Flightseeing Noise Study Public Meeting
Question and Answer Session

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Centennial Hall

**Baker Project Team**

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**1. You said you measured the ambient background noise away from roads and streams. There are many populated areas in Juneau near roads. Will you have data to show the average ambient noise levels that consider these areas?**

We tried to get the primary monitoring sites to be as quiet as possible. There were a couple of sites that had roadways nearby because there was not much choice. The portable, secondary sites, however, had more background noise. We had some downtown monitoring sites, and about one third of our other sites had a variety of noise sources they were exposed to, as well.

**2. What were the criteria you used to select the sites?**

The sites we monitored are ones that get a lot of noise. We do not want anyone to feel we are undervaluing what the noise exposure is in a community. Everyplace is different to some degree, and you may have a slightly different exposure to noise than what we measured at our sites. We measured more than thirty sites. We did not get everywhere perfectly, but most of our sites did a good job of representing an area. We can also make predictions based on other information.

**3. Will topography be included in the model?**

We will have a good indication of the terrain in the model. Terrain is very complex to model, and there are severe changes in this terrain, so we will not get every situation perfectly.

**4. What is the correlation between the ambient and aircraft noise relative to the number of tourists and crew that arrive on the cruise ships?**

We did not keep a record of when the ships arrived or departed, but can get that data. We can show you by hour what the noise levels and the flights are. We might be able to see a pattern with information on ship arrival and departure times.

**5. Did you measure the full frequency for the decibel ratings?**

We primarily measured the A-weighted value that is used almost exclusively to measure community noise. The metric compensates for the varying frequency (low versus high) and relates the noise to how the human ear hears it. The human ear does not hear low frequencies as well as it hears mid-range frequencies. The C-weighted metric weights low frequencies more, so numerically, the measure is almost always higher. That does not necessarily mean that the noise is worse. It is just a different weighting scale so it will always be numerically different. We did not measure C-weighted values, but measured the full spectra or each one-third octave band. You could reconstruct the C-weighted values, from that. Primarily, we wanted to show the real detail of what the frequency looks like.

**6. You said that aircraft noise at 65 dBs begins to interfere with speech. In a World Health Organization document, it said that speech is interrupted for a full sentence (not just listening for particular words but trying to understand the whole sentence) unless the background noise is 15 dBs lower. I have also read that children are affected at much lower levels because they are learning speech, so speech interference is a bigger issue for them, even at lower decibels.**

There is no set number for the threshold of when speech interference starts to occur. With classroom noise, they try to decide how much of a sentence a student will be able to hear and comprehend. They are talking about an educational setting where every word is much more important as opposed to outdoor noise, where people are talking in a more conversational manner. People talk at about the 65 dB level. If you look at FICON (Federal Interagency Committee on Noise), their studies say that 65 dB is about the threshold for people talking relatively close together (three to four feet apart). I am not trying to imply that 65 dB is a hard number, but it is a good general number. It may be too high for some people. For those people who want to be extra careful, look at 55 dB. That level probably approaches more closely the World Health Organization value.

7. **For every 10 dB increase, the perception of loudness doubles. Is it different for aircraft noise?**

That is part of the confusion of aircraft noise. It is not so much that aircraft noise is different, but that there is a difference when you look at single events compared to cumulative event metrics. With single event noise, like one plane flying overhead, a 10 dB change either way will be perceived as twice as loud or half as loud. A 20 dB increase would be four times as loud. When two sounds are played in a laboratory setting and one is lowered until it is 10 dB below the other, that would be the point when someone would say the sound is about half as loud. With DNL or cumulative metrics, a slight change is much more dramatic. For example, with DNL, a 3 dB decrease is half the noise energy. That is a bigger change. In most airport situations there is about a 10 dB to 15 dB range from the quietest to loudest environment. It has a much more dramatic change per given decibel difference.

**8. Have you looked at other areas that have had experience with flightseeing noise like the Grand Canyon and Hawaii to identify potential solutions?**

Yes, we did look at other research relative to helicopter or flightseeing noise. Many of the metrics we presented, like the Time Above the audibility duration, are metrics the National Park Service is promoting for flightseeing or park noise. In addition, the peak hour type of noise is another metric that they are using or valuating. Those are two examples. BridgeNet has done quite a bit of the monitoring in the Grand Canyon and also in Hawaii. We spent close to 100 man days doing noise monitoring in the Grand Canyon for the National Park Service about ten years ago. A lot of the noise monitoring methodology we use was what we developed when looking at noise in a park setting.

**9. What is BridgeNet International and what are your credentials?**

My degree is in engineering and I am a professional engineer. Our primary area is aircraft noise. Our biggest client is the City of Chicago, O'Hare International Airport. We currently are doing projects at 25 different airports including Taiwan and Milan, Italy. Our main area is noise abatement.

10. **A couple of years ago we took our first step towards quieter technology and invested over a million dollars for a 9-passenger airplane that is operating from the airport. Could you identify our airplane in your monitoring and take that sound and place it where the otters are in your study to see what effect that would have throughout the community?**

We can if you have records of when that aircraft operated. I think that it would be useful to show the difference between that aircraft and the otters or some of the other planes.

**11. What were the results of the indoor noise measurements and how did the values apply to the Time Above statistics?**

We have not finished working with the indoor data, but I have looked at it. In general, the houses that we measured generally had decent windows and insulation so the noise reduction was a little bit better. Because of the low frequency of the aircraft here, though, buildings do not reduce noise as well for low frequency as for higher frequency, so you get a little bit under 20 dB as a typical noise reduction. If it were a better frequency content, noise reduction would be around 25 dB. In general, you could knock off about 20 dB from the Time Above numbers. If you had peak event of about 80 dB outside, it would peak at about 60 dB inside a house.

**12. In places like Seattle there is a different kind of acceptance for noise levels than there is for noise levels in Juneau. How do you gauge for that?**

We are doing a Part 150 study at SeaTac airport right now. You asked me to compare tolerance for similar noise levels here versus Seattle? Well, they are not happy campers there either. They are having a nice war right now at noise levels that are at your amount or lower. People who live near Bill Gates want to move the noise to where Paul Allen lives and vice versa. Every community is a little bit different but every community is somewhat similar, too. I think that the uniqueness of Juneau is that the setting is very different with the humidity and the water. Having everything concentrated near the water makes a big difference. Also, the noise here is low frequency, and some of the pitch tones add to the annoyance more. Those factors contribute to

the uniqueness here more than the idea that people here are so different. The character of the noise has special factors in it.

**13. Can you compare the noise that you have studied here to other places?**

Yes and no. Is there another comparative place in the country that has float plane noise and tour helicopter noise to the extent here? No. The closest thing to your situation would be the tour operations at the Grand Canyon. There are places where helicopter events are frequent that are more military in nature, but those are a different sound, too. There is not a lot for comparison, and you do have something very unique here. If you were to drop that uniqueness and just look at the numbers (the DNL's, the Time Aboves, etc.), they are lower than at a major airport, but you may hear sound longer than you would around a major airport. It is different in that sense. You will find that at these levels there is a lot of annoyance at big airports. Probably half the complaints that an airport receives are more in this range than in the range of the highly impacted areas close to the airport.

**14. Can you say that living in Juneau is like living at a major airport?**

No. I would not say that. Airplanes are a very big component of the noise environment here. But is the magnitude as high as at a major airport? No. But the activity level is high.

**15. Will your data be able to be to identify for certain that that an event is not either a commercial float plane on a low day or a jet on a Gastineau Channel departure?**

Will we be right every time? No. But I would say that a majority of the time we will be able to tell what the aircraft is from a few things. Noise from a jet looks very different than noise from a helicopter or a low flying float plane. The speed of the plane when it moves past the sequence of monitoring sites would be different. If a float plane is going overhead the same time a jet takes off and both of them are picked up, we are going to have a lot of confusion time. In general, considering that you don’t have radar and are not able to make a positive identification, we have a fairly high confidence level of properly associating the noise to a certain type of operation.

**16. Can you identify the flights that are scheduled commercial operations for float planes as opposed to the operations that are tour-related?**

We have a pretty good idea for the helicopters, but with the float planes we don’t know as well. I think from the float plane base downtown, almost every operation there is a tour flight. Up at the float plane base at the airport, we have less certainty.

**17. You indicated that background noise levels in the community measured in the low 40's. What degree of significance would you attach to the relatively low background noise levels here to how noisy the over flights seem to people?**

Are you asking if it is the relative difference between the background noise and a noise event versus the absolute noise level that causes the most annoyance? In terms of peak noise, research supports the idea that a person responds not so much to the relative noise, but the magnitude of

that noise. But that is relative to peak noise. Another factor is the amount of time you hear the sound. If you have a lower background you tend to hear an event for quite a bit longer. Duration has an effect on annoyance. The longer you hear a sound, the more you are apt to be bothered by it than you would for a shorter duration sound at the same magnitude.

**18. Based on your comments earlier about not being able to be 100 percent certain about identifying single peak events, should we pay less attention to single peak events and more attention to the overall scheme of the data?**

Any data has errors or problems in it to some degree, but they tend to wash out as you look at more information. You don't necessarily want to look at what the loudest plane was, but what the general level of noise a certain type and path of an aircraft is. Look at some level below the extreme as the typical worst case.

**19. In regards to the DNL and modified DNL noise levels that range in the mid- to upper 50's, does this relate exclusively to outside noise? How does it change when you factor in the 20 dB difference from being inside or does it change at all?**

That is an outdoor noise measurement, so indoor noise in terms of DNL is roughly 20 dB below that. If the measure were 55 dB outdoors then the indoor measure would be roughly 35 dB in terms of DNL. It is the same with peaks. If you have an 80 dB peak then the indoor peak would roughly be about 60 dB.

**20. Will this type of data that you demonstrated tonight be available for each of the sites?**

Yes. The report will show the measurements for each site. We will summarize them and give snapshots for each site.

**21. For clarification, when you use the model to show a moving aircraft and changing dB levels at each site, is that an actual depiction of where that flight went? Would the model show when the aircraft fly up on the bench behind Douglas?**

Yes it would. We put all the routes that we observed in the model and then we had observers tell us which route the aircraft was on. That particular day (shown in the presentation) was an overcast day, and the aircraft were going down the channel. We have the route that goes up on the bench, as well. In addition to the observer who would say what path the aircraft was on, we had a numbering system of where in the channel the aircraft might have been. We also tried to estimate the altitude at which the aircraft was flying, so when the aircraft is on the bench we would be modeling that path on the bench.

**22. Can the model take the certification noise levels compared to the equipment that you measured and plug in a quiet technology aircraft that you did not actually measure?**

Yes. As an example, if you have a helicopter that is 3 dB quieter or 5 dB quieter, in essence we could take that noise curve we have predicted from the actual measurements and knock off 3 dB

or 5 dB and see how that noise level would be different. We would be able to see how the DNL, Time Above numbers and the peak sounds would change, as well.

**23. What comes next?**

We will prepare a draft report of all the numbers and then a final report that will document the information. After this, our task is over. I assume the information would roll into the mediation process.

**24. How will recreation areas be included in the study? The West Glacier Trail and Thunder Mountain areas are areas where the traffic directly funnels, and the impact has been monumental in comparison to what might be happening on the road grid.**

Primarily our monitoring sites were sites where people live. That was what our charge was for the study. With our model, we can then predict some of the outlying areas and what the noise levels might be in the recreation locations. The focus of our study was to monitor actual noise levels where people live. It would be helpful if you let us know a couple of those spots you want to know about. Then we will do a prediction, based upon the model, of what the noise levels would likely be.

**25. The city has gotten a bit of a black eye in the international press because of flightseeing noise. How do you compare how a cruise ship passenger (who is in port for just a few hours) perceives the noise to how an independent tourist might perceive noise over a two day period? An independent tourist spends a lot more money and contributes more to our community. How can we study that?**

I am not sure how we would address that in this study. I would think cruise ship tourists make up a sizeable portion of the people who fly in the helicopters or tour flights. In terms of annoyance related to how long people are visitors, national parks have that same issue. The people who come and stay for a longer period of time tend to be more bothered by the noise from tour flights or aircraft operations than those who drive up, go to an overlook, get back in their car and go on to the next park. I think that it is probably a natural thing that there are people who stay here longer and are more concerned.

**26. I want to clarify my understanding of what you said earlier. I think I heard you say that Juneau has some unique sound characteristics from the flightseeing. I think I also heard you say that communities with similar levels of sound also have concerns about noise. Is that correct?**

Yes. If we were to take the magnitude of noise that you have here from aircraft and put that same magnitude in other communities, people would be bothered there, too. I am not saying that everyone would be bothered or everyone would be happy, but that you would have a segment that would be bothered. There are other things that I think are unique here that do not happen anywhere else.

**27. For clarification of the DNL measurement results slide, you said that a 3 dB increase on the DNL scale is like doubling the amount of noise?**

Yes. That is correct in terms of noise energy.

**28. So what you are saying is that the peak day levels are actually two to almost four times higher, because you said it was 3-5 decibels higher?**

Yes (in terms of noise energy).

**29. On the slides with the modified DNL, the increase looks insignificant. I think the changes in DNL need to be explained well in the report and that you need to state what the difference is.**

You bring up the classic problem of DNL. Relatively small changes are important but they don't come across that well.

**28. Noise level and noise energy are related because energy and force are physical items. You can take a thousand pounds of energy on your body if it is delivered over a long period of time without any physical effects. On the other hand, if I deliver the energy with a 357 (rifle), the results are catastrophic. There is that same kind of situation with the DNL and the maximum single event. If we are going to start talking about the two and try to say we are getting twice as much noise energy because of the time factor, it may be that the noise is not any more damaging than the single event.**

Changes in DNL are hard to quantify as to whether the changes are important or not. You could have a change of 3 dB and some might people might say, "This is incredibly better," or "This is incredibly worse", even though the noise levels have not seemed to move very much. It really comes down to noise being above a certain level of someone's personal threshold. As you start dropping the noise or increasing the noise, typically if a person is bothered by the noise, he or she continues to be bothered by it until it drops below one's personal threshold. Then they will say it has gotten better. As long as it is above that level, it will still bother them. Usually, people will not acknowledge or feel that it has improved. Noise energy, going up or down, is really how that noise energy relates back to a person's response.

**29. Can you explain in more detail, how a dose response survey would be conducted in view of this data? Do you do those surveys in the neighborhoods around the various sites?**

In general, from our measurement sites we could say with a reasonable degree of accuracy how loud it is for everybody in Juneau, not just where we measured, but any location. It is not going to be perfect, but from a survey stand point, it would be good data indicating how loud it is at someone's home. Then you could call people or visit their home. With that address of where someone lives, you can know the noise exposure that person generally gets. Then you could survey their attitude and find out what it is that bothers them or doesn't bother them. Theoretically you would be able to draw a curve that would say of 50 people surveyed that are exposed to a DNL at 50 dB, you get 20 percent annoyed and at 55 dB, you surveyed 100 people

and there are 30 percent who are annoyed. The risk is that the range in noise is relatively narrow and your population base is not huge. You may not be able to scientifically find a relationship. You may have just as many people bothered at one as the other end.

**30. For clarification, your report will still include the single event noises from the commercial aircraft (the big jets down the channel are a majority of the big spikes) to show what dB levels are being sustained in the various areas of the community?**

That is correct. What we will do is identify the total noise from everything, the noise from all aircraft, and the noise from flightseeing aircraft. There are times when a lot is happening at the same time and it is hard to get an exact separation, but those are the general categories we are trying to identify.

- **Ambient or Background Noise Levels**

  How quiet is it when aircraft are not present? The residual noise might be the wind, a nearby creek, trees blowing or a road. To determine that, it is called and L90, when is the noise, 90% it is above that sound. It is the time that is left when not much else is going on. It is a common metric used to describe the background noise.

- **A-weighted (dBA) Scale**

  Various rating scales have been devised to approximate the human subjective assessment to the loudness of a sound. Loudness is the subjective judgment of an individual as to how loud or quiet a particular sound is perceived. The human ear is not equally sensitive to all frequencies with some frequencies judged to be louder for a given signal than another. In order to simplify the measurement and computation of sound loudness levels, frequency weighted contours have obtained wide acceptance. The A-weighted (dBA) scale has become the most prominent of these scales and is widely used in community noise analysis. It gives a single number rating of the sound using A-weighting of the different frequency components of the sound. Its advantages are that it has shown good correlation with human response to sound and is easily measured.

- **Time Above Noise Level**.

  This metric measures the amount of time the noise event is above a certain noise level. Often people relate that to how often one is hearing the helicopters or aircraft overflights. Is it two minutes a day or is it five hours a day? It is often a good measure of your exposure. We measure continuous noise and find a threshold or some value that is common. The time above (TA) 65 dBa would be the amount of minutes that you might experience speech interference. We would count how many minutes, add those up overtime, and that would tell us how many minutes a day it the noise event is above a certain noise level. It can be a good indicator of what the impacts are to you.

- **DNL (Day Night Level)**.

The Federal Aviation Administration's (FAA) criteria and most commonly metric used in aircraft noise assessment is DNL. It was the metric used in the Part 150 Noise Study that was done at Juneau International Airport. The FAA, the Environmental Protection Agency (EPA), and almost every government aircraft organization in the world recommend it. DNL is a sum of all the noise, but it is not very well liked by a lot of communities. In part it is because the measurement averages the noise over time. Helicopter and tour operations don't have a lot of night activity, and that can push the numbers down a bit.

- **Modified DNL**.

  Measurements averages noise levels between 8 a.m. and 9 p.m. instead of over a 24 hour period.