SECTION 5.0

MITIGATION OPTIONS

5.1 Introduction

This section describes mitigation options that may be used to reduce the noise impacts from flightseeing activities. These measures are described qualitatively with potential reductions where appropriate; however, they are not evaluated in detail as part of this study. The wide range of options are listed below and described in the subsequent paragraphs. This includes regulatory access restrictions, utilization of new technology and changes in flight procedures. Implementation alternatives are also presented; this could occur in a regulatory manner through a Part 161 type process or in a voluntary manner such as mediation.

- new technology
- alternative flight paths
- alternative operational procedures
- satellite heliports
- noise budget
- FAR Part 161
- fly quiet
- mediation process

5.2 New Aircraft Technology

New technology is developed for both helicopter and turboprop aircraft, which represent a means of reducing both single event and cumulative noise levels. These advancements provide a lower magnitude of noise and often reduce some of its more annoying characteristics (i.e., pure tones and blade slap). A reduction of three to five dBA is the result of new aircraft technology. Noise reduction technology encompasses the following areas:

- engine noise
- blade noise
- airframe noise

Examples of new technology for propeller floatplane aircraft include new engines, advanced mufflers and propeller design. Juneau's Wings of Alaska has already switched to aircraft(s) that are more quiet than previous models and currently have one aircraft operating out of Juneau International Airport floatplane base that has been re-engined.

The operators' use of new technology can occur through normal attrition as aircraft reaches the end of their useful life, and/or through good neighbor policies followed by the operators, regulations and voluntary programs. Regulation would require a Part 161 process, while voluntary programs might be achieved through a mediation process. Economics are obviously a major factor in the ability of operators to accelerate the replacement of older aircraft with aircraft with new quieter technology.
New aircraft and rotorcraft technology pose potential costs to operators, and a common concern among them continues to be the need to preserve revenue from existing operations in order to pay for future technological modifications. This cost includes early retirement of current aircraft assets, the purchase of new aircraft(s), operating costs that may be potentially higher and potentially reduced efficiency. An example of the cost of reduced efficiency is that while there are quieter technology helicopters available, they cannot carry the same number of passengers as the one which is currently used by the industry and are not as efficient in serving the type of market such as the Juneau Flightseeing industry.

Helicopter manufacturers may be invited to provide presentations on new technology rotorcraft to facilitate this process. Information as to what technology is currently available and what might be available in the projected 5 years would be useful in the decision making process. The suitability of new rotorcrafts in the Juneau flightseeing industry may also be discussed.

New technology rotorcraft and floatplane aircraft can result in lower noise levels. In terms of single event noise levels, these aircraft can reduce the noise by 3 to 5 dBA, which will ultimately reduce the cumulative levels. Assuming that the activity levels remain the same, than the DNL and modified DNL will have the potential of being reduced by about 3 DNL. In addition, the Time Above durations would also reduce as a result of new technology. The degree of reduction is estimated to be a lowering of the Time Above durations by 10% to 20%.

Wings of Alaska provided an operational schedule of their flights made by its new re-engined floatplane. The measurement data showed this aircraft was quieter than existing technology, but because other variables were involved, such as flight paths, the measurement program was not able to definitively measure the difference. .It is estimated, however, that the noise levels are at least 3 dBA less. It is recommended that an actual controlled noise measurement flight test be performed on both the old technology and new re-engined aircraft to determine the actual noise benefits.

5.3 Alternative Flight Paths

The results of noise measurement reflect that certain flight paths have lower noise levels, and a reduction in flight paths along some areas commonly exposed to flightseeing noise, could be feasible as an alternative. These preferred flight paths are only available during good weather conditions and are usually unavailable in low visibility weather. The following describes the development and use of preferred flight paths:

Helicopter Operations. For flightseeing operations via helicopter, the preferred flight path over Douglas Island resulted in lower noise levels overall versus the path down the center of the Gastineau Channel. Similarly, the flight path up the ridgeline, south of Mendenhall Valley, also reduced the overall noise levels; this difference is illustrated in **Figure 5-1**. This figure shows single event noise contours in terms of dBA levels that are standard and preferred procedures; both represent a helicopter operation flying south down the Gastineau Channel. The top portion of the graphic shows the standard procedure down the center of the channel and the bottom portion of the graph shows a helicopter flying on the preferred flight path over Douglas Island. This data depicts the area affected by the overflight and magnitude of the noise, which is less when performing standard procedures. The following recommendations are relative as alternative flight paths for helicopter operations:

- Provide for improved weather reporting information throughout the complete helicopter flightseeing flight path. Complete knowledge of the weather for all areas along a flight path will give the pilot(s) more information as to which path they are safely able to fly. Further, the more precise climate information available, the greater usability is allowed in procedures that are preferred when they are cognizant and confident of which path they can alternately fly.

- Improve compliance monitoring of the preferred flight path. Incentives tied to increased use of these procedures can be implemented through an enhanced Fly Neighborly, Fly Quiet program or through developments in the mediation process.

Figure 5-1
Alternative Helicopter Flight Paths

Figure 5-2
Alternative Floatplane Flight Paths

Floatplane Operations. Floatplane aircraft departing from the downtown airpark at times overfly the South Douglas area; these operations result in the highest flightseeing noise impacts in this community. When the aircraft is able to fly in the center of the Gastineau Channel, the noise levels are significantly lower; this difference in potential impacts is illustrated in **Figure 5-2**. This figure presents the single event noise contours in terms of Lmax dBA from a departure of a single floatplane aircraft from the downtown airpark. The top portion of the figure displays the preferred flight path of an aircraft departing along the right center of the Gastineau Channel and the bottom portion shows an aircraft departing over Douglas. Consequently, the results show a reduction in noise with the preferred procedure.

Since there is a need to depart into the wind, there are times that the aircraft fly directly towards Douglas, and fly over land. Lessening the amount of times this occurs is desirable in terms of reducing noise in Douglas. The following recommendations are alternatives relative to flight paths taken by floatplane operations.

- Develop a specific departure procedure to reduce the degree of over-flights in the Douglas area. This would also be tied into the improvements for alternative departure procedures that are described in the section below (Alternative Flight Procedures).

5.4 Alternative Flight Procedures

Floatplane Operations. The noise impacts associated with floatplane operations may be minimized with the use of two alternative flight procedures, which are listed below:

- *Departure Climb Rate.* For floatplanes departing southbound from the downtown airpark, measurements show that lower altitude operations down the center of the channel result in the lowest noise levels. A slower climb rate allows pilots to use less throttle and noise from aircraft closer to the water does not tend to propagate as far as noise from aircraft at higher altitudes.. This lower climb rate procedure should only be utilized when departures travel down the centerline of the channel. Delaying the climb out until past Thane will also reduce noise levels in Thane and Douglas.

- *Propeller Prop Pitch.* The pitch setting used in the propeller can have a significant impact on the magnitude and character of noise. A higher pitch setting often results in the sounds that have pure tone characteristics that are more intrusive. This alternative proposes to work with Wings of Alaska to determine a pitch setting that results in lower noise impacts for communities along the primary departure paths.

5.5 Satellite Heliports

The development of satellite heliports offers possibilities in reducing the noise impacts for flightseeing helicopter operations. Because of the nature of Juneau's terrain, the pattern of residential development and the predominant weather, , it is not possible to reach the tour locations from existing heliport locations without over-flying residential neighborhoods.

Moving arrival and departure points of flightseeing flights to satellite heliports located away from core residential areas could substantially reduce the impacts of associated noise, since less residential area would be under the flight paths. Note that any potential impacts to wilderness areas may or may not benefit from such an alternative. Given the destinations of the two major operators, a south location for ERA and a north location for Temsco / Northstar, these places offer the greatest potential for noise mitigation.

There are two areas of potential concern relative to satellite heliports. First, if a sufficient number of operations are not shifted to satellite heliports, a noise reduction benefit will not occur. If satellite heliports are used only to increase the total number of operations they would make the problem worse. Second, a suitable site(s) must be located.

If the location of satellite heliports is poorly chosen, the result could be to shift the noise problem from one set of neighborhoods to another. Both issues could be addressed in a detailed analysis of satellite heliports, including modeling of sound propagation along the new flight paths
The results of the measurements completed in this study can be used in the study of satellite heliports. The measured levels would be used to validate a noise model that could be used to predict the changes that would occur in the immediate area of a heliport site and along each of the possible routes.

5.6 Noise Budget

A Noise Budget represents a limit on the overall noise that can be generated by an airport or a group of operations; the purpose of this budget is three-fold:

1) To provide incentives for operators' use of quieter aircraft technology and procedures.
2) To give confidence to the community that the noise levels are being stabilized and may ultimately be reduced in the future
3) To allow operators the knowledge that they can plan future business commitments based on predictable levels of access and activity.

An example of a Noise Budget for Juneau would be to cap the total noise generated by the helicopter flightseeing tour operations. The cap could be fixed or reduced over the future years. In this scenario, additional operations or maintenance of current levels could only occur with increased use of new technology, quieter aircraft, using flight paths or procedures that reduce overall noise levels.

Examples of airports with Noise Budgets are Sea-Tac International Airport and Jackson Hole Airport. Both Noise Budgets were implemented before ANCA went into affect in 1990. These Noise Budgets accumulated their greatest benefit in the first five years of the program.

While the idea of a noise budget is simple, implementation can be difficult. The first step in any approach to developing a Noise Budget for Juneau would be to rate the noise from the current flightseeing operations. Noise budgets work best if implemented through voluntary programs worked out through mediation. Noise budgets can also be implemented through regulation by a municipality if it successfully completes, and defends from legal challenges, a Part 161 process. The Part 161 process is discussed in some detail in its own section below. We understand the CBJ has retained an attorney to explore the Borough's legal options on flightseeing and we defer to his judgement on the use of the Part 161 Process. A third option would be for the Forest Service to use its

ability to permit and limit glacier landings to shift landing permits to those operations that invest in quiet technology or otherwise reduce the noise generated by their flights. The Forest Service has no authority to directly regulate flightseeing flights that do not land on land or glaciers owned by the Forest Service.

5.7 Fly Quiet program

Background

Fly Quiet is a family of programs designed to motivate operators and pilots to fly aircraft as quietly as possible. A Fly Quiet program in Juneau would be built upon existing voluntary Fly Neighborly noise abatement programs along with new potential elements. A Fly Quiet program is likely to result in overall reductions in single event noise and may reduce cumulative noise levels as well. Furthermore, as a voluntary rather than a regulatory program, Fly Quiet has the advantage of reinforcing desirable flight procedures without going through the onerous regulatory requirements of a FAR Part 161 filing or similar federal approval processes.

By monitoring, collecting, analyzing operational and measured noise data, overall trends can be identified simultaneously per a specific individual or operation, which can later be applied for noise abatement programs. In turn, this evaluation can be quantified and translated into monthly reports or scorecards. In addition, these monthly scores for each operator will allow management and flight personnel to measure exactly how they stand vis-à-vis other operators and how their proactive involvement can positively reduce noise in the Juneau area.

Fly Neighborly Program

CBJ currently has an existing voluntary program for noise abatement called Fly Neighborly. This program includes a number of measures to reduce the potential noise levels from flightseeing operations. The program elements include restrictions on hours of operation, preferential flight paths and preferred flight procedures; these have been developed over many years in cooperative efforts between the community, industry and CBJ. All operators are expected to agree to operate within the goals of the Fly Neighborly program.

Although there are benefits to the aforementioned elements, the primary criticism of the program is the limited accountability and the belief that it is not implemented to the maximum extent.

The Fly Neighborly program fundamentals provide a basis for development of the next generation of voluntary programs. The proposed Fly Quiet program would utilize these elements as the basic program.

This program is designed to provide for accountability and incentives to improve the compliance with the noise abatement elements. It would require additional self-reporting by the operator including operational procedures, compliance monitoring by the CBJ, and seasonal noise monitoring.

Fly Quiet Grading Method

Fly Quiet results are processed into a single number rating system so that it is easy to reflect which is the best and how each operator rates. The Fly Quiet Program would initially cover the existing programs in the Fly Neighborly program, but it can be expanded over time to cover issues such as measured noise levels. Both monthly and seasonal reports grading performance on a scale similar to school report cards (60–70 = D, 70-80 = C, 80-90 = B, and 90-100 = A) would be published. Although the data synthesis and calculation underlying these grades may be complex, the published reports must be easy to comprehend and avoid confusing acoustic terminology.

Use of Results

Fly Quiet reports can communicate compliance with existing and future noise abatement programs in a clear, understandable format that allows broad comparisons between operators over time. Making this information available to the public serves both as a motivational tool for the operators and an educational device for the public.

It is important to emphasize that the primary purpose of Fly Quiet reports is to motivate operators by rewarding good noise abatement procedures, as well as encourage environmental competition to some degree equal to economic competition. By publicly providing this information, Fly Quiet would enable operators to engage in informed self-evaluation and improvement. In addition, Fly Quiet would allow the CBJ to announce an annual award to the environmentally best operator. Positive reinforcement and good publicity is the expectancy for a strong incentive on their performance (incentives could be tied to Forest Service Landing permit process).

Reports would be published by the CBJ and made available throughout the community. Examples of methods for reporting the results are listed below:

- publishing the results in the paper
- publish results in brochures
- pilot incentives
- awards and announcements

5.8 Seasonal Noise Monitoring

Seasonal noise monitoring would involve a noise measurement program similar to that completed in this study. This data would be used to document noise levels and provide information for use in the Fly Quiet program. This monitoring session would occur during the flightseeing season at a number of the sites exposed to flightseeing operations. The scope of the monitoring does not need to be as extensive; however, it would reduce costs and simplify the analysis of the results.

Noise monitoring is expensive and it is time consuming to evaluate the results. Since there is no radar data available to correlate the aircraft to the noise event, it is not always possible to know the source of the noise. Therefore a limited pilot study may be initially employed for the 2001 season to evaluate the usefulness of the data in a Fly Quiet program and in providing information to the community and the operators. A network of seven sites is recommended for the initial program for measuring flightseeing noise operations.

5.9 FAR Part 161 Process

Part 161 maps out the requirements and procedures for implementing new airport use and access restrictions by airport proprietors. The Airport Noise and Capacity Act (ANCA) of 1990 limited the ability of airport proprietors to restrict aircraft operations at an airport. In order to implement such restrictions, the proprietor must complete a Part 161 study. Section 2.6 describes in detail the ANCA regulation.

The regulation also states that proprietors must use the DNL metric to measure noise effects. In addition, it requires the utilization of the Part 150 land use guideline table. This table includes 65 dB DNL as the threshold contour, which is used to determine compatibility, unless there is a locally adopted standard that is more stringent. A sample of this land use table is presented in **Table 2-9**. The Part 150 regulation was summarized in Section 2.6.

The regulation identifies three types of use or access restrictions that require different types of compliance for each restriction. These three types of restrictions are listed and described in detail below:

- negotiated restrictions
- stage 2 aircraft restrictions
- stage 3 aircraft restrictions

Generally speaking, any restriction that affects the number of times an aircraft operates is considered a use or access restriction. Although the ANCA phase-out of Stage 2 aircraft does not apply to aircraft under 75,000 pounds, the FAA has determined that Part 161 limits the proprietors' authority to apply and this is the same for smaller aircraft(s) as

well. Thus, Part 161 would apply to restrictions on helicopter or float plane operations that might be developed by the CBJ.

Negotiated restrictions are more favorable from the FAA's standpoint, but still require procedures for approval and implementation. They must be agreed upon by all airlines, operators and public notices must be given. This agreement developed through mediation by all parties involved would be considered a negotiated restriction.

Stage 2 restrictions are difficult, since one of the major reasons for 1990 Airport Noise and Capacity Act (ANCA) was to discourage local restrictions more stringent that the ANCA's year end 1999 phase-out. To comply with the regulation and institute, a new Stage 2 restriction is that the proprietor must generally do two things: a) prepare a cost / benefit analysis of the proposed restriction and b) give proper notice. The cost / benefit analysis can be extensive, which entails considerable evaluation and Stage 2 restrictions do not require approval by the FAA.

Stage 3 restrictions are especially difficult to implement, because they involves considerable additional analysis, justification, evaluation and financial discussion. Further, Stage 3 restrictions must result in a decrease in noise exposure to 65 dB DNL to noise sensitive land uses (i.e. residences, schools, churches and parks). It is a regulation that requires both public notice and FAA approval.

ANCA applies to all local noise restrictions that are proposed after October 1990. While helicopters are not typically categorized as Stage 2 aircraft nor specifically addressed in Part 161, current interpretation is that any restriction to helicopter operations would be viewed as a potential Stage 2 restriction. The following are potential actions of regulatory noise restrictions that would trigger a Part 161 process:

- noise budget
- hours of day or day of week restrictions
- restrictions on the operations of types of aircraft or rotorcraft

To date, no airport has completed an approved Part 161 study. However, some airports are proceeding on studies to restrict operations of Stage 2 corporate jets through the Part 161 process. The costs for such studies range from 250K to well over 1 million dollars. This does not include any legal costs that are incurred if a restriction is developed or challenged. A Part 161 study has two basic components a) the acoustic and b) the financial aspect. The major cost is the financial analysis.

There are two difficult issues in developing a Part 161 restriction in Juneau. The first is the requirement to utilize the 65 DNL noise criteria as defining when potential noise impacts occur. DNL noise levels from the flightseeing operations are below 65 DNL; thus, it is more difficult to demonstrate a noise impact when using that standard. This is a common problem facing smaller airports that are considering a Part 161 study.

The second issue that poses a challenge to selective regulation of helicopter operations must proceed in a manner that is non-discriminatory. Any restriction based on noise must be fairly and equally applied to all aircraft types. It is not legal to select a single category of aircraft for restriction. For example, the courts have previously denied restrictions that ban jets. Since helicopter operations are currently judged under Stage 2, it may be possible to restrict their operations; however, it would need to apply to all helicopter operations, not just flightseeing. Furthermore, since there are aircraft at Juneau International Airport, such as the Alaska Airlines operations, that are louder than flightseeing aircraft, any noise level based restriction directed toward flightseeing aircraft must also be applied to these louder aircrafts as well.

5.10 Mediation Process

The mediation process offers advantages over all the alternatives in implementing mitigation options. Mediation in itself is not a noise abatement alternative, but a means of operations supporting abatement procedures. The primary benefit of this alternative is its ability to more successfully facilitate the implementation of actions or noise abatement actions, which would be difficult to achieve thorough the Part 161 process.