement of impacted wetlands

The wetland delineation, the vegetation community types and the proposed expansion provide the basis for compensatory mitigation provided in this mitigation plan. The following mitigation plan provides for the loss of open water areas, marsh areas, playa/mudflat areas and saline meadow areas. Due to size constraints of the mitigation site, the proposed mitigation plan replaces the community types as well as functions and values lost on the expansion site, but in a more compact setting. The proposed mitigation wetlands are basically incorporated into one large system which offers considerable biodiversity. It is intended to serve as habitat for a wide range of species including all stages of their life histories (e.g., breeding, nesting, feeding, resting, etc.)

4. Selection of mitigation site

Due to the amount of wetland impacts proposed on the expansion site, the SLCIA does not own sufficient land to provide for on site mitigation and the FAA's restriction on the development by the SLCIA of any bird attractants within 10,000 feet of a runway, a process was initiated with various resource agencies and the SLCIA to select an off site location. A selection process was developed that used these nine criteria: quality, size, proximity, safety, type, continuity, ratio, ownership and easements/right-of-way (see XEA, 1992). Several sites were examined but the location selected by the SLCIA and the resource agencies is the one proposed for use by this mitigation plan (see Figure 3). This particular site was selected based upon:

- having relatively low habitat value in its current condition,
- being large enough to provide for the amount of wetlands to be created,
- being within six miles of SLCIA to absorb displaced wildlife,
- being at least 10,000 feet from the new runway for safety reasons,
- being able to support the types of wetlands impacted on the expansion site,
- being contiguous with existing types of habitats that are to be created, and
- land being under private ownership,
- land consistent within local planning objectives.

C. Statement of Objectives

The overall objective of this mitigation plan is to demonstrate that, by its implementation, it will result in compensatory wetland mitigation required by the Corps and EPA (and other regulatory agencies). This mitigation includes the replacement of the types of wetland communities impacted, replacement of the approximate acreages of each wetland type impacted and, at a minimum, replacement of the biological functions and values lost on the...
expansion site. These biological functions and values are determined using the Habitat Evaluation Procedures (HEP) developed by the U.S. Fish and Wildlife Service.

1. Replacement of Habitat Units

Due to use of the proposed expansion site by numerous migratory and non-migratory waterfowl species for breeding, nesting, feeding and resting, it is the intent of this mitigation plan to replace these lost functions and values. To evaluate the biological functions and values of the expansion site, a HEP analysis was applied. HEP is a process by which the unit value of an acre of habitat is determined by species habitat models developed by the FWS from published research results. For the airport expansion site, five target species and one guild were selected from the list of available models to represent groups of species that use the site resources in different ways. Those target species include the blue-winged teal (Anas discors) or cinnamon teal (Anas cyanoptera), gadwall (Anas strepera), great blue heron (Ardea herodias), redhead (Aythya americana), white-faced ibis (Plegadis chihi), and the wintering shorebird guild (adapted for migratory shorebirds). The unit habitat value of one acre for each modelled target species was multiplied by the number of acres of appropriate habitat to obtain the number of Habitat Units (HU's) available in wetlands on the expansion site.

2. Replacement of general habitat types

The replacement of Habitat Units could occur by producing a different type of wetland community than exists on the expansion site. However, this mitigation plan replaces the required number of Habitat Units lost using similar acreages of the same wetland communities impacted on the expansion site. These habitat types include open water, marsh, mudflat and saline meadow.

3. Minimize maintenance needs

As directed by the various resource agencies and the desires of potential site managers, this mitigation plan design attempts to minimize the amount of required maintenance to sustain the system as a functioning wetland. A site such as this will always require some maintenance of water control structures, roads, etc. However, several design features have been incorporated to help limit the amount of maintenance. This design attempts to reduce yearly operational and maintenance costs in order to be more inviting to group(s) or organization(s) interested in managing the site.
II. WETLAND IMPACTS ON EXPANSION SITE

A. Description of Expansion Area

1. Habitat Types

The SLCIA and its proposed expansion area lie along a transitional gradient from uplands, through wetlands, to the Great Salt Lake. A variety of habitat types, including open water, marsh, saline meadow, and playa/mudflat, occur between the uplands and the Great Salt Lake to the northwest. Wetlands identified in the wetland delineation study (ESA, 1989) include a total of 3102.1 acres of open water, marsh, saline meadow, and playa/mudflat (Table 1). A map of the areas found to be jurisdictional wetlands on the airport expansion site is presented in Figures 4a, 4b, and 4c.

a. Open water

The areas designated as open water include 392.6 acres that are inundated by up to three feet of water for at least nine months of the year (see Typical Sections). Most of the open water areas within the project area are dependent on flows diverted from canals by adjacent duck clubs as a primary source of water. As a result, they are flooded in the fall for the hunting season and remain inundated until the next summer when evaporation reduces the volume of water and additional inputs are not available due to irrigation demand for canal water. In some years, the open water areas may be completely dry by the end of the summer. Fluctuations of water level preclude the establishment of large areas of contiguous emergent vegetation around the perimeters of most of the open water areas. Cover by submerged or floating aquatic vegetation within the ponds is also affected by water level fluctuations, as well as by planting efforts of the duck clubs. For the purposes of habitat quality evaluation, it was assumed that cover by aquatic vegetation in open water areas is approximately 30% on the expansion site, but no data is available.

b. Marsh

The marsh areas on the airport expansion project site occupy 533.1 acres that are also supplemented with water from the canals by the duck clubs. The marshes are characterized by large contiguous stands of emergent vegetation, which indicate that water levels in these areas are more stable and persistent during the growing season. The marsh vegetation includes hardstem bulrush (Scirpus acutus), alkali bulrush (Scirpus maritimus), cattail (Typha latifolia), swordleaf rush (Juncus ensifolius), other rushes (Juncus spp.), common reed (Phragmites australis), and reed canary grass (Phalaris arundinacea).

c. Saline meadow

Saline meadow areas occur on 1013.4 acres around the perimeters of open water, marsh, and playa wetlands. They are subject to seasonal inundation or saturation when the open water and marshes are filled with water, or when snowmelt or runoff accumulates in slight topographic depressions. Vegetation cover in saline meadow wetlands is generally close to 100% and the dominant plant species include saltgrass (Distichlis spicata), wiregrass (Juncus arcticus), foxtail barley (Hordeum jubatum), and scratchgrass (Muhlenbergia asperifolia), with bassia (Bassia hyssopifolia), pigweed (Chenopodium album), bulrushes (Scirpus spp.) and other salt-tolerant grasses and forbs. It should be noted that not all saline meadow areas are jurisdictional wetlands.
d. Playa/Mudflat

The areas designated by the wetland delineation as playa consist of a combination of playa and mudflat areas on a total of 1163.0 acres. The mudflat areas occur on the north end of the expansion project site and are seasonally flooded by canal water supplied by the duck clubs. The water in these mudflats is shallow and recedes during the growing season, leaving an ever-increasing expanse of bare mud. The playa areas on the south end of the expansion project site are also subject to seasonal flooding and drying. However, the source of water to these wetlands is snowmelt and precipitation runoff. Evaporation of surface water from the playas and mudflats during the growing season results in the capillary rise of salt from saline subsoils to the soil surface. Deposition of salt within the rooting zone precludes the establishment of vegetation over much of the playa and mudflat wetland area. Salt-tolerant grass and forb species may become established near the perimeters of the playa wetlands or in portions of the playas that are subject to flushing by fresh water. Those species include iodine bush (Allenrolfea occidentalis), seepweed (Suaeda torreyana, S. calceoliformis), pickleweed (Salicornia europaea), bassia, gray molly (Kochia americana), fat-hen saltbush (Atriplex patula), saltgrass, etc.

e. Upland

The airport expansion project area includes 3427.4 acres of upland habitat in addition to the 3102.1 acres of wetland (Figures 4a, 4b, and 4c). The upland areas include agricultural fields, pastures, and saline plain areas. The agricultural fields and pastures are generally subject to irrigation. The saline plain areas receive only natural precipitation and support a shrub canopy, dominated by greasewood (Sarcobatus vermiculatus) and rubber rabbitbrush (Chrysothamnus nauseosus). Other shrub species include shadscale (Atriplex confertifolia), basin saltbush (Atriplex gardneri var. tridentata), and broom snakeweed (Xanthocephalum sarothrae). Herbaceous species include cheatgrass (Bromus tectorum), saltgrass, foxtail barley (Hordeum jubatum), bassia, peppergrass (Lepidium perfoliatum), and curlycup gumweed (Grindelia squarrosa).

2. Wildlife

The wetlands and uplands of the airport expansion site provide habitat for a variety of wildlife species (ESA, 1991). Birds are the most diverse vertebrates with at least 145 species suspected to occur. Mammals are represented by small rodents, muskrats (Ondatra zibethica) and predators such as weasel (Mustela spp.), striped skunk (Mephitis mephitis), raccoon (Procyon lotor), and red fox (Vulpes vulva). Amphibians and reptiles are also in the area. The existence of wetlands accounts for the presence of over half of the species of birds within the expansion site. Similarly, several mammals and all the amphibians are tied to the presence of wetlands.

Much of the avian life using wetlands on the expansion site is associated with seasonally flooded playas. Flooding occurs naturally through snowmelt and rainfall runoff and artificially through water control structures. Waterfowl and shorebirds opportunistically use these areas when water conditions are favorable, particularly during the spring and fall when some of the ponds may be filled with water by adjoining duck clubs. Maximum one day counts of 4000 waterfowl and nearly 500 shorebirds were made within the project area during the migratory periods of 1990. Counts as high as 1000 American avocets (Recurvirostra americana) and 5000 ducks were made in previous years (Ella Sorenson, personal communication) when the Great Salt Lake water level was high and similar habitat was limited in other areas by flooding. Some breeding by shorebirds [(American avocet, black-necked stilt (Himantopus mexicanus), willet (Catoptrophorus semipalmatus), and
killdeer (Charadrius vociferus) does occur during the summer period, with limited waterfowl nesting also occurring. Wading birds are also regular users of the expansion area with snowy egret (Egretta thula), great blue heron (Ardea herodias), and black-crowned night heron (Nycticorax nycticorax) present to feed. Nesting habitat in the expansion area is not available for these species, nor for other marshland colonial nesting birds. Limited use by piscivorous birds [(American white pelican (Pelecanus erythrorhynchos), double-crested cormorant (Phalacrocorax auritus), and mergansers (Mergus spp.)] is made of the project area when the flooded playas and mudflats contain fish. Limited marsh areas within the expansion site where water is more permanent (from artificial control structures) provide habitat for several marsh birds including Virginia rails (Rallus limicola), Sora rails (Porzana carolina), common yellowthroat (Geothlypis trichas), and marsh wrens (Cistothorus palustris).

The uplands in association with the wetlands also provide foraging areas for several raptors including the Northern harrier (Circus cyaneus) and short-eared owl (Asio flammeus). Rodent populations using these areas provide the food base for these birds and for several mammalian predators. Relatively poor quality upland habitat provides habitat for several upland species of birds, with Western meadowlark (Sturnella neglecta) being the most common.

Species of concern: Seven avian species listed as sensitive by the Utah Division of Wildlife Resources (UDWR) and two listed as endangered under the Endangered Species Act of 1973 have been observed to use the wetlands within or near the expansion site. The snowy plover (Charadrius alexandrinus), long-billed curlew (Numenius americanus), Swainson's hawk (Buteo swainsoni), American white pelican, double-crested cormorant, Caspian tern (Sterna caspia), and white-faced ibis (Plegadis chihi) are state of Utah listed sensitive species, while the bald eagle (Haliaeetus leucocephalus) and peregrine falcon (Falco peregrinus) are federally listed species.

All of these species intermittently use the expansion area for feeding or resting when conditions are favorable. The snowy plover may have nested on the site during years when the Great Salt Lake was at high levels (Ella Sorensen, personal communication). A Biological Opinion (FWS, 1991) states that the proposed airport expansion does not jeopardize the continued existence of the bald eagle or peregrine falcon. Reasonable and prudent measures specified within the Biological Opinion necessitate the mitigation for the loss of wetland and upland foraging and prey base habitat.

B. Wetland Functions and Values on Expansion Site

The environmental importance of specific wetland areas is generally evaluated relative to eleven functions and values characteristic of most wetlands. Those functions and values include: groundwater discharge, groundwater recharge, floodflow alteration, sediment stabilization, sediment/toxicant retention, nutrient removal/transformation, production export, wildlife diversity/abundance, aquatic diversity/abundance, recreation/aesthetics, and uniqueness/heritage. The wetlands on the expansion site currently provide the groundwater discharge function during periods of high water table, and the groundwater recharge function during periods when the water table is lower and surface water is ponded in the wetlands. During peak flow periods in the spring or when the level of the Great Salt Lake rises significantly, the expansion site wetlands have historically provided floodwater storage areas. This function has been altered somewhat by the installation of dikes, canals, and dams by duck clubs and irrigation districts. Because most of the expansion site wetlands are not often subject to surface flows, the sediment stabilization function is not very important. Wetlands with substantial vegetation cover and a surface outlet connecting them to adjacent waterbodies provide the sediment/toxicant retention, nutrient removal/transformation, and production export functions, which protect downstream water
quality. However, few wetlands on the expansion site have both vegetation cover and a surface outlet. Aquatic habitat on the expansion site wetlands are of low function and value due to the uncertainty of the water supply and fluctuating water levels. Wildlife habitat function and value is similarly reduced by the irregularity of the water supply, but the wetlands are of significant value to large numbers of waterfowl, shorebirds, raptors, etc. The heritage value of the wetlands results from the use of the site by the sensitive wildlife species mentioned previously. The potential recreational value of the wetlands is reflected in the number of duck clubs that have become established on property adjacent to the airport expansion site. However, the recreational value of the expansion site itself is negligible due to restrictions to public access required to maintain airport security and safety.

Habitat conditions on the expansion site and on the mitigation site were projected for 100 years and the Average Annual Habitat Units for that time period were calculated. According to results of this analysis, the expansion site in its existing condition provides 1582.08 HU's for the blue-winged or cinnamon teal, 1582.08 HU's for the gadwall, 235.55 HU's for the great blue heron, 243.41 HU's for redhead, 292.14 HU's for white-faced ibis, and 761.74 HU's for migratory shorebirds (see Table 2 under the column labelled Expansion Site, Current).

The HU value of the different habitat types on the expansion site may be calculated by combining values for the target species. In its existing condition, the expansion site provides 879.40 HU's in open water habitat, 835.92 HU's in marsh habitat, 1388.32 HU's in saline meadow and 1593.36 HU's in playa/mudflat habitat (see Table 3 under the column labelled Expansion Site, Current).

C. Wetland Impacts on Expansion Site

1. Direct

a. Description of direct impacts

Direct wetland impacts proposed on the expansion site are a result of placing fill material for three basic project components. These three components are 1) the runway and related facilities, 2) the UPL powerline relocation and 3) alterations required by the BASH policy. The placement of fill material will directly impact 262.3 acres of jurisdictional wetlands (see Wetland Impact Sheets in 404 permit application).

The runway component includes constructing a 12,000 foot runway, associated taxiways, additional terminal concourses and associated tarmac areas, maintenance and storage support facilities and maintenance and access roads. Fill for the runway component will directly impact about 203.2 acres of jurisdictional wetlands.

The UPL powerline component includes constructing a year-round, 25 foot wide access road along the 4.9 miles of relocated powerline. This road serves as access for both a construction and for future, all weather maintenance. In addition to the road, 50 foot by 250 foot powerline pads or peninsulas will be placed approximately every 600 feet for support towers. The powerline relocation component of the project proposes to impact about 13.0 acres of jurisdictional wetlands.

The SLCIA’s BASH policy requires that any areas that attract birds that may potentially interfere with aircraft safety be altered to eliminate or reduce this safety problem. Portions of three open water areas at the north end of the proposed runway will be filled (to prevent standing water) as part of the BASH policy to reduce potential aircraft-bird conflicts. These topographically low areas
are flooded much of the year. Areas requiring fill related to the
BASH policy total 59.1 acres.

b. Impact acreages by wetland type

Based on vegetation mapping within jurisdictional wetlands prepared
during development of the XEA and proposed development plan, the
numbers of acres directly impacted per wetland type are presented
below.

<table>
<thead>
<tr>
<th>WETLAND TYPE</th>
<th>ACREAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>93.7</td>
</tr>
<tr>
<td>Marsh</td>
<td>14.2</td>
</tr>
<tr>
<td>Mudflat/Playa</td>
<td>55.7</td>
</tr>
<tr>
<td>Saline Meadow</td>
<td>111.7</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>275.3</strong></td>
</tr>
</tbody>
</table>

2. Indirect

a. Description of indirect impacts

Indirect wetland impacts on the proposed expansion site result from
the SLCIA no longer allowing areas to be artificially flooded.
Wetland areas north of the north end of the runway will no longer be
seasonally flooded by the duck clubs. The majority of the area
impacted by this flooding activity is mudflats. No fill material
will be placed within these jurisdictional wetlands but dike(s) will
be placed as needed in upland areas (across manmade channels)
connecting the water source (the Surplus Canal) and these mudflat
areas (see Wetland Impact Sheets in 404 application). The only
water source for these mudflat areas after the expansion project
begins will be natural precipitation. The mudflats will be
converted to playas as a result of the indirect impacts. The saline

meadow areas subject to indirect impacts will remain saline meadows.

b. Impact acreages by wetland type

Based on vegetation mapping within jurisdictional wetlands prepared
during development of the XEA and the preferred development plan,
the numbers of acres per wetland type to be indirectly impacted are
presented below.

<table>
<thead>
<tr>
<th>WETLAND TYPE</th>
<th>ACREAGE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open Water</td>
<td>0</td>
</tr>
<tr>
<td>Marsh</td>
<td>0</td>
</tr>
<tr>
<td>Mudflat/Playa</td>
<td>62.8</td>
</tr>
<tr>
<td>Saline Meadow</td>
<td>0.8</td>
</tr>
<tr>
<td><strong>TOTAL:</strong></td>
<td><strong>63.6</strong></td>
</tr>
</tbody>
</table>

3. Habitat Unit losses using HEP

Due to the direct impacts to wetlands on the expansion site, the
habitat value of the site will be decreased for wildlife, including
the HEP target species. According to the HEP analysis, losses of
HU's will include 139.7 HU's for the blue-winged or cinnamon teal,
139.7 HU's for the gadwall, 55.94 HU's for the great blue heron,
57.81 HU's for the redhead, 12.19 HU's for the white-faced ibis, and
98.28 HU's for the migratory shorebirds (see Tables 2 & 3, under the
column labelled Expansion Site, Losses). Losses of HU's by habitat
type will include 208.85 for open water, 26.59 for marsh, 170.18 for
saline meadow and 98.00 for mudflat. These numbers represent the
Habitat Units for which compensation must be provided by the created
wetlands on the mitigation site.
III. WETLAND MITIGATION SITE

A. Location

The proposed mitigation site is located approximately 2.5 miles northwest of the SLCIA. It is located in parts of Sections 14, 15, 22 and 23, Township 1 North, Range 2 West, SLBM (see Figure 3). This existing upland site is bounded by wetlands on all sides except for a small area of upland to the northwest. Elevations on the upland portion of the site range from about 4214 to 4222. The site slopes slightly to the north at about 0.1% to 0.5% with little micro-topographic relief.

A line is shown on Figure 3 that is 10,000 feet from the edge of the proposed runway. The FAA regulations do not permit the SLCIA to construct any type of bird attractants within this 10,000 foot wide zone. This mitigation plan proposes to establish compensatory mitigation west of this line.

B. Existing Conditions

1. Property ownership

One of the criteria used to select a mitigation site was that the proposed site be under private ownership. This is a requirement of state and federal agencies. This is because public lands generally have a higher level of natural resources protection than do private lands. This proposed mitigation site is under various ownerships with parcel sizes ranging from about 10 to 265 acres. The SLCIA is in the process of acquiring these lands.

2. Land uses

The majority of the property owners on the mitigation site lease or use this area for lambing and calving grounds and for livestock grazing purposes. During the spring, several of the property owners use this area for newborn sheep and calves. The area is also grazed during the remainder of the year, primarily by cattle.

A north-south aligned dirt road is located near the center of the mitigation site. This road provides access to duck clubs and livestock grazing areas to the north. A second dirt road forks off the main road to the northwest. This road provides access to duck clubs and livestock grazing areas northwest of the mitigation site. These roads are private and not open to public use. Just south of the mitigation site is a locked gate or a security person to prevent public access.

The North Point Consolidated Canal lies near the southern edge of the upland area. This canal carries water from about April to January to agricultural areas west and north of the mitigation site. The canal has banks that are about two to four feet higher in elevation than adjacent lands. These high bank elevations allow water to be higher than the surrounding terrain which allows large areas to be irrigated. The canal slope is extremely flat in the mitigation area (approximately one foot drop per three miles).

3. Hydrology

Hydrology of the upland areas of the mitigation site is driven by precipitation. There is a very limited amount of irrigation that occurs north of the North Point Canal. As evidenced by the vegetation present on the site, water availability is very limited. The majority of the site's precipitation occurs from October through May (11.8 inches) in the form of snow and rain. The mean annual precipitation of the site is about 15.3 inches, with the mean annual evaporation being about 50.6 inches (based on information collected at the SLCIA by the Utah Climate Center) .
As discussed in more detail in the following Soils section, five soil bore holes were drilled to about a 10 foot depth. Slotted PVC pipes were installed in the holes so that ground water levels could be monitored. Based on information collected in January 1992, ground water levels vary from about 1.6 to 3.2 feet below the ground surface. The location of these piezometers are shown on Figure 5. The following table shows the ground water elevations and distance below the surface for each piezometer.

<table>
<thead>
<tr>
<th>PIEZOMETER ID</th>
<th>WATER ELEVATION</th>
<th>FEET BELOW SURFACE</th>
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<tbody>
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<td>1</td>
<td>4217.2</td>
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<td>4216.9</td>
<td>3.2</td>
</tr>
<tr>
<td>5</td>
<td>4215.5</td>
<td>1.8</td>
</tr>
</tbody>
</table>

The relatively high water table does not appear to affect the surface conditions due to the presence of a hard pan below the surface. This is evident by the site's mesic and xeric vegetation.

There are two artesian wells on the mitigation site. These wells are reported to be several hundred feet deep (exact depth unknown) and have been in place for many years. They produce small quantities of water on a continuous basis (estimated at about five gallons/minute). This continual source of water has created small areas of emergent vegetation in the immediate vicinity of each well.

Water quality of the piezometers, the North Point Canal and the eastern flowing well was sampled in February 1992. Results of analysis for temperature, pH and electrical conductivity are presented below.
Soils were mapped as part of the Soil Survey of the Salt Lake Area, Utah (USDA-SCS, 1974). Soil map units were reassessed in light of intended uses for mitigation and mapping was refined from 1:2,400 scale orthophotos dated September 28, 1990. Refined mapping of soil types generally corresponds with mapping of existing vegetation in the mitigation area. Soil cores were obtained from five locations in the mitigation site (see Figure 5). Discrete soil horizons of each core were submitted to the Soil Testing Laboratory at Utah State University for pertinent analyses.

Soil types identified in the SCS Soil Survey are:

Jordan silty clay loam
Lasil silt loam, 0 to 2 percent slope
Lasil silt loam, drained, 0 to 1 percent slope
Saltair silty clay loam
Terminal silt loam

Descriptions from the Soil Survey are as follows.

The Jordan soil occurs on lake plains near the Great Salt Lake. The range site is alkali bottoms. The taxonomic classification of the Jordan soil is: fine, mixed, mesic, Salorthidic Natrustalf. This soil is somewhat poorly drained, strongly alkali and has horizons with concentrations of salt. Slopes are 0 to 1 percent.

The Lasil soil occurs on lake plains and is strongly saline-alkali. The range site is alkali bottoms. The taxonomic classification of the Lasil soil is: fine-silty, mixed, mesic, Typic Natrustalf. The soil is somewhat poorly drained or artificially drained. Slope are 0 to 3 percent.

The Terminal soil occurs on lake plains with slope of 0 to 1 percent. The taxonomic classification is: fine-loamy, mixed, mesic, Petrocalcic Natrustalf. The soil is somewhat poorly drained, strongly saline-alkali, and underlain by a fragile hardpan within a depth of 20 inches.

The Saltair soil occurs in the lowest parts of lake plains. The series is poorly drained, strongly saline-alkali affected. Slopes are 0 to 1 percent. The taxonomic classification is: fine-silty, mixed, mesic, Typic Salorthid.

For the purposes of this study, the Jordan, Lasil and Terminal soils are similar. The Jordan soil is distinguished by a subsurface horizon with salt concentrations (salic horizon). The Terminal soil is distinguished by a thin, fragile hardpan (petrocalcic horizon) within two feet of the surface. The Lasil soil is distinguished by the absence of the salic and petrocalcic horizons. The Jordan, Lasil and Terminal soils are similar in being somewhat poorly drained and saline-alkali in the subsoils. These soils were grouped as the Natrustalf Association (see Figure 5). The Saltair soil is dissimilar in lacking a surface layer of organic matter accumulation (topsoil) and being saline-alkali at the surface.

Soil samples were extracted from five drill holes in the mitigation site. Descriptions of these pedons are presented in the APPENDIX. Selected layers of these soils were analyzed for parameters.
important for use in wetland establishment. Results of this
analysis are listed in Table 4. The areas of soil types with
corresponding vegetation types are listed in Table 5.

Dominant soil types in the project area were further stratified into
layers of more-or-less similar soil material types, based on
attributes influencing their value for use in wetland establishment.
Two general material types were identified:

Loamy topsoil: dark colored loam and silt loam with
accumulated organic matter; typically nonsaline (EC < 4
mmhos/cm) and sodic (SAR > 16).

Saline-sodic subsoil: light colored, fine-textured (silty
clay, silty clay loam, clay loam and clay); includes coarse-
textured lenses (loamy sand, sandy loam, silt loam); typically
saline (EC > 4 mmhos/cm) and sodic (SAR > 16).

Loamy topsoil is distributed to an average depth of about one foot
on the Natrustalf Association. Loamy topsoil is absent on the
Saltair soil. Saline-sodic subsoil underlies the topsoil on the
Natrustalf Association. It extends from the surface down in the
Saltair soil.

5. Vegetation

Habitat types similar to those on the expansion site occur on the
mitigation site, including areas of open water, marsh, saline
meadow, playa/mudflat, and upland (Figure 6). In addition to these
five habitat types, the mitigation site includes areas of scrub-
shrub vegetation, supporting small tamarisk (Tamarix ramosissima)
trees over an understory resembling the saline meadow.

Due to existing property ownership boundary lines, the SLCIA is
proposing to acquire entire parcels from their owners and not just
the area needed for implementation of this plan. As a result, the
purchase of these lands will, in part, result in the purchase of
jurisdictional wetlands. Figure 6 shows the areas considered to be
jurisdictional wetlands on and around the mitigation site. Most of
the areas that would qualify as jurisdictional wetlands are located
on the north and south edges of the mitigation property. To the
south, areas of open water, marsh, saline meadow, and scrub-shrub
habitat occur in abandoned oxbows in Baileys Lake. To the north,
areas of playa, saline meadow, marsh, and open water occur in
natural depressions that are periodically flooded by runoff and the
duck clubs. Surrounded by these lower wetland areas, the central
portion of the mitigation site consists of mostly upland. All of
the wetland creation activities will take place within this central
upland area in order to avoid further impacts to wetlands.

The only jurisdictional wetland areas within the central upland
portion of the site are related to two artesian wells. Each well
supports a small marsh community immediately around the well itself
(less than 100 feet in diameter). In addition, hydrophytic
vegetation is becoming established in a small area south of the
North Point Consolidated Canal and just west of the 10,000 foot
line. This encroachment of hydrophytic vegetation is strictly a
result of the current property owner leaving irrigation head gates
open year round. This mitigation plan proposes to leave these
structures in place and the future site manager can open or close at
their discretion.

The remaining 735.8 acres of area available for wetland creation
consist of upland habitat. The plant species present in the habitat
types within the mitigation property are similar to those described
for the expansion project area.
6. Wildlife

The proposed mitigation site is largely upland in nature and, as a result, is dominated by upland wildlife species. The poor quality of this habitat, indicated by the abundance of greasewood (Sarcobatus vermiculatus), rubber rabbitbrush (Chrysothamnus nauseosus), and cheat grass (Bromus tectorum), likely reduces the value of this area to upland wildlife. Bird surveys conducted in April through June 1991 (ESA, 1991) indicate the presence of several upland species that likely nest within the mitigation site, with Western meadowlark being the most numerous. Several wetland avian species use adjacent wetland areas and seasonally use the uplands when they contain standing water, as during the wet spring of 1991. Several species of upland mammals and reptiles also use the proposed mitigation site.

Species of concern: Three species listed as sensitive by the UDWR may occur within the upland portion of the mitigation site: long-billed curlew, Swainson’s hawk and ferruginous hawk (Buteo regalis). The long-billed curlew appears to nest within the mitigation site in low numbers, with up to four pairs nesting (ESA 1991). Limited nesting opportunities, coupled with low prey base due to the poor habitat quality, probably limit the two hawk species to infrequent visits. The endangered bald eagle and peregrine falcon may infrequently pass through the mitigation site while foraging, but limited preferred prey likely limits sustained use. Other sensitive species listed by the UDWR have been observed passing over the mitigation site (American white pelican, double-crested cormorant, white-faced ibis, and snowy plover (ESA, 1991), but without suitable habitat in the upland portion, use by these species is unlikely.

C. HEP Analysis of Habitat Units

Because only the central upland portion of the mitigation property will be altered by the mitigation activities, the existing conditions on only that portion of the site were evaluated for habitat values using the Habitat Evaluation Procedures. Due to the absence of jurisdictional wetlands within the portion of the mitigation site to be developed, the site in its current condition provides no HU’s for which mitigation will be required for any of the target species (see Table 2 under the column labelled Mitigation Site, Current).
IV. WETLAND MITIGATION PLAN

A. Hydrology

1. Water rights

Water for the mitigation site will be diverted from the North Point Consolidated Canal. The North Point Consolidated Canal Company, is in the process of compiling the necessary water rights information related to the canal to address resource agency and other canal water users concerns. The Canal Company has indicated that shares will be sold (or traded in exchange for canal improvements) to the SLCIA. These shares will entitle the SLCIA, including the future site manager(s) legal diversion of water from the canal to the mitigation site when water is present in the canal (usually late March-early April to early January). The North Point Canal Company has indicated that there is sufficient water in the canal to satisfy the needs of the mitigation site as currently designed. It requests that excess water not consumed on the mitigation site be available to other shareholders.

The North Point Canal Company is legally entitled to a diversion rate of 90 cfs and 35 cfs from the Surplus Canal corresponding to water rights dating back to 1862 and 1915, respectively (as stated in the Proposed Determination of Water Rights in Utah Lake and Jordan River Drainage Area, Northwest Subdivision, dated June 1975). The Proposed Determination places restrictions on the use of this water for wildlife cover and feed, open water for waterfowl and fur-bearing animals, pasture irrigation, stock watering and intensive agriculture. The Company's water rights (e.g., water) are distributed by the use of shares. The Company has 8,252 outstanding shares of which 7,127 shares are committed to the west branch of the canal (branch that flows through the mitigation site). Water shares will be either leased on a long-term basis or sold to the SLCAA for use on the mitigation site. Water is distributed to its users on a pro-rata basis (e.g., equal amount of water for each stock share).

2. Inlet-outlet control systems

The proposed water delivery system for this mitigation site is based on providing more water than is necessary to account for evapotranspiration losses. Excess water above evapotranspiration losses will be diverted from the North Point Consolidated Canal to prevent water quality problems. Water can be diverted from the North Point Consolidated Canal at two locations depending upon the operation and management of the site. However, it is anticipated that water will be diverted from the eastern diversion point the majority of the time (see Figure 7). This additional water will usually spill out the north end of the western cell over a spillway system. Water can be spilled from either the east cell or the west cell and still be used by other water users to the west. This water will be collected by a constructed ditch at the west end of the west cell and will discharge water into an existing ditch used to delivery North Point Canal water further to the north and west. Water can also be drained completely from either cell should this be necessary. Water drained from the west cell can be discharged into the constructed ditch and used by others whereas water drained from the east cell must be drained onto existing wetlands immediately north of the site. The dike separating the east and west cell will have an adjustable spillway/stop logs to allow independent water levels in either the east or west cell. Normally, this spillway (stop logs) will be removed so that there is free flow between the east and west cells.

Inlet system

The North Point Canal will provide all the water required to sustain wetlands on the mitigation site. Water will be diverted from the canal just west of the 10,000 foot line established by the FAA. A
concrete headwall will be recessed into the north bank of the canal. The north bank will be relocated northward about six feet for about 15 feet to create a small "bay" in the canal (see Typical Sections). Water will be diverted from the canal through the headwall to the mitigation site by a submerged pipe inlet. This pipe will be an 18-inch diameter, hard, smooth-walled plastic pipe which will provide excellent corrosion resistance and smooth flow characteristics. A headgate will be placed on the canal side of the headwall to allow or prevent water from entering the pipe. On the mitigation site end of this pipe, gravel will be placed to prevent muskrats from burrowing along the pipe. These structures will not modify the flow characteristics (flow capacities, water elevations, etc.) of the canal either upstream or downstream.

This type of diversion system is proposed at both the southeastern corner of the eastern cell and just west of the duck club road dike that separates the eastern and western cells (see Figure 7). The easternmost diversion is intended to provide all the necessary water for the entire wetland mitigation site. However, the western diversion (just west of the dike separating the cells) can supply water to the western cell if the eastern cell is dewatered for any reason.

The submerged pipe delivery system is intended to provide relatively constant water discharges for the mitigation site even though water elevations and discharge in the North Point Consolidated Canal may vary. Water elevations in the canal range from about 4219.0 to 4220.0 within the area proposed for installing diversion structures based upon a detailed survey and the hydraulic analysis using the Corps' HEC-2 backwater analysis program and expected flow variations. Discharge measurements within the canal were also conducted to define the elevation-discharge relationship. Discharges in the canal through the mitigation site are expected to range from about 40 cfs to 100 cfs.

Outlet system

Water discharging from the mitigation site can be handled by two different methods depending upon the current operation of the site. During normal operations, the mitigation site is intended to operate as one system. The outfall of water for normal operations will occur at the west end of the mitigation site (see Figure 7). The discharge of water from the mitigation site to a receiving ditch will be controlled by a five foot wide spillway (weir). This adjustable spillway will control water elevations in the mitigation area by removing or replacing stop logs. A water level gage will be placed adjacent to the outlet to allow maintenance personnel to determine the exact water surface elevation in the mitigation area (design elevation 4218.0 to 4218.5). The stop logs and water level control system will be operable by one person and can be locked to prevent tampering. Various stop log sizes will be provided to fine-tune water levels (see Typical Sections).

If the mitigation site is temporarily managed as two independent cells, water will be discharged from the western cell in the same manner as if the site was managed as one system. Water elevations will be controlled the same way for the eastern cell (e.g., five foot adjustable spillway) except at a location just east of the dike dividing the east and west cells (see Figure 7). Once water flows over this spillway and through the dike, it will be discharged into a six foot wide, 18-inch deep earthen canal on the north side of the dike (see Typical Sections). This canal will convey water along the north side of the dike and discharge water into the ditch at the same location as the eastern cell's spillway. This canal allows water to be diverted from the North Point Canal, to flow through the eastern cell of the mitigation site, and to discharge into the ditch that will convey water northwest of the mitigation site for use by others.

In the event that the mitigation site (either cell or both cells)
require complete draining, provisions have been made to allow this operation. Water from the western cell (or for the entire system if operated as one cell) will drain from a low elevation outlet adjacent to the spillway. This 30-inch diameter, low elevation outlet will be at about elevation 4214.5 (discharge capacity of about 30 cfs). This low elevation outlet (a plastic, screened corrugated pipe) will be placed in a concrete headwall with a headgate (see Typical Sections). This system will only be used in the event the cell(s) needed to be drained.

The eastern cell can be drained independent of the western cell if it needs to be. The same low elevation outlet described above will be adjacent to the eastern cell's spillway. Due to elevational differences, water drained from this cell cannot be diverted to the outfall ditch proposed northwest of the mitigation site. Should draining of the eastern cell be required, water will be discharged to the existing open water and playa areas to the north. This system will be screened to prevent fish from exiting the mitigation site. The elevation of this 30-inch diameter outlet will be about 4214.5.

The dike/road separating the east and west cells will have an adjustable spillway system as described above to allow the cells to be hydraulically independent of each other should it be needed. When the mitigation site is managed as one system, the stop logs will be completely removed to allow complete hydraulic connection between the two cells. If one of the cells needed to be drained (or have a different water elevation than the other cell), stop logs will be installed.

3. Water quality

As noted above, water will be withdrawn from the North Point Consolidated Canal and utilized in the mitigation area. This inflowing water meets Utah Water Quality Standards (Table 4.7-4, XEA). In a previous study, total dissolved solids (TDS) were measured to be approximately 1000 mg/l with biological oxygen demand (BOD₅) ranging from 1.85 to 2.20 mg/l. Heavy metals such as total copper, total chromium, and total cadmium had average concentrations of 0.15 mg/l, .01 mg/l, and 0.009 mg/l respectively. Total zinc had the highest metal concentrations with 0.07 mg/l. Total carbon concentrations ranged between 34 mg/l and 48 mg/l with an average of 40 mg/l. Most of this carbon was in the form of particulate organic carbon. Electrical conductivity of the canal water was measured to be 1,060 umhos/cm.

The mitigation wetland water system is designed to be flow-through with a 45 to 60 day retention time. With this amount of flushing and the relatively good water quality entering the mitigation area (low TDS and BOD₅), water quality problems are not anticipated.

A winter period of stagnation will occur in these ponds during three winter months when inflow water will not be available. Whether equilibrium is established between the overlying pond water and the highly saline soil pore water will depend on the degree of wind-driven mixing. If the pond(s) freeze, mixing will be minimized. Under these conditions, the higher density pore water will resist mixing with the overlying water and a density gradient in the open water areas will result with the less saline water near the surface. If the open water areas remain open, mixing will result in an equilibrium between pond salinity and soil salinity as noted in the relationship shown in Figure 8. A partial barrier to this process could be created by lining the ponds with topsoil. This would result in a quiescent, lower salinity layer within the lower salinity topsoil that would not be affected by wind-driven processes in the pond, thus resulting in less transport of highly saline pore water into the overlying water.
Water stagnation could also result in a botulism problem, particularly during warm weather in the presence of dead birds or mammals. The projected turnover rate within the mitigation wetland will be rapid enough to prevent the stagnation required for botulism or conductivity problems, even during periods of maximum evapotranspiration.

The herbicide Magnacide H is utilized in the North Point Consolidated Canal for weed control. If applied to the water in the canal at a concentration of 10-15 ppm with a two to four hour contact time, the herbicide will have a significant effect on the fish and macroinvertebrates within the mitigation area. The current application rate to the canal is once every four to six weeks during the summer growing season. To prevent impacts to organisms in the mitigation wetlands during the two to four hour contact period, the intake structures to the wetlands will be closed until concentrations of Magnacide H drop below 1 ppm in the canal, which is the concentration found to be toxic to fish.

4. Water budget analysis

A water budget analysis of the mitigation site was performed to determine how much water needs to be diverted from the North Point Consolidated Canal to account for evapotranspiration demands. Long-term monthly precipitation data (1951 to 1980) were obtained from the SLCIA. Use of pan evaporation data from the SLCIA (1928 to 1933) was recommended for this site by the Utah Climate Center. The Utah Climate Center also recommended the use of a pan coefficient of 0.70 (converts pan evaporation to free-water evaporation). The Center stated that SLCIA evaporation data are more applicable to the mitigation site than data from the Saltair station. The Climate Center performed an analysis of the various evaporation data around the State and found the Saltair data to be in a group by itself. That station's pan evaporation did not match other evaporation data available in the area. For these reasons, climate data from the SLCIA station were used instead of data from the Saltair station that were used in the XEA.

The mean annual precipitation at the SLCIA station used in this analysis is 15.31 inches. The mean annual evaporation (converted from pan evaporation to free-water evaporation) is 50.59 inches. Table 6 provides a monthly analysis of the evapotranspiration demands on the mitigation site based on 135 acres of open water and 105 acres of marsh from June through August (low water elevation at 4218.0) and 222 acres of open water and 105 acres of marsh from September through May (high water elevation at 4218.5). The increase in open water acreage for this period is related to the mudflat area being inundated by water at the high water elevation. Table 6 also indicates the volume of water needed and the average monthly flowrates necessary to offset evapotranspiration needs. Based on this analysis, the months of December through March require no diversion from the North Point Consolidated Canal because precipitation is greater than evaporation. This period corresponds to the period during which the North Point Consolidated Canal is usually dewatered for maintenance purposes.

Based only on evapotranspiration needs, the daily flowrate from the North Point Consolidated Canal ranges from a low of about 0.1 cfs in November to about 2.9 cfs in July. The mean annual water volume needed for this mitigation site to account for evapotranspiration only is about 860 acre-feet.

Losses to ground water were considered to be insignificant because the present ground water is within two to three feet of the surface despite several years of below normal precipitation. After the mitigation site is filled with water, it is anticipated that the ground water levels around the mitigation site will rise. In addition, most of the open water areas will require excavation down to the present ground water elevations to attain desired water
5. Diversion rates

Based on evapotranspiration demands, the volume of water in the open water and marsh areas, accounting for low and high water levels, and a 45 to 60 day turnover time to maintain good water quality, the daily flowrate to be diverted from the North Point Canal to the mitigation site (for one hydraulically connected system) varies from about 5.1 cfs during the winter to 8.8 cfs in the spring/summer. The flowrate needed to maintain the desired 45 to 60 day turnover time remains constant throughout the year (5.1 cfs to 6.8 cfs); only evapotranspiration demands vary during the year.

To eliminate the need to modify the rate at which water is diverted from the North Point Canal (by a maintenance person) to the mitigation site (operated as one hydraulically connected system), an 18-inch pipe is proposed at the eastern diversion point. About seven to nine cfs will flow through an 18-inch pipe based on water elevations in the canal ranging from 4219.0 to 4220.0 and water elevations in the mitigation site ranging from 4218.0 to 4218.5. The auxiliary diversion located just west of the dike separating the two cells will require a 12 to 15-inch pipe. A second 12 to 15-inch pipe could be installed at the eastern diversion in the event the two cells were operated independently and the North Point Canal Company did not want the additional water being diverted from the canal.

The amount of water returned to the outfall ditch west of the mitigation site is a function of the amount diverted from the canal and the evapotranspiration rate. For example, if nine cfs were diverted from the canal in July, 6.5 cfs will return to the outfall ditch to the northwest. If seven cfs were diverted, 4.5 cfs will return to the ditch.

B. Dikes/Roads

Dikes are proposed for use on this mitigation site to provide a way to create open water without large volumes of excavation, to provide access for maintenance personnel, to provide access through the site for duck clubs to the north and west, and to provide an elevated upland area that can be used by various upland and waterfowl species.

The construction of a dike along the eastern and northern portion of the mitigation site is proposed to create open water areas since the slope of the existing terrain is towards the north. The top elevation of the dike will be at 4220.0 (1.5 to 2.0 feet higher than the open water elevation). Its side slopes will be constructed with 5:1 slope (five feet horizontal per one foot of rise) on both sides. The top width will be 20 feet (except for the dike on which the duck club access road is located). The dike will be constructed of top soil and acceptable subsoils excavated from the mitigation site. The top four to six inches of the dike will consist of topsoil in order to enhance revegetation.

The 20 foot top width of the dike is intended to provide adequate room for routine maintenance vehicles and for any heavy equipment that may be required during construction and in the future (if needed). The dike along the east and north side of the open water areas is not intended for vehicular access for the public or duck hunters.

The dike in the middle of the mitigation site is intended to replace the primary access to duck clubs and grazing areas north and west of the mitigation site. It also provides management options to control water levels in the east or west cell. A five foot spillway with stop logs will be provided in the dike to allow independent water level control for the cells if desired.
Due to traffic demands on the present access road, the road on the dike will have a 24 foot width with the upper road section being constructed with compacted road base. A four foot high, vegetated berm with 3:1 side slopes are proposed on either side of the road to act as a noise and visual barrier (see Typical Sections).

To minimize the amount of water leaking through the dikes, a clay core will be constructed inside the dikes. This clay core will be 10 feet in top width (at elevation 4219) with 2:1 side slopes (see Typical Sections). It will be constructed per geotechnical recommendations determined prior to construction. The clay material will come from on site sources.

C. Soils

Because the mitigation plan was designed to be compatible with the natural topography occurring on the mitigation site, the requirements for cut and fill have been minimized. As a result, the existing one foot to eighteen inches of topsoil will remain in place over much of the wetland area to be developed. In areas where cutting or filling is necessary, one foot of topsoil will be removed separately and reapplied immediately to regraded areas. If immediate reapplication is not possible, topsoil will be stored separately on site in low, flat stockpiles and reapplied to regraded areas as soon as possible. In addition, some topsoil will be imported from the wetlands to be disturbed on the expansion project area in order to provide seeds and vegetative propagules of native plant species that are not commercially available. This topsoil will be removed from wetlands to be disturbed to a depth of one foot to eighteen inches. It will then be transported to the mitigation site and immediately respread on prepared areas that are intended to develop the same type of vegetation as that present in the wetland from which the soil was removed. Areas requiring cut or fill will be regraded and one foot of upland topsoil will be respread over the saline subsoil prior to application of the wetland topsoil harvested from the expansion project site.

D. Vegetation

The objective of the mitigation plan is to provide the habitat conditions necessary to compensate for the loss of wetlands on the expansion site. To accomplish that objective, the topographic, hydrologic, and soil conditions necessary to support the same wetland and upland plant communities impacted on the expansion site will be provided. Plant species common to the open water, marsh, and saline meadow wetlands on the expansion site and in the immediate vicinity will be planted in areas which are characterized by the appropriate topography, hydrology, and soils. As described in the previous section, seeds and vegetative propagules present in the topsoil of wetlands to be disturbed will be used to provide ecotypically adapted plant material for revegetation. If necessary, additional seeds, tubers, plugs, and mats of vegetation will be harvested from wetlands in the vicinity of the mitigation or expansion sites for immediate transplanting into the mitigation wetlands. An additional alternative will be to harvest seeds or plugs of vegetation to be grown in a greenhouse for at least three months prior to transplanting into the mitigation wetlands. Seeds or rooted transplanted will only be purchased if they are available from local sources.

1. Open water habitat

The mitigation plan (Figure 7) proposes that the construction of the mitigation area consist of approximately 135.0 acres of open water, 104.7 acres of marsh, 138.2 acres of saline meadow, 87.4 acres of mudflat, and 270.9 acres of upland habitat. The open water areas will consist of channels and ponded areas that will be permanently
inundated with 1.5 to 3.5 feet of water (see Typical Sections). It is anticipated that these areas will remain clear of emergent vegetation as long as water depths greater than 1.5 feet are maintained, with no drawdown episodes during the growing season. A steep transition to open water from adjacent emergent vegetation areas (see Typical Sections) will discourage encroachment of emergent plant species into open water areas. The shallower edges of the open water ponds will be planted with tubers or transplants of submersed vegetation, such as Sago pond plant (Potamogeton pectinatus), coontail (Ceratophyllum demersum), muskgrass (Chara vulgaris), naias (Naias flexilis), etc. Propagules of these species may be obtained commercially or by applying one foot of topsoil from ponds on the expansion site to the surface of the upland topsoil on the mitigation site immediately prior to flooding the ponds.

2. Marsh habitat

The marsh areas on the mitigation site will be permanently inundated by water less than one foot deep. During the low water season between May and September, water depths will range from less than one inch on the perimeter of the marsh to six inches at the transition to open water (see Typical Sections). During the high water season between September and May, water depths within the marsh will range from six inches to one foot. This water regime will be adequate for the establishment of emergent plant species, including alkali bulrush (Scirpus maritimus), hardstem bulrush (Scirpus acutus), wiregrass (Juncus arcticus), and swordleaf rush (Juncus ensifolius). Other plant species that are likely to become established in the marsh mitigation areas include cattail (Typha latifolia) and common reed (Phragmites australis). These two species are undesirable from a habitat perspective and efforts will be made to exclude them from the site. Toward that end, only tubers of alkali bulrush and hardstem bulrush will be planted. If topsoil is used as the source of propagules for marsh vegetation, only soils removed from emergent stands that are free of cattail or common reed will be used. The bulrushes will be planted in a relatively dense pattern and encouraged to form a closed canopy capable of excluding invading species. During the marsh establishment period, planting will take place in concentric bands and the water level will be raised slowly so that the sprouting plants in each band will be able to maintain enough leaf surface above the water surface to provide oxygen to the roots. Portions of the marsh that are located adjacent to channels and areas subject to flowing water will be stabilized with a coarse mesh erosion control fabric to prevent soil losses until the vegetation can become established. Plugs of vegetation will be planted through slits in the fabric, if plugs are used.

3. Mudflat habitat

The large expanse of mudflat on the mitigation site will be maintained relatively free of vegetation by allowing the surface to dry out during the growing season. Water will range from zero to six inches deep during the high water season (see Typical Sections). In May, the water level will slowly be dropped six inches until the mudflat area is exposed at the rate and discretion of the future site manager using water level control structures. The surface of the mudflat area will be graded to eliminate the existing vegetation and to reduce the topsoil depth to six inches. Grading will also provide a mosaic of shallow depressions and low berms. The depressions will retain water less than one foot deep when the water level is dropped in the spring. Evaporation throughout the summer will eliminate the ponded water and result in the capillary rise of salts to the soil surface as the soil water evaporates. Deposition of salts in the root zone will prevent the reestablishment of most species of vegetation. Some salt-tolerant plant species, such as pickleweed (Salicornia europaea), iodine bush (Allenrolfea occidentalis), seepweed (Suaeda torreyana), and saltgrass...
(Distichlis spicata), may become established on the low berms and along the upper edge of the mudflat areas due to the drainage of the soil water to lower topographic positions before evaporation provides salt deposition adequate to exclude vegetation. The water level will be raised six inches from elevation 4218.0 to 4218.5 in late August or early September prior to the migration of shorebirds and waterfowl in order to provide the areas of shallow flooding preferred by some species. No revegetation will be occur.

4. Saline meadow habitat

The saline meadow mitigation wetlands will be located in areas over which the soil surface is less than one foot higher than the high water level in the rest of the mitigation wetlands (see Typical Sections). They will also be located in areas adjacent to the wetland perimeter berms where it is assumed that seepage from the elevated water levels in the mitigation wetlands will raise the existing water table to within one foot of the soil surface. It is assumed that the water in the mitigation wetlands will maintain the water table in the saline meadow areas within one foot of the soil surface over the entire year, and that snowmelt and precipitation will result in seasonal inundation or saturation to the soil surface. The upland vegetation currently dominating the saline meadow areas will be removed and mats or plugs of saltgrass will be installed in a grid pattern during the high water table period in the spring to provide centers for vegetative reproduction. The mats and plugs will be obtained from saline meadow areas to be disturbed on the expansion project site. Alternative sources of saltgrass and other meadow plant species include purchase of seed from local commercial sources, collection of seed from undisturbed stands in the project vicinity, or application of a topdressing of six inches of soil and root mass removed from saline meadow areas to be disturbed and immediately spread over the mitigation area saline meadows. Planting of mats or plugs is preferable to the topdressing of soil and roots in terms of providing rapid establishment of meadow species and exclusion of weeds. If commercial seed sources or local seed collections are used, species to be planted include saltgrass, foxtail barley (Hordeum jubatum), wiregrass, scratchgrass (Muhlenbergia asperifolia), and hoary aster (Machaeranthera canescens).

5. Wetland habitat

Two existing wetlands occur on the upland portion of the mitigation site (associated with artesian wells). The eastern wetland area will not be impacted or affected by grading of the proposed mitigation plan. It is expected that the existing marsh vegetation around the well will remain in place even though it will be inundated by a few inches of water during high water periods (within a proposed mudflat area). It will provide a local source of relatively warm, less saline water.

The elevation adjacent to the western artesian well is about 4215.0 which is the bottom of the proposed open water areas. This mitigation plan proposes to extend the well's pipe to elevation 4219.5 or 4220.0 and replace the surrounding marsh vegetation back around the well. This well will be on an island in the middle of an open water area. The topography of the island will be designed to support the replaced marsh area and the proposed saline meadow.

6. Upland habitat

Upland areas adjacent to the mitigation wetlands may be improved by interseeding of native grasses and forbs known to be valuable for wildlife use. Suggested species include western wheatgrass (Agropyron smithii), Indian ricegrass (Oryzopsis hymenoides), saltgrass, hoary aster, and Letterman needlegrass (Stipa
lettermanii). Abandoned agricultural fields south of the North Point Canal are dominated by curlycup gumweed and other weeds. Application of an EPA approved herbicide and cultivation may be necessary prior to drill-seeding the seed mix of native grasses and forbs. In cultivated areas or other areas devoid of shrubs, rooted transplants of basin saltbush (Atriplex gardneri var. tridentata), four-wing saltbush (Atriplex canescens), and greasewood (Sarcobatus vermiculatus) will be planted in a random pattern with an average density of one shrub every 100 square feet.

E. Fisheries.

Certain fish species exist in the North Point Canal and may include common carp (Cyprinus carpio), Utah chub (Gila atraria), Utah sucker (Catostomus ardens), fathead minnows (Pimephales promelas), and mosquito fish (Gambusia affinis). Because the intake structures to the mitigation site will not be screened, fish movement from the North Point Consolidated Canal into the wetlands will occur. Depths of three to four feet in the deepest portions of the open water habitat should provide conditions adequate for the survival of these species. Fish populations will be replenished in the spring when water from the canal is diverted into the site. Turnover rates will be adequate to maintain dissolved oxygen concentrations high enough and salinity concentrations low enough to support these species through the remainder of the year. However, residence time for water in the ponds will also be long enough to allow the development of a phytoplankton and zooplankton base for the aquatic food chain.

F. Wildlife

The objectives of the mitigation plan relative to wildlife are to replace the habitat values lost on the expansion site, to improve habitat for several species over that found on the expansion site, and to satisfy the measures prescribed by the Biological Opinion (FWS, 1991) concerning the bald eagle and peregrine falcon. The values of the wetlands as proposed in the mitigation plan are broad and varied. The combined system of saltgrass meadow, seasonally flooded mudflats, deep and shallow open water, extensive dense stands of marsh vegetation and areas of mixed marsh vegetation and open water will provide habitat for a large variety of wetland wildlife species. While the presence of created wetland habitat will not guarantee usage by wildlife, the proximity of other favorable habitat areas, as well as displaced individuals from the expansion area, will increase its potential for use.

Nesting, brooding, feeding and loafing areas for waterfowl will be provided by implementation of the mitigation plan. Areas of hardstem bulrush and saltgrass associated with pockets of open water will provide nesting and brooding habitat for several species of ducks (Bellrose, 1976 and Williams and Marshall, 1938). The deeper sections of flooded mudflat and large and small pockets of open water will provide feeding areas for migratory ducks of all types. Fish populations will not only benefit piscivorous ducks, but also pelicans, cormorants, egrets and herons. Seeds from saltgrass and alkali bulrush will seasonally provide additional food resources for some species of waterfowl. Canada geese (Branta canadensis) may also find nesting, brooding and loafing habitat within the mitigation area. The surrounding dikes and small islands interspersed within the marsh may provide nesting areas while feeding may occur on associated upland grasslands or within the shallow water of the marsh itself. The open water sections will provide areas for loafing and escape from predators.

A large section of mudflat habitat is being created to provide habitat for migratory shorebirds and waterfowl. This mudflat is designed to mitigate for the loss of seasonally flooded playas and mudflats within the expansion area. The predictability of the water levels will provide suitable shorebird habitat during critical times.
periods every year and will not be dependent upon precipitation events and water users. Water levels within the project wetlands will be managed to provide seasonally flooded mudflat during the spring and fall migratory periods. The mudflat area will be flooded with water from early September through mid-May, with water depths ranging from zero to six inches. In mid-May, the water level will be dropped three inches and again another three inches at the end of May or early June. In late-August, the water will again be raised six inches. When flooded, the mudflat will provide ample foraging area for a large variety of shorebirds, much like that on the expansion site. When water levels are lowered after the migratory period, nesting and brooding habitat for avocets, killdeer, snowy plover, willets and stilts will be available. The timing of exposure of the mudflats to create dry playa was set to coincide with the peak nesting period for snowy plover (Paton and Edwards 1990, 1991). One to five acre pockets of shallow water formed in depressions (both natural and excavated) in the mudflat will hold water well into the summer, collecting runoff water from summer storms as well. These shallow pockets of water will enhance habitat for summering and early fall migrant shorebirds.

A large section of contiguous marsh vegetation will be created within the mitigation wetlands. This marsh is designed to provide nesting habitat for colonial nesting waterbirds such as the white-faced ibis, snowy egret, black-crowned night-heron, Forster's tern (Sterna forsteri) and Franklin's gull (Larus tipus). The vegetation will be comprised largely of hardstem bulrush, with the goal to provide areas where colonial nesting birds are isolated from predators, particularly on the west end where the bulrush stand borders a large body of open water. This area will also provide excellent habitat for rails, yellowthroats and marsh wrens and will provide useful duck nesting and brooding habitat around its variegated edges.

While primarily designed around the needs for bird species, the mitigation site will provide favorable habitat for other wildlife groups. In particular, the mitigation site will be conducive for muskrats. Muskrats may play an important role in maintaining some of the shallower open water pockets within the marsh. Dike construction will be done to minimize damage by muskrats and allow for the encouragement of healthy populations. The developed mitigation site will provide good to excellent habitat for three mammalian predators: striped skunk, red fox and raccoon. The skunk is native to the area while the other two species are recent invaders to the region due to land-use changes, removal of competing species and introductions. The mitigation site has been designed to reduce predation of birds and nests through isolation with open water, small islands and dense stands of vegetation. Fox and raccoons are expected, however, to be able to access some of the nesting areas because of their propensity to cross shallow water.

Upland areas surround the mitigation wetlands, with the largest expanses to the south, west, and east. These upland areas are important to the wetland mitigation plan for several reasons. First, the uplands increase the value of the wetlands for several wildlife species by providing additional nesting and food resources. Second, they create a buffer for the wetlands from neighboring lands where future land uses may conflict with the wetland management. This is particularly important on the south side of the wetland area where housing development may occur in the future and on the east and west where future management of adjoining uplands is uncertain.

A third benefit of the adjoining uplands is the availability of habitat for wildlife species dependent on upland areas. The area south of the wetland will be the most valuable for upland species because of its size with the potential of providing good nesting habitat for long-billed curlews, a species listed as sensitive by the UDWR. The adjacency of the wetland will also increase the value of the upland for some upland species by providing some food, water
and cover resources.

Species of concern: For UDWR sensitive species occurring on the expansion site, the mitigation wetlands should provide equal or better habitat values than those on the expansion site. Pelicans and cormorants will benefit from the existence of permanent forage fish populations while the white-faced ibis may benefit from the creation of nesting habitat, especially if the Great Salt Lake floods nesting areas again. Snowy plover nesting habitat will also be available if the lake floods present nesting areas.

The mitigation site will provide sufficient replacement for wetlands lost on the expansion site for bald eagle and peregrine falcon. The permanent fish populations will provide food resources for the bald eagle except under conditions of full ice cover. The presence of waterfowl and shorebirds will provide consistent food resources for peregrine falcons, with the waterfowl also providing alternate food sources for bald eagles. Populations of waterfowl and shorebirds are expected to be similar or greater than those on the expansion site and the existence of wetted habitat throughout the summer will provide more consistent prey base for peregrines during this period.

V. COMPENSATION FOR WETLAND LOSSES ON EXPANSION SITE

The goals of the wetland mitigation include compensation for wetland acreage and Habitat Units lost due to impacts to wetlands on the expansion site. In Tables 2 and 3, the number of Habitat Units lost on the expansion site is compared to the number of HU's gained due to implementation of the mitigation plan on the mitigation site. In a comparison by habitat type, the number of HU's gained by mitigation in excess of those lost on the expansion site range from 107.14 for playa/mudflat habitat to 274.14 for open water, if large trees become established in close proximity to the mitigation wetlands. In a comparison by target species, excess HU's above those required for one-to-one compensation for HU's lost range from 40.23 for the redhead to 311.65 each for the blue-winged or cinnamon teal and the gadwall. The number of HU's gained by the proposed mitigation will be inadequate to compensate for the less than the shorebird HU's lost on the expansion site. This would also be true for the great blue heron HU's lost if no trees are planted on the mitigation site. However, if trees are planted on the mitigation site and become established, great blue heron HU's gained by mitigation will be more than adequate to compensate for expansion site losses. Overall, the total number of HU's that will be gained by implementation of the proposed mitigation plan will more than compensate for the total losses of HU's due to impacts to habitat on the expansion site.

According to the least squares estimate generated by the HEP analysis of the amount of area needed per target species to compensate for habitat losses on the expansion site, the size of the mitigation site is more than adequate. The proposed mitigation site will provide 736.2 acres of habitat, of which 465.3 acres are wetlands. As indicated in the table below, the largest area required by those species that utilize predominantly wetland habitat is 434.1 acres. The great blue heron will require 1032.4 acres if no trees are planted on the mitigation site, but this number is
significantly reduced with the planting of trees. Assuming that trees will be planted or become established on the mitigation site by natural means, the size of the mitigation site ranges from 1.7 to 7.3 times the size necessary for in-kind compensation for habitat losses for species that use primarily wetland habitat.

<table>
<thead>
<tr>
<th>Species</th>
<th>Estimate of Habitats Utilized</th>
<th>Adequate Acreage</th>
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</thead>
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<tr>
<td>Teals</td>
<td>Wetlands</td>
<td>237.2</td>
</tr>
<tr>
<td>Gadwall</td>
<td>Wetlands</td>
<td>237.2</td>
</tr>
<tr>
<td>Great blue heron</td>
<td>Wetlands</td>
<td>1032.4</td>
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<tr>
<td>(without trees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Great blue heron</td>
<td>Wetlands</td>
<td>334.7</td>
</tr>
<tr>
<td>(with trees)</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Redhead</td>
<td>Wetlands</td>
<td>434.1</td>
</tr>
<tr>
<td>Shorebirds</td>
<td>Wetlands and Uplands</td>
<td>779.21</td>
</tr>
<tr>
<td>White-faced ibis</td>
<td>Wetlands</td>
<td>101.1</td>
</tr>
</tbody>
</table>

For the shorebird guild which uses upland habitat as well as wetland habitat, the mitigation site would have to be 43.0 acres larger with the same proportion of habitat types in order to provide in-kind replacement for all of the HU's lost on the expansion site. However, the size of the mitigation site including upland acreage is an arbitrary number defined by property boundaries. The creation of wetlands on the mitigation site increases the habitat value for shorebirds of upland areas on adjoining properties. Inclusion of these enhanced areas in the analysis would result in a determination that the mitigation is adequate as proposed to compensate for losses of habitat on the expansion site. Improvements in habitat value as a result of increased predictability of water and food resources will also occur although such improvements are not reflected in the Habitat Suitability Model for migratory shorebirds.

A Habitat Suitability Index Model is not currently available for the snowy plover. However, 62.8 acres of mudflat on the expansion site will no longer be artificially flooded due to the expansion project. These mudflat areas will be converted by draining to drier playa habitat that is more suitable for the snowy plover. The 62.8 additional acres of playa habitat on the expansion site will more
than compensate for the 55.7 acres of playa to be directly impacted by the expansion project. There will be no temporal loss of habitat because the playa will develop immediately following draining of the mudflats.

The other functions and values of the wetlands to be impacted on the expansion site will also be replaced by the creation of the mitigation wetlands. The types of wetlands to be created on the mitigation site are the same as the types to be impacted on the expansion site, including open water, marsh, saline meadow, and playa or mudflat. The acreage of the mitigation wetlands are compared to the expansion site wetland impacts by wetland type in Table 1. The acreage of each type of wetland on the mitigation site following implementation of the mitigation plan will exceed the acreage to be impacted for each wetland type on the expansion type. Although none of the wetland functions and values have been quantified except for the wildlife habitat values, it can be assumed that the mitigation wetlands more than compensate for the functions and values lost due to wetland impacts on the expansion site by providing more acres of the same types of wetlands.

VI. MONITORING AND MAINTENANCE

A. Water Control Systems

Water outlet control structures will be monitored weekly to ensure that the desired water elevations are being maintained and to ensure that excessive leaking is not occurring. If leaking is observed, the source of the problem must be rectified. Water inlet structures will also be monitored weekly to ensure that the inlet structures are not clogged by debris and that there is sufficient water in the canal to provide the necessary water to the mitigation site. Monitoring will include examining the area around pipes, headwalls, etc. to ensure that muskrats or other animals are not burrowing around them. The above monitoring will be needed for the life of project.

If water is ever drained from a cell, the headgates should be greased, etc. to ensure a long life and to ensure that they work when needed.

The management group(s) will need to be in contact with the North Point Canal Company on a regular basis to determine if there are any water delivery problems that could affect the water delivered to the mitigation site. This is especially true when the canal will be drained for yearly maintenance (or at any other time of the year) so that the headgate between the canal and the mitigation site can be closed. Otherwise, water may flow from the mitigation site into the canal.

The canal on the north side of the dike that can convey water from the east cell and bypass the west cell will be monitored ever fall for vegetation growth. This canal should be relatively free of thick vegetation which will decrease its capacity to convey water (when needed).
B. Dikes/Roads

Dikes will be inspected in the spring and fall for damage due to animal burrows and erosion. If the dike is damaged by animals or erosion, the holes will be backfilled with soil, compacted and revegetated. Should the problem continue, site specific measures will have to be implemented. The dikes will also be examined for water leakage.

Climate variations and traffic volumes (and type) will cause deterioration of the roads. The constant freeze/thaw of the winter, spring and fall seasons allows the road to get soft and rutted. The severity of the damage and the length of time it will take to become undesirable is difficult to project since every year the climate is different. However, the road will be bladed each spring. It is expected that every three to four years, road base will need to be replaced and compacted on the section of road over the dike. This discussion should be used as a guideline for maintenance of the road, but the exact needs will have to be evaluated yearly.

C. Vegetation

The vegetation on the mitigation site will be monitored twice yearly for the first five years following completion of construction by a vegetation biologist. Monitoring will take place in the spring (June) and fall (September), and will evaluate each habitat type for vegetation cover, species composition, and survival of transplants. Permanent quadrats will be established at random locations within each habitat type. Quadrats will be evaluated for cover by vegetation and for survival of transplanted shrubs, plugs, mats, etc., as applicable. The species composition of the vegetation within each quadrat will be evaluated for the development of weed infestations. Permanent photo-points will also be established at strategic locations from which the development of the wetlands can be recorded. Photographs will be taken at each photo point during each monitoring visit to document wetland development or the occurrence of problems.

Following each monitoring visit, a report will be prepared presenting the current data and comparing those data to the results of previous monitoring visits and to revegetation goals. Revegetation goals will include 80% cover by vegetation within wetland habitat types by the end of the fourth growing season following implementation, vegetation cover in the upland habitat type equal to 80% of the cover in an undisturbed upland area in the vicinity, and 80% survival of transplants. The report will be submitted to the SLCAA, to the Corps and to other interested resource agencies.

If monitoring results indicate that the development of the mitigation wetlands is not progressing satisfactorily, additional mitigation measures will be implemented. Those measures may include, but not be limited to, planting additional plugs or transplants of wetland plant material, adjustment of the water regime to solve salinity or turnover rate problems, installation of additional erosion control fabric, reseeding, etc. Weed control will be implemented only if a serious infestation of noxious species occurs. Weed control will consist of mechanical removal, spraying with an EPA-approved herbicide, cutting and inundation during the winter, or other means that are suitable for implementation in proximity to surface water and aquatic ecosystems.

D. HEP Analysis

The HEP analysis will be repeated after of two growing seasons (September) and at the end of five growing seasons following the completion of mitigation implementation by a HEP certified person using the same models and procedures used in the development of this
mitigation plan. Additional HEP analyses will be performed if results of the five-year HEP indicate that the habitat unit replacement goal of the mitigation plan has not been accomplished.

E. Wildlife

Monitoring of wildlife populations will be conducted on the mitigation site to determine its use and suitability for various wildlife species. In August, immediately prior to raising the water level in the wetlands, macroinvertebrates will be qualitatively determined in each habitat type. This will allow the monitoring of the aquatic food base for waterfowl and shorebirds in the project area.

Bird surveys will be conducted weekly during the migratory periods and biweekly during the nonmigratory periods. Incidental observations will be made of other species during these avian surveys. Surveys will be conducted for a period of at least five years. Results of the surveys will be compared to surveys conducted on the expansion site during 1989 and 1990. These surveys will be used to help determine the success of the mitigation efforts. Problems in habitat development identified from these and other surveys may initiate corrective measures in management developed in consultation with the manager of the site, the Corps, UDWR and FWS.

F. Predator Control

Predation of nests, particularly by red fox and raccoon, may significantly limit production of some species of birds. If such predation is deemed a problem by the managers of the site, predator control measures may have to be implemented to reduce these losses in production. Development of control measures may be done in cooperation with appropriate state and federal agencies.

G. Grazing

Grazing of sheep and cattle is a current use of the mitigation site. All grazing activities will be discontinued within the area converted to mitigation wetlands, as well as within the upland and existing wetland areas south of the North Point Canal on the east end of the mitigation site. Cattle guards will be installed at all three roads that enter the mitigation site to prevent livestock movement onto the site along these roads. A fence will be installed about 50 to 100 feet away from the base of the dike (to the north, east and west) to prevent trespass of livestock from adjacent grazed lands. Fencing will also be placed along the southern edge of the mitigation area south of the North Point Canal.
VII. SUMMARY

The proposed expansion of the Salt Lake City International Airport will result in impacts to 338.9 acres of jurisdictional wetlands, including open water, marsh, saline meadow, and playa/mudflat areas. A Habitat Evaluation Procedures analysis of existing conditions on the expansion site indicates that at total of 503.62 Habitat Units of wildlife habitat will be lost as a result of these wetland impacts. This mitigation plan presents specific criteria for the creation of 464.9 acres of low maintenance wetlands on the mitigation site of the same types as will be impacted on the expansion site. The HEP analysis of the proposed mitigation wetlands projects that the implementation of the mitigation plan will provide 717.49 HU's of wildlife habitat if no trees are planted or 800.65 HU's of wildlife habitat if trees are planted in the vicinity of the mitigation wetlands. Thus, this mitigation plan, as proposed, accomplishes all of the stated goals and objectives of the required mitigation.

It is the intention of the SLCAA to "bank" the excess wetland habitat that will be created on the mitigation site (213.87 HU's with no trees or 297 HU's with trees). These excess HU's (wetlands) will be used to compensate for future airport expansion projects (if future impacts are necessary).
VICINITY MAP

SALT LAKE CITY INTERNATIONAL AIRPORT

NOT TO SCALE

FIGURE 3
Figure 4a

AREAS OF CORPS JURISDICTION
1. OPEN WATER
2. SALINE MARSH
3. SALINE MEADOW
4. SALINE FLATS AND PLAYAS
5. SALINE PLAINS

CORPS JURISDICTIONAL WETLANDS
SALT LAKE CITY INTERNATIONAL AIRPORT
NORTHERN SECTION

Figure 4a
AREAS OF CORPS JURISDICTION

1. OPEN WATER
2. SALINE MARSH
3. SALINE MEADOW
4. SALINE FLATS AND PLAYAS
5. SALINE PLAINS

CORPS JURISDICTIONAL WETLANDS

SALT LAKE CITY INTERNATIONAL AIRPORT

CENTRAL SECTION

Figure 4b
AREAS OF CORPS JURISDICTION

1. OPEN WATER
2. SALINE MARSH
3. SALINE MEADOW
4. SALINE FLATS AND PLAYAS
5. SALINE PLAINS

CORPS JURISDICTIONAL
WETLANDS
SALT LAKE CITY INTERNATIONAL
AIRPORT
SOUTHERN SECTION

Figure 4c
SALT LAKE CITY INTERNATIONAL AIRPORT

MITIGATION SITE

EXISTING CONDITIONS / SOILS MAP

Legend:
- W = Water
- Sa = Silt/or clay loam
- Na = Natrustuff Association
- * = Piezometer/Soil Boring
- + = Artesian Well

Date: February 14, 1993
Scale: 1" = 250' North

THE BEAL-BROWN GROUP

FIGURE 5
SALT LAKE CITY INTERNATIONAL AIRPORT
MITIGATION SITE
WETLAND MITIGATION PLAN
Legend
- Open Water
- Marsh
- Mud Flat
- Salar Meadow
- Upland

Date: February 14, 1982
Scale: 1" = 500' North

FIGURE 7
Relationship Between Ground Water Conductivity and Soil Conductivity

FIGURE 8
### ACREAGE BALANCE

<table>
<thead>
<tr>
<th>Habitat</th>
<th>Expansion Site Acreage</th>
<th>Mitigation Site Acreage</th>
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<tbody>
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<td></td>
<td>Current</td>
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<tr>
<td>Open Water</td>
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<td>Marsh</td>
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<td>Saline Meadow</td>
<td>1013.4</td>
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<tr>
<td>Playa/Mudflat</td>
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<tr>
<td>Wetland Total</td>
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<td>Upland</td>
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<tr>
<td>TOTAL</td>
<td>6529.5</td>
<td>5717.1</td>
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</table>

* The indirect impacts to Saline Meadow will not result in a loss of habitat acreage.

** The indirect impacts to Mudflat will result in a conversion of 62.8 acres of Mudflat to Playa. The net result will be a simultaneous loss of 62.8 acres of Mudflat and gain of 62.8 acres of Playa.
## HABITAT UNIT BALANCE BY SPECIES

<table>
<thead>
<tr>
<th>Species</th>
<th>Expansion Site</th>
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<tbody>
<tr>
<td></td>
<td>Current</td>
<td>With Project</td>
<td>Losses</td>
</tr>
<tr>
<td>Blue-winged &amp; Cinnamon Teals</td>
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<td>235.55</td>
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<td>Great Blue Heron (with trees)</td>
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<td>Shorebirds</td>
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<tr>
<td>TOTAL (with trees)</td>
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<td>4192.72</td>
<td>-504.40</td>
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## HABITAT UNIT BALANCE BY HABITAT TYPE

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<td>TOTAL</td>
<td>4697.12</td>
<td>4192.72</td>
<td>-504.40</td>
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* Open Water Habitat Units are dependent upon if trees are planted. If no trees are planted: 715.85 HUs are gained by mitigation; if trees are planted: 799.01 HUs are gained.
Results of Laboratory Analysis of Soil Borings.

<table>
<thead>
<tr>
<th>Drill Hole</th>
<th>Depth (ft)</th>
<th>pH</th>
<th>EC (mmhos/cm)</th>
<th>SAR</th>
<th>--- Estimated ---</th>
<th>Texture</th>
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<td>71.7</td>
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<td>11.8</td>
<td>78.4</td>
<td>8</td>
<td>58</td>
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</tbody>
</table>

**NOTE:** Soils with electrical conductivities (EC) greater than 4 mmhos/cm are considered to be saline, with the potential for negative effects to plant germination and establishment. Soils with exchangeable sodium percentage (SAR) greater than 15 are considered to be sodic, with the potential for negative effects to infiltration rates as well as vegetation. The examined at boring sites 1, 3, 4 and 5 qualify as saline-sodic due to EC's greater than 4 mmhos/cm and SAR greater than 15%. Only the surface soils at hole 1 is sodic but not saline. Although the vegetation presently growing in these soils are adapted to saline and sodic conditions, the quality of the topsoil and subsoil present on the site for vegetation establishment is variable.

### TABLE 4

<table>
<thead>
<tr>
<th>Soil Type</th>
<th>Vegetation Type</th>
<th>Area (acres)</th>
<th>Percent (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Natrustal Association</td>
<td>Saline Meadow</td>
<td>76.5</td>
<td>6.6</td>
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<tr>
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<td>Upland</td>
<td>1077.2</td>
<td>93.4</td>
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<tr>
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<td>TOTAL</td>
<td>1153.8</td>
<td>100.0</td>
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<tr>
<td>Saltair Soil</td>
<td>Marsh</td>
<td>5.6</td>
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<td>Saltair Soil</td>
<td>Saline Meadow</td>
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<td>Playa/Mudflat</td>
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<td>Saltair Soil</td>
<td>Upland</td>
<td>33.2</td>
<td>11.1</td>
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<td>Saltair Soil</td>
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<td>100.0</td>
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<td>Open Water</td>
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<tr>
<td>TOTAL</td>
<td></td>
<td>1596.4</td>
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### TABLE 5

537
# WETLANDS MITIGATION WATER BUDGET ANALYSIS

*All values in inches unless noted*

<table>
<thead>
<tr>
<th>MONTH</th>
<th>PAN EVAP.</th>
<th>METHOD</th>
<th>PAN COEFF.</th>
<th>ACTUAL EVAP.</th>
<th>PRECIP.</th>
<th>MONTHLY OPEN WATER (ACRES)</th>
<th>OPEN WATER EVAP. (ACRES)</th>
<th>MARSH EVAP. (ACRES)</th>
<th>MARSH EVAP. (ACRES)</th>
<th>AVE. DAILY FLOW (cfs)</th>
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<tr>
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<td>0.7</td>
<td>3.33</td>
<td>1.14</td>
<td>-2.19</td>
<td>222</td>
<td>-40.4</td>
<td>105</td>
<td>-19.1</td>
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<tr>
<td>November</td>
<td>2.03 e</td>
<td></td>
<td>0.7</td>
<td>1.42</td>
<td>1.22</td>
<td>-0.20</td>
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<td>-3.7</td>
<td>105</td>
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<td>0.79 e</td>
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<td>0.7</td>
<td>0.55</td>
<td>1.37</td>
<td>0.82</td>
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<td>N/A</td>
<td>105</td>
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<tr>
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<td>0.7</td>
<td>0.18</td>
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<td>February</td>
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<td>0.7</td>
<td>0.75</td>
<td>1.33</td>
<td>0.58</td>
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<td>105</td>
<td>N/A</td>
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<td>0.7</td>
<td>1.69</td>
<td>1.72</td>
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<td>2.21</td>
<td>-2.07</td>
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<td>-38.2</td>
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<tr>
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<td>0.7</td>
<td>6.07</td>
<td>1.47</td>
<td>-4.60</td>
<td>222</td>
<td>-85.1</td>
<td>105</td>
<td>-40.2</td>
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<tr>
<td>June</td>
<td>11.82 m</td>
<td></td>
<td>0.7</td>
<td>8.27</td>
<td>0.97</td>
<td>-7.30</td>
<td>135</td>
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<td>July</td>
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<td>0.7</td>
<td>9.74</td>
<td>0.72</td>
<td>-9.02</td>
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<tr>
<td>August</td>
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<td>0.7</td>
<td>8.34</td>
<td>0.92</td>
<td>-7.42</td>
<td>135</td>
<td>-83.5</td>
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<td>-5.08</td>
<td>222</td>
<td>-94.0</td>
<td>105</td>
<td>-44.5</td>
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</table>

**TOTALS:**

- PAN EVAP. = 72.27
- ACTUAL EVAP. = 50.59
- PRECIP. = 15.31
- MONTHLY OPEN WATER = -35.28
- OPEN WATER EVAP. = -528.6
- MARSH EVAP. = -331.4
- AVE. DAILY FLOW = -860.0

(1) 'm' indicates measured values, "e" indicates estimated values, from Utah Climate Center.

(2) State values range from 0.68 to 0.72, use 0.70, from Utah Climate Center

(3) in acre-feet, based on 222 acres Sept-May & 135 acres Jun-Aug

(4) in acre-feet, based on 105 acres year round

(5) precipitation is greater than losses so no need for additional water.

**NOTE**: Average daily flow (cfs) accounts for ET losses only; no grd water losses or inputs.
X. TYPICAL SECTIONS

Marsh—Duck Club Road—Marsh

By Pass Canal Section
(Below Diversion)
Section A-A
North Point Canal Diversion Detail
Section A-A

TYPICAL SECTIONS

Section B-B

By Pass Canal Detail
(At Diversion)

TYPICAL SECTIONS
Typical Sections

Low Elevation Drain

Literature Cited


USFWS. 1991. Biological Opinion, Salt Lake City Airport expansion. Letter from CD Johnson, USFWS, Salt Lake City, Utah to B Johnson, Environmental Planner, Federal Aviation Administration, Denver

SOIL DESCRIPTIONS

DRILL HOLE #1: This corresponds with an area mapped as Jordan Soil in the SCS Soil Survey.

Taxonomic Classification: Fine, mixed, mesic, Salorthic Natrustalf

A1 (0-0.5 feet) light brownish gray (2.5Y6/2) silt loam, grayish-brown (2.5Y5/2) moist; weak, medium platy structure; slightly hard dry, very friable moist; nonstickey and slightly plastic wet; noncalcereous; nonsaline and nonsodic; few very fine, few fine, few medium roots; common very fine and few fine pores; gradual, smooth boundary.

B1 (0.5 to 1 feet) light brownish gray (2.5Y6/2) silt loam, grayish-brown (2.5Y5/2) moist; weak, medium subangular blocky structure; hard dry, friable moist; slightly sticky and slightly plastic wet; slightly calcereous; nonsaline and nonsodic; few very fine, few fine, few medium roots; few very fine and few fine pores; gradual, smooth boundary.

B2, (1-2 feet) light brownish gray (10YR6/2) loam, dark grayish-brown (10YR4/2) moist; moderate, medium, subangular blocky structure; few, thin clay films; hard dry, friable moist; slightly sticky and plastic wet; calcereous; nonsaline and sodic; few very fine roots; few very fine and few fine pores; clear smooth boundary.

C1u (2-4 feet) light gray (2.5Y/2) very strong loamy sand with common, large, prominent mottles (7.5YR5/6); massive; loose dry, very firm moist; very plastic and very sticky; calcereous; saline and alkaline; no roots; few very fine pores; clear smooth boundary.

C2u (4-8 feet) greenish gray (5G5/1) when moist, silty clay; common, medium, prominent mottles (7.5YR5/6); massive; very hard dry, very firm moist, sticky and plastic; calcereous; saline and alkaline; no roots; no pores; abrupt smooth boundary.

C5u (8-10 feet) light brownish gray (2.5Y6/2) loamy sand, grayish-brown (2.5Y5/2) moist; massive; loose dry, loose moist, nonstickey and nonplastic; calcereous; saline and alkaline; no roots; no pores.

DRILL HOLE #2: This corresponds with an area mapped as Saltair Soil in the SCS Soil Survey.

Taxonomic Classification: Fine, mixed, mesic Typic Salorthid

C1u (0-2 feet) light grayish-brown (2.5Y6/2) clay, grayish-brown (2.5Y5/2) moist; very hard dry, very firm moist, sticky and plastic wet; calcereous; strongly saline and alkaline; no roots; few fine pores; diffuse boundary.

C2u (2-4 feet) grayish-brown (2.5Y5/2) clay; massive; very hard dry, very firm moist, sticky and plastic wet; saline and alkaline; no roots; few very fine pores; clear smooth boundary.

C3u (4-6 feet) light olive brown (2.5Y5/4) loamy sand with common, large, prominent mottles (7.5YR5/6); massive; loose wet, loose moist, nonstickey and nonplastic; calcereous; saline and alkaline; no roots; no pores; abrupt smooth boundary.

C4u (6-8 feet) greenish gray (5G5/1) when moist, silty clay; common, medium, prominent mottles (7.5YR5/6); massive; very hard dry, very firm moist, sticky and plastic; calcereous; saline and alkaline; no roots; no pores; diffuse boundary.

C5u (8-10 feet) light brownish gray (2.5Y6/2) loamy sand, grayish-brown (2.5Y5/2) moist; massive; loose dry, loose moist, nonstickey and nonplastic; calcereous; saline and alkaline; no roots; no pores.
DRILL HOLE #3: This corresponds with an area mapped as Terminal Soil in the SCS Soil Survey, but is more similar to the Jordon Soil.

Taxonomic Classification: Fine-loamy, mixed mesic Salorthidic Natrustalf

A (0-1 feet) dark grayish brown (2.5Y4/2) silt loam, very dark grayish brown (2.5Y3/3) moist; weak, fine, subangular blocky structure; slightly hard dry, friable moist, nonsticky and nonplastic wet; noncalcareous; nonsaline and sodic; few very fine roots; few fine pores; clear, smooth boundary.

B1 (1-1.5 feet) grayish brown (2.5Y4/2) clay loam, dark grayish brown (2.5Y4/2) moist; moderate, medium, subangular blocky structure; slightly hard dry, firm moist, sticky and plastic wet; calcareous; saline and sodic; few very fine roots; few fine pores; clear, smooth boundary.

C1 (1.5-4 feet) moist soil is olive gray (5Y5/2) loam; few, fine, prominent mottles (7.5YR5/6); massive; hard dry, firm moist, sticky and plastic wet; calcareous; saline and sodic; no roots; no pores; clear, smooth boundary.

C2 (4-6 feet) moist soil is brown (7.5YR5/3) silty clay loam; common, fine, faint mottles (7.5YR5/6); massive; hard dry, very firm moist, sticky and plastic wet; calcareous; saline and sodic; no roots; few very fine and few fine pores; clear, smooth boundary.

C3 (6-7 feet) moist soil is strong brown (7.5YR6/3) sandy loam; massive; loose dry, loose moist, nonsticky and nonplastic wet; calcareous; no roots; no pores; clear, smooth boundary.

C4 (7-10 feet) moist soil is gray (5Y5/1) silty clay; many, large prominent mottles (7.5YR5/6); massive; very hard dry, very firm moist, sticky and plastic wet; calcareous; saline and sodic; no roots; no pores.

DRILL HOLE #4: This corresponds with an area mapped as Lasil Soil in the SCS Soil Survey.

Taxonomic Classification: Fine-silty, mixed, mesic, Typic Natrustalf

A1 (0-1 feet) light brownish gray (10YR6/2) loam, dark grayish brown (10YR4/2) moist; weak, medium, subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic wet; calcareous; saline and sodic; few very fine roots; common very fine pores; clear boundary.

B1 (1-2 feet) light brownish gray (2.5Y6/2) silty clay loam, grayish brown (2.5Y5/2) moist; moderate, medium, blocky structure; hard dry, firm moist, sticky and plastic wet; calcareous; saline and sodic; few very fine pores; few very fine roots; clear boundary.

C1 (2-4 feet) moist soil is grayish brown (2.5Y5/3) silty clay loam; massive; hard dry, very firm moist, sticky and plastic wet; calcareous; saline and sodic; no roots; few very fine pores; diffuse boundary.

C2 (4-6 feet) moist soil is grayish brown (2.5Y5/3) silt loam; common, large, prominent mottles (7.5YR5/6); massive; hard dry, very firm moist, slightly sticky and slightly plastic wet; calcareous; saline and sodic; no roots; few very fine pores; diffuse boundary.

C3 (6-8 feet) moist soil is light grayish brown (2.5Y6/2) silty clay; massive; very hard dry, very firm moist, very sticky and very plastic wet; calcareous; saline and sodic; no roots; no pores; diffuse boundary.

C4 (8-10 feet) moist soil is brown (7.5YR5/3) silty clay; few, large, prominent mottles (7.5YR5/6); massive; very hard dry, very firm moist, very sticky and very plastic wet; calcareous; no roots; no pores.
DRILL HOLE #5: This corresponds with an area mapped as Jordon Soil in the SCS Soil Survey, but is more similar to the Terminal Soil.

Taxonomic Classification: Fine-loamy, mixed mesic Petrocalcic Natrustalf

A1 (0-1 feet) Light brownish gray (10YR6/2) silt loam; grayish brown (10YR5/2) moist; weak, course granular structure; slightly hard dry, very friable moist, nonsticky and nonplastic moist; calcareous; saline and sodic; few fine roots; no pores; clear boundary.

B2 (1-2 feet) Light brownish gray (10YR6/2) loam; grayish brown (10YR5/2) moist; moderate, medium subangular blocky structure; slightly hard dry, friable moist, slightly sticky and slightly plastic moist; calcareous; saline and sodic; few fine roots; few fine pores; abrupt boundary.

C1 (2-2.25 feet) Light gray (2.5Y7/2) lime cemented material; weakly indurated; hard dry, hard moist, nonsticky and nonplastic wet; strongly calcareous; abrupt boundary.

C2 (2.25-4 feet) Light brownish gray (2.5Y6/2) silty clay loam; grayish brown (2.5Y5/2) moist; few, fine, faint mottles (7.5YR5/6); massive; very hard dry, firm moist, sticky and plastic; calcareous; saline and sodic; no roots; few very fine pores.

C3 (4-6 feet) Light gray (2.5Y7/2) silty clay; light brownish gray (2.5Y6/2) moist; common, medium, prominant mottles (7.5YR5/6); massive; very hard dry, firm moist, very plastic and very sticky wet; calcareous; nonsaline and sodic; no roots; common very fine pores; diffuse boundary.

C4 (6-10 feet) Moist soil is gray (5Y5/1) silty clay loam; common layers of oxidized material (7.5YR5/6); massive; hard dry, very firm moist, very sticky and very plastic wet; calcareous; saline and sodic; no roots; few very fine pores.