

6.2 AIRPORT NOISE

This section considers the level of aircraft noise associated with landings and takeoffs at SGU based on current and forecast future conditions with and without the proposed replacement airport. The potential effects of airport noise on area residents and noise-sensitive land uses are also assessed in this section.

A discussion of noise measurement and a description of various noise metrics are provided in **Appendix A, Principles of Aviation Noise Evaluation**. **Appendix B, Supporting Information on Noise Analysis**, provides in-depth information concerning the analyses conducted to prepare the noise evaluation and the fundamental information required to prepare those analyses. Noise analysis was conducted in accordance with FAA Order 1050.1E, *Environmental Impacts: Policies and Procedures*.

Based on comments received on the Draft EIS, the following additional information has been included in this Final EIS:

- **Appendix S, Noise Levels for 2003 Conditions**
- **Appendix T, Audibility Evaluation for Zion National Park**
- **Appendix U, 15-Hour Sensitivity Analysis**
- **Appendix V, Use of INM Versions 6.1 and 6.2 in the St. George Replacement Airport EIS**
- **Appendix W, Issues Relating to Mitigation of Aircraft Noise on Zion National Park**
- **Appendix X, Monitored Noise Abatement Initiatives**
- **Appendix Y, Memorandum of Agreement Between Federal Aviation Administration & National Park Service**

This additional information is provided for explanation and assistance. It is not required under the National Environmental Policy Act (NEPA), as interpreted by the Council on Environmental Quality (CEQ) directives.

The analysis includes determination of noise exposure in 2003 and as forecast for the years 2010 and 2020. With the exception of the audibility evaluation, aircraft-related noise exposure is defined through use of noise contours and location point computations prepared with the FAA's Integrated Noise Model (INM), Version 6.1. These findings are presented using a variety of noise metrics, including:

For an average annual 24-hour day in the immediate airport environs:

- Day-Night Sound Level (DNL)
- Time (in minutes) of exposure to noise above 65 dBA (A-weighted decibel)
- Number of events contributing to time above 65 dBA

The effects of aircraft noise on noise-sensitive 4(f)/303(c) facilities within the region surrounding St. George are evaluated in terms of airport-related effects in **Section 6.6, Department of Transportation Act, Section 4(f)/303(c) Properties and Resources**, of this chapter. The cumulative noise effects from all aircraft sources are addressed in **Chapter Seven, Cumulative Impacts**.

6.2.1 NOISE ANALYSIS METHODOLOGY

Aircraft noise may be evaluated for a variety of component sources. In the case of the immediate existing SGU environs, the assessment of noise levels with and without the proposed replacement airport provides specific information about the effects of the proposed replacement airport within the area near the airport. At locations more distant from the existing or proposed replacement airport, the airport-related traffic is dispersed along a number of flight paths leading in all directions away from the facility, the aircraft have climbed to their en route flight altitudes, and local training operations are not a factor in the total noise energy experienced. At these more distant locations, the noise associated with other aircraft activity contributes a greater proportion to the overall (or cumulative) noise energy present.

This section presents information related to the NEPA evaluation of the No-Action and Proposed Replacement Airport alternatives within the airport environs. **Section 6.6, Department Of Transportation Act, Section 4(f)/303(c) Properties and Resources**, addresses the effects of the proposed replacement airport on noise levels associated with the existing airport, and **Chapter Seven** will present the findings about aircraft noise from all sources for noise-sensitive 4(f)/303(c) facilities not in the immediate airport environs.

6.2.1.1 Noise is Assessed With and Without the Proposed Replacement Airport

A comparison will be drawn between the aircraft noise-related effects of SGU in its present location and at its proposed replacement airport location several miles to the southeast. An assessment of current conditions, based on the year 2003, is presented to serve as a basis of comparison against the noise levels and distribution patterns anticipated for the future (see **Appendix S** in the Final EIS). Projections of aircraft noise are made for the years 2010 and 2020, with the airport located in its present position along a ridge line west of the center of St. George, Utah (No-Action Alternative), as well as at its proposed replacement location south of Washington City, Utah (Proposed Replacement Airport Alternative).

6.2.1.2 The Integrated Noise Model (INM)

A computer model is used to determine the noise exposure patterns related to aircraft operations in the airport environs. To attempt to directly measure prevailing noise levels would require months of measurement at numerous noise monitor sites — an impractical, more expensive, and potentially less accurate method of determination, particularly when estimating noise levels that would not occur for several years into the future.

The most current version of the INM (Version 6.1) was used for the modeling of noise at all locations within the scope of the study. The INM is specified by the FAA for the prediction of aircraft noise at civilian airports in FAA Order 1050.1E, Appendix A, Section 14.2b. It is a computer model which, during an average 24-hour period at an airport, accounts for each aircraft flight along flight paths leading to or from the facility, or overflying it. Flight path definitions are coupled with separate tables in the program database relating to noise levels at varying distances and engine power settings for each distinct type of aircraft selected.

Briefly, this is how the model computes aircraft noise exposure. At regular grid locations at ground level around the airport, the distance to each aircraft in flight is computed, and the associated noise exposure of each aircraft flying along each flight path within the vicinity of the grid location is determined. Additional corrections are applied for excess air-to-ground attenuation, acoustical shielding of aircraft engines by the aircraft body, and speed variations. The logarithmic acoustical energy levels for each individual aircraft are then summed for each grid location. For the DNL metric, an extra 10 dBA weight is applied to nighttime operations (from 10:00 p.m. to 7:00 a.m.). The total values of aircraft noise exposure at each grid location are then used to interpolate contours of equal aircraft noise exposure for reference DNL (i.e., 65 DNL, 70 DNL, etc.) For this study, contour analysis is used to describe DNL dispersion patterns in excess of 60 DNL associated with forecast aircraft activity at existing SGU and the proposed replacement airport.

The model can also compute noise levels at user-defined points on the ground. For this "grid" analyses, the model computes the acoustic data only at the locations (grid points) selected by the user. Data on acoustic energy and peak noise levels requested by the user are computed for each aircraft overflight in the vicinity of the grid point. This data is reported for each desired metric. For this study, the requested grid point noise level data for the existing and proposed replacement airport environs include Time Above 65 dBA and the Number of Events Above 65 dBA.

To activate the INM, a variety of user-supplied input data is required. These include a mathematical definition of the airport runways relative to a base reference point, the mathematical description of ground tracks above which aircraft fly, and the assignment of specific aircraft with specific engine types to individual flight paths from each runway end. Optionally, the user may adjust standard database information to reflect the vertical profiles used by aircraft as they fly to or from the airport through the adjacent airspace or may modify the default noise-power-distance curves in the model. This information is more fully described in **Appendix B**.

In addition, INM Version 6.2b¹ was used to conduct an **Audibility Evaluation for Zion National Park**. This information is presented in **Appendix T** in the Final EIS and an explanatory paper describing the FAA's use of INM V6.2b is presented in **Appendix V** in the Final EIS.

6.2.1.3 Noise Impact Criteria – Airport Environs

Under FAA Orders 1050.1E and 5050.4A, an increase of 1.5 DNL over noise-sensitive land uses within the 65 DNL contour is considered to constitute a significant adverse noise impact. Increases in noise of lesser magnitude are not considered great enough to create a significant impact.

In accordance with FAA Order 1050.1E, special consideration needs to be given to the evaluation of the significance of noise impacts on noise-sensitive areas within national parks, national wildlife refuges, and historic sites, including traditional cultural properties. For example, the DNL 65 dBA threshold does not adequately address the effects of noise on visitors to areas within a national park or national wildlife refuge where other noise is very low and a quiet setting is a generally recognized purpose and attribute. The potential noise effects of the proposed replacement airport on Section 4(f)/303(c) lands are discussed in **Section 6.6, Department of Transportation Act, Section 4(f)/303(c) Properties and Resources**, of this chapter and in **Chapter Seven, Cumulative Impacts**.

The metrics selected for evaluation throughout the airport environs are selected to respond to three considerations. The DNL metric is selected to describe those areas that would be considered to be incompatible with the noise associated with aircraft, if 65 DNL is exceeded. The area exposed to DNL between 60 dBA and 65 dBA is also provided to assist the community in the development of a land use management program to regulate the encroachment of incompatible uses into areas exposed to moderate levels of aircraft noise.

The change in Time Above and Numbers of Events Above 65 dBA were selected to inform the community residents of changes in areas that are expected to be exposed to noise levels and events that might disturb outdoor speech communication.

6.2.2 INM ANALYSIS FOR THE CURRENT CONDITION AT THE EXISTING AIRPORT

To provide a basis of comparison to existing conditions in the community and the surrounding area, noise contours and supplemental metrics of noise were computed for the year 2003. The preparation of these data requires an assessment of the flight activity present at the airport and throughout the study area, to define each contributing component of the noise pattern. **Appendix B, Section B.1, Noise**

¹ The audibility evaluation for this study was performed with the latest (beta) version of INM 6.2b, noted in this document with the suffix "b."

Modeling Methodology (in the Draft EIS), details the input data and development of information on the various components. The noise levels for 2003 conditions in the regional 4(f)/303(c) locations, including Zion National Park, are included in **Appendix S** in the Final EIS.

6.2.2.1 INM Input Data

The INM requires the development of information describing the operational characteristics of an airport for the period of an average annual day of activity. The information includes:

- Number of local and itinerant flight operations by time of day
- Fleet mix
- Runway location and usage statistics
- Flight track definition and usage
- Climb and descent profiles for each aircraft type along each flight track

Appendix B details information related to the INM input information for the various conditions of noise assessed for this study. **Appendix S** (in the Final EIS), **Noise Levels for 2003 Conditions**, presents the noise level data for 2003 conditions.

Operations and Fleet Mix

Fleet mix and operational data are provided in the aviation activity forecasts presented in **Appendix B, Supporting Information and Noise Analysis**, and **Appendix E, Aviation Activity Forecasts**, in the Draft EIS. Fleet mix was based on a consideration of radar data for the airport and interviews with local pilots regarding their equipment and their operating characteristics. **Table 6.1** presents the estimated number of operations by year and day for the mix of aircraft types selected to represent the current mix of traffic at the existing airport. The types and numbers of aircraft operating at an airport are the principal contributors to the size of the airport's noise exposure pattern.

Distribution of Operations by Time of Day

The time of day at which operations occur is significant to the DNL noise metric required for use in the evaluation of the effects of aircraft noise on areas surrounding airports. At SGU, the great majority of the activity occurs during the daytime hours, although a small proportion of the general aviation activity and a slightly larger percentage of the commercial passenger traffic operate in the shoulder hours from 10:00 p.m. to 11:00 p.m. and 6:00 a.m. to 7:00 a.m. to meet connections in Salt Lake City or Los Angeles. **Table 6.2** summarizes the time of day characteristics of the operations at SGU for the existing conditions.

Table 6.1
AVERAGE DAY AND ANNUAL OPERATIONS – 2003 CURRENT

Aircraft Group	INM Type	Annual	Average Day
Bell 206L Helicopter	B206L	2	Less than 0.1
Twin Engine Piston	BEC58P	5,475	15.0
Commuter Turbo Prop	EMB120	6,266	17.2
Single Engine Piston	GASEPV	26,176	71.7
Business Jet	LEAR35	1,095	3.0
Helicopter	R22	3,650	10.0
Air Tour	SA350D	42	0.1
Air Tour	SA365N	4	Less than 0.1
Regional Jet (50-seat)	CLREGJ	0	0.0
Cargo Turbo Prop	DHC6	1,052	2.9
Large Commuter Turbo Prop	DHC830	0	0.0
Regional Jet (70-seat)	GV	0	0.0
	Total	43,761	119.9

Source: Landrum & Brown, 2004

Table 6.2
DAY/NIGHT TRAFFIC DISTRIBUTION – 2003 CONDITIONS

Operations Group	Landings		Takeoffs	
	Day	Night	Day	Night
General Aviation	95%	5%	95%	5%
Cargo	100%	0%	100%	0%
Military	100%	0%	100%	0%
Air Carrier/ Commuter	80%	20%	90%	10%

Source: Landrum & Brown, 2004.

Runway Usage

An assessment of wind conditions at St. George indicates that traffic would operate in north flow on Runway 34 (landings from the south and takeoffs to the north) 35 percent of the year, and in south flow on Runway 16 (landings from the north and takeoffs to the south) 65 percent of the year. In close proximity to an airport, the proportion of directional flow is the second most important contributor to the distribution of noise.

Flight Track Definition and Usage

The paths along which aircraft fly are important to the distribution of the noise pattern beyond the immediate environs of the airport. For the St. George study, flight paths were defined for each component of the aircraft operating condition. At the existing airport, flight paths were defined for visual flight rule conditions (VFR), instrument flight rule conditions (IFR), training and airport pattern operations, and helicopter activity. Numerous maps of these flight paths are provided in **Appendix B** for arrivals to and departures from existing SGU both in north and south traffic flow conditions, as well as for training and pattern practice activity.

Transient operations are conducted by those aircraft that fly to or come from an airport other than SGU, or do not conduct operations for training. IFR (Instrument Flight Rule) tracks were developed from an assessment of approximately 60 days of radar data acquired from the Los Angeles Air Route Traffic Control Center (ARTCC), and supplemented by radar data available from the Salt Lake ARTCC. Analysis of the radar data resulted in the definition of 149 flight corridors used by IFR aircraft, each having from zero to six subtracks developed to define the dispersion of operations across the flight corridor.

Aircraft that operate during VFR (Visual Flight Rule) conditions are not required to maintain contact with air traffic control, and consequently, their paths of flight are not identified on radar data. Therefore, extensive interviews and surveys were conducted with pilots operating from SGU and other airports within the **Initial Area of Investigation** (IAI) study area in an effort to define routes of VFR flight. This effort successfully identified 120 VFR flight paths for application at the existing airport leading to or from 30 identifiable destinations within or beyond the project study area. In addition to the paths flown by fixed-wing aircraft, 14 routes were defined for helicopter traffic operating to and from the ramp/heliport operations area at SGU, based on the routes indicated by helicopter pilots interviewed. The final component of the transient aircraft operations are conducted by the Air Tour Operators (ATOs), who during their flights over scenic areas in the southwest, land at SGU to refuel or take refreshment. Extensive interviews with ATOs throughout the area indicated a series of eight flight tracks that pass over portions of the study area and land at the existing SGU airport.

Table 6.3 summarizes the allocation of INM flight tracks applied for the existing airport. **Exhibit 6.1 and Exhibit 6.2** in the Draft EIS present for Runway 16 and Runway 34, respectively, flight tracks modeled to and from the existing airport. **Exhibit 6.3** in the Draft EIS presents the helicopter, touch-and-go, and training tracks modeled for the existing airport.

The existing proportion of use of each of the flight tracks is provided in **Appendix B**.

Table 6.3
FLIGHT TRACK SUMMARY – EXISTING AIRPORT

Track Type	Arrivals		Takeoffs		Total
	Runway 16	Runway 34	Runway 16	Runway 34	
IFR Backbone	30	34	49	36	149
IFR Subtracks	104	84	156	100	444
VFR	30	30	30	30	120
Air Tour	3	3	1	1	8
Helicopter	7		7		14
Training/Touch-Go	1	1	2	2	6

Source: Landrum & Brown, 2004

Climb and Descent Profiles

Within the immediate airport environs, the INM default rates of climb out from, and descent to the airport, were selected for use for all aircraft types. However, because a large study area is evaluated for this assessment, the standard INM profiles were determined, for a variety of reasons, to be inadequate to represent use by the typical IFR and VFR operations beyond the immediate vicinity of the airport. These are:

- INM default climb profiles terminate at 10,000 feet above field elevation;
- INM default descent profiles originate at 6,000 feet above field elevation; and
- INM does not compute noise where a profile is not present, thus requiring the user to extend profiles to assure that noise is computed at altitudes above 10,000 feet for departures and above 6,000 feet for arrivals.

Therefore, since this analysis also extends to cover low-level noise over noise-sensitive public use areas at considerable distances from the immediate airport vicinity, the profiles were modified to reflect level flight once the departing aircraft reached en route cruising altitude, or was assigned a level flight segment from beyond the boundaries of the study area prior to intercepting the standard rate of descent.

General aviation VFR fixed-wing and helicopter aircraft, as well as air tour aircraft, were assigned level flight segments along each pilot-defined route derived from the general aviation interview process, assuring also that ground clearance over the highest point along the route was provided in accordance with Federal Aviation Regulations (FAR) (500 feet above surface terrain over uncontrolled surfaces, and 2,000 feet over national park terrain). IFR flight profiles were extended at their default rates of climb or descent to the typical radar-indicated altitudes for commuter carrier aircraft (23,000 Mean Sea Level (MSL) or approximately 20,000 feet above the airport) where they were assigned level flight segments extending well-beyond the IAI study area. Appendix B describes the development of flight profiles used in these analyses in greater detail.

6.2.2.2 Results of Noise Modeling – Existing Conditions

Based upon the INM input information summarized in the previous section and detailed in Appendix B, computations were made to represent the noise exposure pattern at the airport in 2003. Contours of 60, 65, and 70 DNL were computed and are presented on Exhibit 6.4 in the Draft EIS. The noise contours are centered along the runway.

The 70 DNL contour does not extend beyond the existing airport property line. The 65 DNL contour remains principally over airport property, but extends about 250 feet west of the property boundary and about 300 feet to the east of airport property. The 60 DNL contour extends approximately 1,200 feet east and west of the property line. To the north and south of the runway, each contour remains on airport property. Table 6.4 provides information regarding the acreage and noise-sensitive uses falling within the contour bands.

Table 6.4
AREA OF NOISE EXPOSURE IN ACRES
Existing St. George Airport 2003

Noise Level	Area within Contour (Acres)	Number of Dwellings within Contour	Estimated Population within Contour
60 – 65 DNL	236.7	7	20
65 – 70 DNL	116.7	0	0
70+ DNL	102.9	0	0
Total 60+ DNL	456.3	7	20
65+ DNL	219.6	0	0

Source: Landrum & Brown analysis, 2004

The dwellings and population residing within the 60 to 65 DNL contour band are located in three areas – directly east of the mid-point of the runway, at the far southwest corner of the contour, and in the far northeast corner of the contour. There are no noise-sensitive non-residential uses within the 60 DNL contour for existing conditions.

6.2.3 NOISE ANALYSIS FOR FUTURE CONDITIONS (YEARS 2010 AND 2020) FROM OPERATIONS AT EXISTING AND REPLACEMENT AIRPORT SITES

INM evaluations were conducted for two future scenarios at St. George. The No-Action Alternative presumes the continued operation of the existing airport, while the Proposed Replacement Airport Alternative evaluates the conditions of noise present within the airport environs if the airport is relocated to a new site several miles southeast of its present position. Noise assessments were conducted for each site for the years 2010 and 2020 to provide a comparison of the anticipated aircraft noise effects of a new facility to anticipated future conditions without a new airport.