1.3 Noise Corridors

The essence of this alternate helicopter study is to determine whether there are sites that could dramatically reduce the number of households impacted by noise from helicopter flightseeing operations. Part of the evaluation of each site that made it past the first screening level was to compare the number of households that would be affected by noise from flightseeing helicopters going to and from their permitted landing sites from each of the potential sites.

To quantify this comparison, three thousand foot and six thousand foot corridors were drawn along the potential flight routes to the point where they were well past all human habitation (as a point of reference, 5,280 feet equal 1 mile). The number of residences within each of these corridors was then counted and compared. A single-family residence was counted as one, a duplex as two; a condo development equaled the number of individual units in the development.

These corridors do <u>not</u> contain all the residences that would hear helicopter noise from the flight routes. We estimate the noise level at the edges of the 3,000 foot corridor to be about 65 dBA (the level which starts to interfere with conversation) and at the edges of the 6,000 foot corridor, it is estimated that the noise level from the helicopter flights would be about 55 dBA (the level where aircraft are clearly audible). Last summer's noise study found that most residential areas of Juneau, away from major roads, have daytime L90 noise levels (the noise level that is exceeded 90% of the time) in the low 40s dBA. In a very quiet environment, distant helicopter noise down into the 30 dBA level is audible, but quieter than the ticking of a bedroom clock. The purpose of the noise corridors was to simply provide comparable data for all sites.

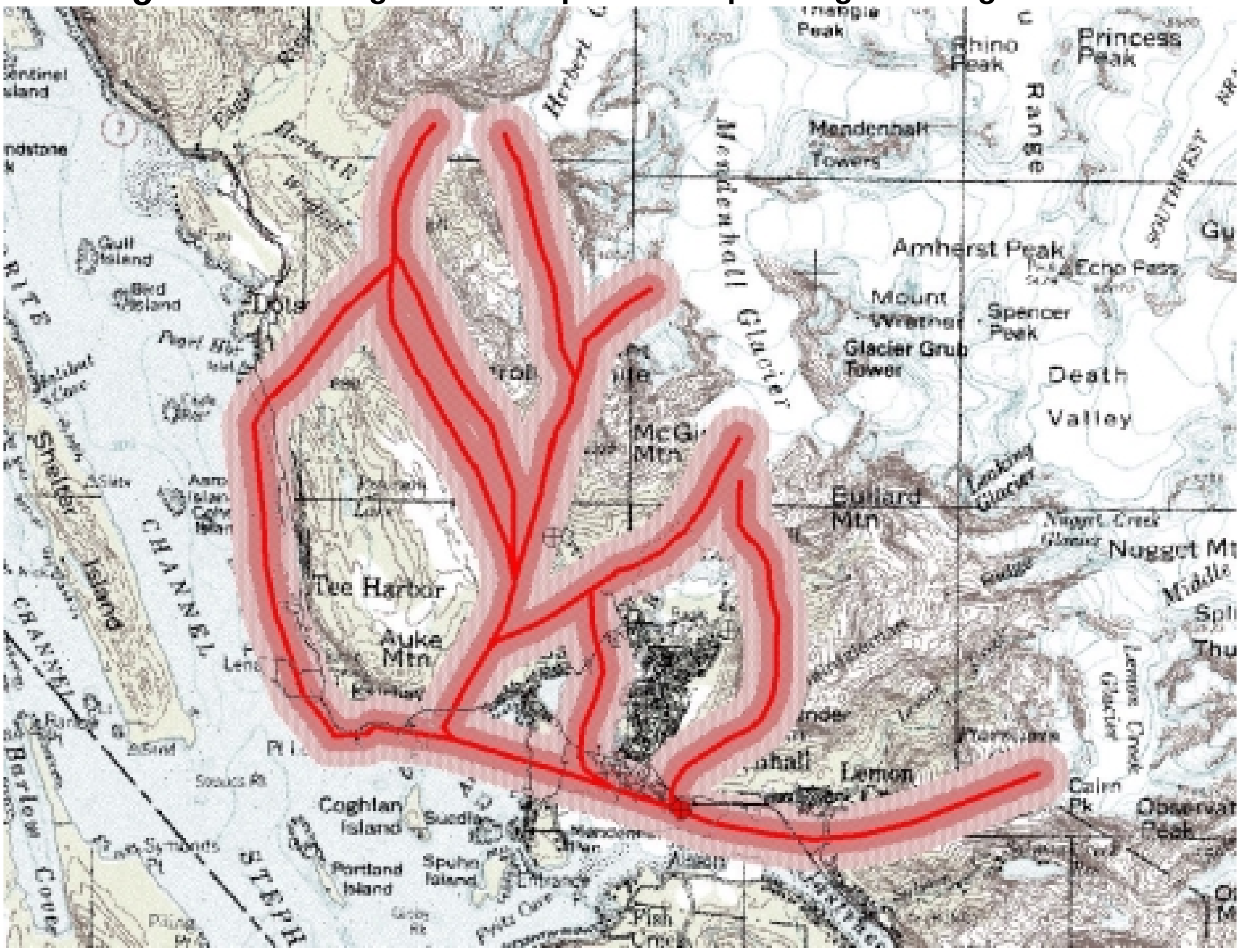
Many factors influence how sound travels. The altitude of the helicopter and whether it is climbing, flying at a steady altitude, or descending, affects helicopter sound. Wind, humidity, the existence and height of a cloud ceiling, topography, and ground cover also affect the distance at which noise can be heard. These factors are too variable to accurately factor, but again, for the purposes of this study, they are irrelevant. As mentioned earlier, unless alternate heliports offer dramatic reductions in flightseeing noise, they are not worth pursuing. A proposed solution that reduces noise for 1,000 people, but does so by inflicting an increased noise level on 600 others, would not be a solution at all.

In evaluating the impact of flight routes, we also considered on a case-by-case basis, the frequency the route would be used. Noise from five helicopters a day has a far different impact on residents than noise from fifty helicopters a day even if there is no difference in the maximum noise. If residences are impacted by floatplane flightseeing noise as well as helicopter flightseeing noise, the impact on residences is greater than the sum of the two parts.

Some sites offered good weather routes that would be heard by few if any residences. If these sites' bad weather routes would fly over an unacceptable number of homes, however, they were not advanced through the screening process. The analysis of all of the noise corridors is based on the presumption that while charter helicopter flights would continue to originate from the airport, all helicopter flightseeing would move to the alternate heliports. A scenario that simply added flights at the alternate heliports without an equivalent reduction from the existing bases would not result in an overall reduction of flightseeing noise.

The figures and table on the following pages show the existing heliports, flight lines, and corridor residence counts. Maps showing flight corridors for proposed sites are presented with the analysis of each site.

Figure 3 Existing Juneau Airport Helicopter Flight Seeing Routes



	3000’ **Noise Corridors**	6000’ **Noise Corridors**
Affected Land Parcels	1098	2422
Affected Housing Units	841	2260

The parcel and housing unit totals are for all helicopter flightseeing routes out of the airport. The number of homes affected depends on the particular flight path.

Figure 4 Existing ERA Routes

	3000’ **Noise Corridors**	6000’ **Noise Corridors**
Affected Land Parcels	1205	2783
Affected Housing Units	1779	3777

The parcel and housing unit totals are for all helicopter flightseeing routes out of ERA’s heliport. The number of homes affected depends on the particular flight path.

1.4 Sound Modeling and Monitoring

1.4.1 Background

This Alternate Heliport Study used a noise measurement survey and computer modeling assessment to assess the suitability of various alternate heliport sites. The survey and assessment were based upon the methodology of our 2000 Flightseeing Noise Assessment and the results from that study were used to validate noise model conditions specific to Juneau. The following section details the methodology used in the measurement survey and the computer modeling of results into noise contours.

1.4.2 Noise Measurement Survey Methodology

The noise measurement survey was designed to provide actual noise data of helicopters operating along the flight lines that will be used if a heliport is established at one of the Level 4 heliport sites (Dupont, Montana Creek, Sheep Creek, Mendenhall Glacier). ERA and Temsco provided helicopters to fly along the new routes and a recording GPS was placed onboard to record the exact routes. This data was then compared to current noise levels from the existing heliport sites.

Four locations were used for measurement of the two southern heliport locations and four locations were also used for measurement of the two northern heliport locations. The monitoring locations were selected to measure the noise levels in the neighborhoods that might be affected by the alternative heliport sites. The locations were selected on the basis of: (1) proximity to proposed heliport flightseeing routes, (2) the proximity to noise sensitive land use areas, and (3) ambient noise levels.

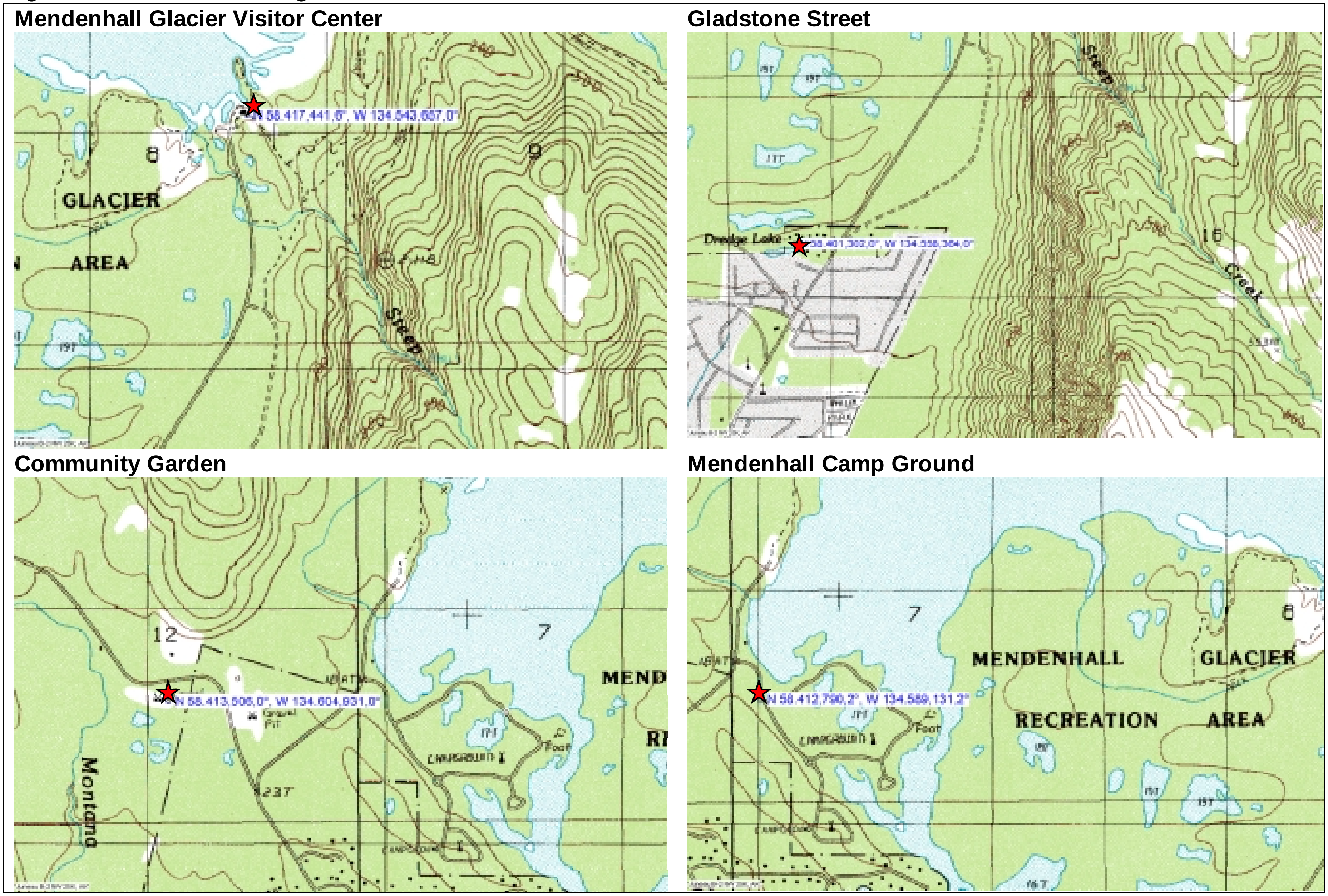
Each of the sites is listed in **Table 4-1** on the next page. **Figure 4-1** shows the noise measurement sites in the south Gastineau Channel area. **Figure 4-2** is a map of the sites located in the Mendenhall Valley. The numbers of sites referenced in these figures correspond to the ones listed in **Table 4-1.**

Table 4-1 NOISE MEASUREMENT LOCATIONS

Site	Name	Address	Neighborhood
	South Gastineau Channel		
101	S101	Sandy Beach Parking Lot	Douglas
102	S102	Sheep Creek Delta	Thane/Sheep Creek
103	S103	End of Thane Road	Thane
104	S104	Lucky Me	Lucky Me
	North Mendenhall Valley		
111	N111	Mendenhall Campground	Skaters' Cabin Area
112	N112	Gladstone St.	Upper Mendenhall
113	N113	Mendenhall Visitor Center	Mendenhall Glacier
114	N114	Community Garden	Montana Creek

Figure 4.1 Noise Measurement Location Map (Southeast Measurement Sites)

Figure 4.2 Noise Monitoring Locations for Montana Creek and Mendenhall Visitor Center Sites



Measurement Procedures.

Noise measurements were conducted on August 23rd, 2001 at each of the measurement locations. Monitors collected continuous 1-second LEQ noise levels, aircraft single event data, and ambient noise levels. The equipment was checked and calibrated at the beginning and end of the measurement survey.

At each noise measurement site, we collected the following data:

- continuous one-second noise levels
- single event data (SEL, Lmax and Time Above Duration) for individual aircraft
- hourly noise data (LEQ, Level Percent, Time Above)
- correlation of noise data with aircraft identification
- non-aircraft ambient sound level (Level Percent)

Instrumentation

The monitoring program was conducted with state-of-the-art noise measurement equipment and procedures. Each site utilized Brüel & Kjaer 2236 Sound Level Meters which automatically calculate the various single event data. The Brüel & Kjaer system also includes software that provides data storage for later retrieval and analysis. The measurements consisted of monitoring the A-weighted decibel in accordance with procedures and with equipment that comply with specific International Standards (IEC), and measurement standards established by the American National Standards Institute (ANSI) for Type 1 instrumentation.

Measurement and Analysis Procedures

The noise measurement methodology employed in this study uses a program designed to continuously measure noise at each location. From this data, different noise metrics, including aircraft single event noise event level, time above levels and the ambient levels, can be calculated.

Each noise monitor was staffed during the course of the noise measurements. Observers logged the time of different noise events that occurred during the measurement program. Aircraft operations during measurement periods were determined by software correlation between the recording GPS from the helicopter and the noise and time measurements from the sound monitors. This gave precise information as to the time and location of the helicopter in connection with noise levels. This correlation was then double checked against the field notes of the observers conducting the measurements.

Once the collection and correlation of the noise and flight data was complete, the various noise metrics were calculated using proprietary software developed by BridgeNet. The results of the single event and cumulative noise metrics are presented for each of the alternative heliport sites.

1.4.3 Computer Modeling

Computer models are often used to predict changes to the noise environment that would result from development alternatives under consideration. The FAA's Integrated Noise Model (INM) Version 6.0b was used in this study to illustrate single event noise contour information. Inputs to the model were collected and validated so that they could be used to predict future changes in noise that would occur with potential alternatives. The INM includes an extensive database of civilian aircraft noise characteristics and the most recent version incorporates the advanced plotting features included in the Air Force's noise map computer model.

Noise contours were generated in this study using the INM Version 6.0b. The original INM was released in 1977. The latest version, INM Version 6.0b, was released for use in 2001 and is the state-of-the-art in airport noise modeling. The INM is a large computer program developed to plot noise contours for airports. The program is provided with standard aircraft noise and performance data for over 100 aircraft types that can be tailored to the characteristics of the airport in question. Version 6.0b includes an updated database that includes some newer aircraft, the ability to include run-ups and topography in the computations, and a provision to vary aircraft profiles in an automated fashion. It also includes more comprehensive and flexible contour plotting routines.

The results of the 2000 flightseeing noise measurements and the measurements completed in this study were used to validate the noise model to conditions specific to Juneau.