NOISE EXISTING CONDITIONS TECHNICAL REPORT FOR ANGOON AIRPORT ENVIRONMENTAL IMPACT STATEMENT ANGOON, ALASKA

Prepared for

Federal Aviation Administration

and

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Contents

Figures

Tables

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1.0 INTRODUCTION

The Federal Aviation Administration (FAA) is preparing an environmental impact statement (EIS) in response to a request from the Alaska Department of Transportation and Public Facilities (DOT&PF) for funding and other approvals for a new land-based airport near the community of Angoon in Southeast Alaska. At present, there is no land-based airport runway in or near Angoon. The DOT&PF has prepared the *Angoon Airport Master Plan* (DOT&PF 2007) for the proposed airport site. The EIS is evaluating three alternative airport sites: the DOT&PF proposed action and two alternative sites. This technical report has been prepared in conjunction with the EIS and summarizes the findings of noise measurements and analysis completed in Angoon, Alaska, during the summer of 2009 to document existing conditions and establish noise baselines for the EIS analysis. Noise measurements were collected over a period of seven days between August 20 and August 27, 2009.

The proposed land-based airport would be a small, commercial airport typical of other rural airports in Southeast Alaska. The initial construction would include a 3,300-foot-long paved runway, with the ability to extend the runway length to 4,000 feet in the future if air traffic warrants it. The airport would have a short, perpendicular taxiway leading from the runway to a small apron area, which may eventually contain a small passenger shelter building. The proposed airport site is being evaluated to allow for a future full-parallel taxiway, which will only be constructed if demand and safety conditions justify the additional construction expense. The runway, perpendicular taxiway, and apron would be surrounded by clear areas required for safety. An access road would be required for all three potential locations. The proposed access road would have a gravel surface and would be two lanes wide (one lane in each direction) with 9-foot-wide lanes and minimal shoulders.

The noise measurements were collected at three sites within the study area, as well as at one site in Angoon to capture both existing aircraft noise events and ambient noise data. One of the noise measurement sites was located in the vicinity of the DOT&PF's proposed airport site (Airport Alternative 3a), which is a modification of the proposed site defined in the *Angoon Airport Master Plan* (DOT&PF 2007) and which the DOT&PF adopted as their proposed action for the purpose of the EIS. Two additional measurements sites were located at Airport Alternative 4 and Airport Alternative 12a. See Figure 1 for the locations of the noise measurement stations. The results of the existing conditions noise analysis reported herein include a description of both cumulative and single event metrics, as well as correlation of actual aircraft events with single event noise data.

2.0 EXISTING CONDITIONS

Angoon is located in the Southeast Region of Alaska on Admiralty Island, near the midway point between Sitka and Juneau. Angoon has no road connections to any other communities within the region. Existing transportation consists of the Alaska Marine Highway System; private boat traffic; and scheduled, charter, and private floatplane service to Favorite Bay and other nearby water bodies within the National Forest Wilderness.

Scheduled air transportation services to Angoon are currently provided by Alaska Seaplane Service, which operates two or three scheduled daily flights to and from Juneau, depending on the season, from the seaplane terminal located in Favorite Bay. In addition to the scheduled seaplane service, there is also on-demand charter seaplane service provided on a seasonal basis as well as private planes. The scheduled and charter aircraft that serve Angoon are propeller-driven, single-engine piston aircraft. Alaska Seaplane Services operates the Cessna 180, which is capable of seating up to four passengers and cargo, and the DeHavilland Beaver aircraft, which can seat up to eight passengers and cargo, depending on the configuration.

Due to the orientation of Favorite Bay, the proximity of rocks to the seaplane lane, and the absence of a landing light system in the waterway, existing seaplane operations are limited to daylight hours and favorable weather conditions.

Existing noise conditions were assessed by conducting noise measurements at four sites: one in Angoon and three other sites at alternative airport locations within the study area. Descriptions of each of the sites are contained in section 6.1 of this document and depicted in Figure 1. The City site recorded typical community noise levels, including nearby car traffic. The City site was also able to measure noise events from seaplane activity in Favorite Bay. Typical city noise levels were measured between 60 and 70 decibels (dB), equivalent to the sound levels generated by low levels of passenger vehicle traffic.

Each of the other three noise measurement sites were located in forested areas, on either U.S. Forest Service land within the Admiralty Island National Monument and Kootznoowoo Wilderness Area (the Monument–Wilderness Area), or on Kootznoowoo Incorporated land on the peninsula on which the community of Angoon is located. The three noise measurement sites located within the study area were located in areas with low ambient noise levels, well below typical noise thresholds in urban, developed areas. Ambient noise levels in undeveloped areas are usually 25–40 dB, equivalent to quiet bird calls and areas with no man-made development. At the three sites, any audible or observed aircraft noise activity was typically from either float planes traveling to or from Angoon and transient aircraft overflying the area in route to other locations.

3.0 CHARACTERISTICS OF SOUND

Sound is technically described in terms of sound pressure (amplitude) and frequency (similar to pitch). Sound pressure is a direct measure of the magnitude of a sound without consideration for other factors that may influence its perception by humans. The range of sound pressures that occur in the environment is so large that it is convenient to express them on a logarithmic scale. The standard unit of measurement for sound pressure is the decibel (dB). Decibels represent the ratio of two quantities, one being the sound level that is measured and the other being a reference sound level corresponding approximately to the faintest sounds detectable by the human ear. The greater the sound level measured in dB, the louder is the sound.

On the logarithmic scale, a sound level of 70 dB has 10 times as much acoustic energy as a level of 60 dB, while a sound level of 80 dB has 100 times as much acoustic energy as 60 dB. This differs from the human perception to noise, which typically judges a sound 10 dB higher than another to be twice as loud, 20 dB higher to be four times as loud, and so forth.

The concept of change in sound levels is related to the reaction of the human ear to sound. The human ear detects relative differences between sound levels better than absolute values of levels. Under controlled laboratory conditions, a human listening to a steady unwavering pure tone sound can barely detect a change of approximately 1 dB for sound levels in the mid-frequency region. However, when ordinary noises are heard, a young healthy ear can only detect changes of 2–3 dBs. A 5-dB change is noticeable while a 10-dB change is judged by the majority of people as a doubling effect of the sound. Therefore, it is typical in environmental noise studies to consider a 3-dB change as potentially discernible.

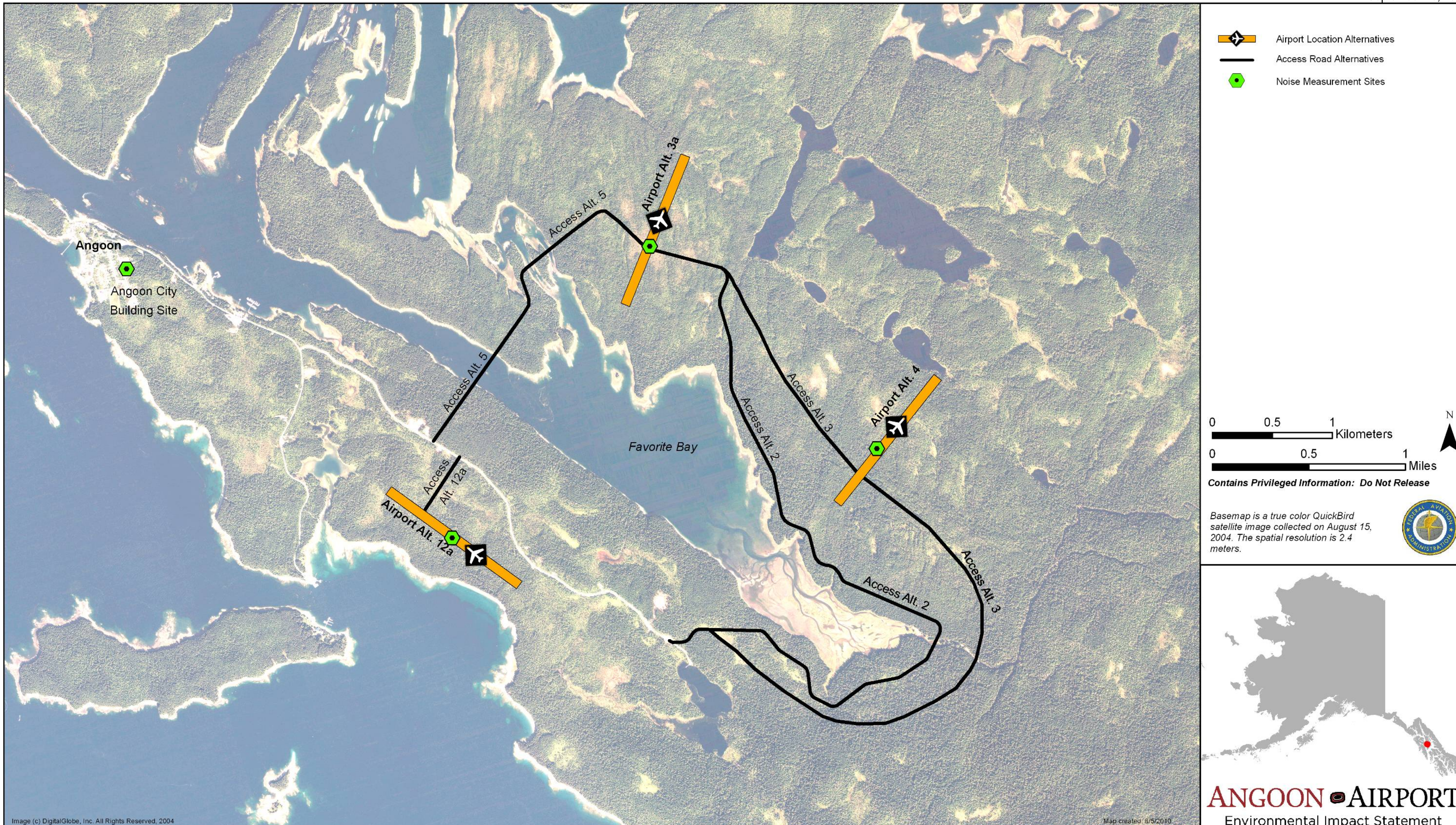

Figure 1. Noise measurement sites. *Note*: Access Alternative 5 was studied and is shown on this map, but it was subsequently dropped from consideration in the EIS. Symbols for airport alternatives represent locations only and not final areas of disturbance.

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Many factors influence how a sound is perceived and whether or not it is considered annoying to the listener. This includes not only physical characteristics of the sound but also secondary influences such as sociological and external factors. The “Handbook of Noise Control” describes human response to sound in terms of both acoustic and non-acoustic factors (Harris 1979).

Sound rating scales are developed to account for how humans respond to sound and how sounds are perceived in the community. Many non-acoustic parameters affect individual response to noise. Background sound, which is an additional acoustic factor, is important in describing sound in rural settings. Fields, in his analysis of the effects of personal and situational variables on noise annoyance, identifies an association between reported annoyance and fear of an accident (Fields 1992). In particular, Fields states that there is firm evidence that aircraft noise annoyance is associated with: (1) the fear of an aircraft crashing or of danger from nearby surface transportation; (2) the belief that aircraft noise could be prevented or reduced by pilots or authorities related to airlines; and (3) an expressed sensitivity to noise generally. Therefore, it is important to recognize that such non-acoustic factors contribute to human response to noise.

4.0 EFFECTS OF NOISE

Noise is often described as unwanted sound and is known to have several adverse effects on people. From these effects, criteria have been established to help protect the public health and safety and prevent disruption of certain human activities. These criteria are based on effects of noise such as hearing loss (not a factor with typical community noise), communication interference, sleep interference, physiological responses, and annoyance. Each of these potential noise impacts is briefly discussed in the following narrative.

Hearing loss is generally not a concern in community/aircraft noise situations, even when close to a major airport or a freeway. The potential for noise-induced hearing loss is more commonly associated with occupational noise exposures in heavy industry; very noisy work environments with long-term, sometimes close-proximity exposure; or certain very loud recreational activities such as target shooting and motorcycle or car racing. In order to prevent hearing loss, the Occupational Safety and Health Administration (OSHA) identifies a noise exposure limit of 90 dBA (A-weighted frequency level) for eight hours per day (higher limits are allowed for shorter duration exposures). Noise levels in neighborhoods, even in very noisy neighborhoods, do not exceed this standard and are not sufficiently loud to cause hearing loss.

Communication interference is one of the primary concerns with aircraft noise. Communication interference includes interference with hearing, speech, or other forms of communication, such as watching television and talking on the telephone. Normal conversational speech produces sound levels in the range of 60–65 dBA and any noise in this range or louder may interfere with the ability of another individual to hear or understand what is spoken. There are specific methods for describing speech interference as a function of the distance between speaker, listener and voice level.

Sleep interference, particularly during nighttime hours, is one of the major causes of annoyance due to noise. Noise may make it difficult to fall asleep, create momentary disturbances of natural sleep patterns by causing shifts from deep to lighter stages and may cause awakenings that a person may not be able to recall.

Annoyance is the most difficult of all noise responses to describe. Annoyance is an individual characteristic and can vary widely from person to person. What one person considers tolerable may be unbearable to another of equal hearing capability. The level of annoyance also depends on the characteristics of the noise (i.e., loudness, frequency, time, and duration) and how much activity interference (e.g., speech interference and sleep interference) results from the noise. However, the level of annoyance is also a function of the attitude of the receiver. Personal sensitivity to noise varies widely. Table 1 lists some typical events and their corresponding sound levels for reference.

Table 1. Typical Sound Levels of Common Occurrences

Event	Sound Level in dBA
Rock band (indoors)	108–114
Food blender	88
Vacuum cleaner	70
Conversation (indoors)	60
Dishwasher on rinse cycle at 10 feet	60
Bird calls (outdoors)	44

Source: Federal Interagency Committee on Noise 1992

It is important to note that while the overall Angoon area is generally relatively quiet, periodic aircraft noise is both typical and expected by residents and users of the area. The degree to which such sounds affect people or cause annoyance is a factor of the amplitude, pitch, and duration of the sound and an individual's sensitivity to and feelings about the source of the sound. In many rural Alaska communities, residents associate aircraft noise with important economic, social, and medical transportation as well as with the arrival of supplies and mail. In such communities, tolerance for such noise is often higher than in communities less dependent on air travel for basic goods and services.

5.0 BACKGROUND ON NOISE METRICS

Various rating scales have been devised to approximate the human subjective assessment of "loudness" or "noisiness" of a sound. Noise metrics can be categorized as single event metrics and cumulative metrics. Single event metrics describe the noise from individual events, such as an aircraft flyover or car horn. Cumulative metrics describe the noise in terms of the total noise exposure throughout the day. In accordance with federal requirements, the EIS will focus on cumulative metrics, using the Day-Night Average Level (DNL) metric.

The DNL is a 24-hour average that includes a sound weighting for noise at night and is the required metric used by the FAA in National Environmental Policy Act (NEPA) environmental evaluations. In 1981 the FAA formally adopted the DNL as its primary metric to evaluate cumulative noise effects due to aviation activities. Past and present research by the Federal Interagency Committee on Noise (FICON) verified that the DNL metric provides an excellent correlation between the noise level an aircraft generates and community annoyance to that noise level. The DNL is the 24-hour average sound level in dB. This average is derived from all aircraft operations during a 24-hour period that represents an airport's average annual operational day. It is important to note that due to the logarithmic nature of noise, the loudest noise levels control the 24-hour average; and the DNL adds a 10 dB noise penalty to each aircraft operation occurring during nighttime hours (10 p.m. to 7 a.m.) to compensate for people's heightened sensitivity to noise during this period.

The DNL metric may not be the ideal measure in all applications, but the 24-hour DNL metric can be a useful noise descriptor in many settings. For example, because it has a nighttime penalty weighting, the DNL metric can be an effective means of evaluating aircraft noise disturbances at night when human activity and ambient sound levels are generally lower.

In addition to the FAA-required use of the DNL to determine noise exposure, single event metrics were also analyzed for each measurement site. Typically, in areas that have quiet ambient levels or that have a small number of aircraft operations, analyzing single event metrics aids in understanding noise exposure in the area. For this technical report, findings from the noise measurement survey are presented using the following metrics.

5.1 Single Event Metrics

The following bullets describe the single event noise metrics used when evaluating data obtained from the four noise measurement sites. Single event metrics are a convenient method for describing noise from individual aircraft events.

- ***A-weighted Frequency Level (dBA*).** To simplify the measurement and computation of sound loudness levels, frequency weighted metrics have obtained wide acceptance. The dBA scale has become the most prominent of these scales and is widely used in community noise analysis. The metrics used in this study are all based upon the dBA scale.

- ***Maximum Noise Level (Lmax).*** The highest noise level reached during a noise event is called the Maximum Noise Level, or Lmax. For example, as an aircraft approaches, the sound of the aircraft begins to rise above ambient noise levels. The closer the aircraft gets, the louder it is until the aircraft is at its closest point directly overhead. As the aircraft passes, the noise level decreases until the sound level settles back to ambient levels. It is this metric (Lmax) to which people generally respond when an aircraft flyover occurs.

- ***Minimum Noise Level (Lmin).*** The Lmin is the lowest (quietest) dBA value.

- ***Sound Exposure Level (SEL*).** The duration of a noise event, or an aircraft flyover, is an important factor in assessing annoyance and is measured most typically as a SEL. The effective duration of a sound starts when a sound rises above the background sound level and ends when it drops back below the background level.

  A SEL is calculated by summing the dB level each second during a noise event and compressing that noise energy into one second. The SEL value is the integration of all the acoustic energy contained within the event. This metric takes into account the Lmax of the event and the duration of the event. For aircraft flyovers, the SEL value is numerically about 10 dBA higher than the maximum noise level.

5.2 Cumulative Metrics

Cumulative noise metrics have been developed to assess response to noise. They are useful because these scales attempt to include the loudness and duration of all noise, the total number of noise events, and the time of day and frequency which these events occur into one rating scale. While single event metrics describe one aircraft noise occurrence, cumulative metrics describe the noise resulting from multiple noise occurrences over a specified period of time.

- ***Equivalent Noise Level (LEQ).*** LEQ, often considered the average sound level, is the sound level corresponding to a steady-state A-weighted sound level containing the same total energy as a time-varying signal (noise that constantly changes over time) over a given sample period. LEQ is the "energy" average taken from the sum of all the sound that occurs during a certain time period; however, it is based on the observation that the potential for a noise to impact people is dependent on the total acoustical energy. LEQ can be measured for any time period.

- ***Time Above 65 (TA65).*** The FAA developed the Time Above metric as a second metric for assessing impacts of aircraft noise around airports. The Time Above metric refers to the total time in seconds or minutes that aircraft noise exceeds certain dBA noise levels in a 24-hour period. It is typically expressed as Time Above 65, 75, and 85 dBA sound levels, which can be used to illustrate various degrees of noise interference. The level TA65 dBA generally represents the time when noise is above the level at which outdoor speech interference starts to occur.

- **Percent Noise Levels (Ln)**. Ln is the noise level exceeded for specified percentages (n) of the time (e.g., L90 represents the sound level exceeded 90% of the time). The Ln metric is used in this study to identify the measured ambient sound levels. Ambient sounds are those that are typically related to the immediate surroundings of an area.

- ***Day-Night Average Level (DNL).*** The DNL describes noise experienced during an entire (24-hour) day. DNL calculations account for the SEL of aircraft and the number of aircraft operations, and include a penalty for nighttime operations. In the DNL scale, noise occurring between the hours of 10 p.m. and 7 a.m. is weighted by an additional 10 dB. This penalty was selected by the FAA to account for the higher sensitivity to noise in the nighttime and the expected further decrease in background noise levels that typically occur at night.

6.0 NOISE MEASUREMENT SURVEY

The noise measurement survey serves to:

- identify noise levels for individual aircraft operations, both on the ground and in the air, specific to the local Angoon seaplane environment and its unique conditions;

- identify the aircraft noise and ambient noise level at multiple locations around the project area using a variety of noise metrics; and

- give confidence in the accuracy of the DNL noise exposure contours that will be generated as part of the EIS.

The field noise measurement program conducted for this study included the use of portable noise measurement sites at four locations for seven days; the noise monitors recorded the one-second noise levels on a continuous basis and were later analyzed to compute other noise metrics. These noise metrics included DNL, 8-hour LEQ, single event SEL and Lmax, ambient descriptors (L1, L10, L50, L90, L99), and TA65 dBA.

6.1 Noise Measurement Locations

Noise measurements were conducted at selected locations within the study area. The noise measurement sites are presented in Figure 1. Table 2 lists the latitude and longitude of those locations where noise equipment was placed for measurement purposes. Airport Alternative 3a is the DOT&PF's proposed airport location for the purpose of the EIS. Airport Alternatives 4 and 12a are the proposed alternative airport locations being considered in the EIS. These three sites were located in a forest area, on lands managed by the U.S. Forest

Service within the Monument–Wilderness Area or on lands administered by Kootznoowoo Incorporated. The three noise measurement sites located near proposed airport locations were in areas with minimal existing exposure to aircraft noise, and each had low ambient noise levels.

The noise measurement site in Angoon (the City site) was located near a city building to capture the ambient noise levels in the city environment. The City site was located on land across from the city post office and emergency room, northwest of a small area of residential land use. At the City site and the three forest sites, analysts were able to record noise events from seaplane activity in Favorite Bay, correlating seaplane events with corresponding noise data.

Table 2. Noise Measurement Sites

Site	Latitude	Longitude
Airport Alternative 4	N57.47023	W134.48766
Airport Alternative 3a	N57.48984	W134.50975
Airport Alternative 12a	N57.47259	W134.54740
City site	N57.49951	W134.58073

6.2 Measurement Procedures

Noise measurements were conducted for this study between August 20 and August 27, 2009. Information was collected for a seven-day period at each of the noise measurement sites. The equipment was checked and calibrated on a regular basis throughout the measurement survey. The primary purpose of the noise measurements was to determine the ambient noise levels at each of the sites. Seven days of measurement information is sufficient because there is no existing ground based airport at Angoon and modeled noise levels for the proposed new airport will be considered in conjunction with the measured ambient noise levels.

The noise measurement survey used specialized monitoring instrumentation that allowed for the measurement of single event data and ambient noise levels. The data collected at each noise measurement site are listed below:

- Continuous one-second noise levels
- Single event data (SEL, Lmax, and duration) for aircraft and other noise events (when available)
- Hourly noise data (LEQ, Ln)
- DNL
- Correlation of noise data with aircraft identification (when available)
- TA65 dBA

The survey used software that provides continuous measurement and storage of the one-second LEQ noise level. From this data, the noise descriptors described above could be calculated. In addition, this data can be used to plot the time histories for noise events of interest. Time histories show how the sound level varies at a specific site by the second, minute, or hour of a day.

6.2.1 INSTRUMENTATION

The noise measurement program was consistent with state-of-the-art noise measurement procedures and equipment. The measurements consisted of measuring dBA in accordance with procedures and equipment that comply with specific International Standards of the International Electrotechnical Commission, and measurement standards established by the American National Standards Institute for Type 1 instrumentation, as specified in FAA guidance concerning such noise measurement programs. Measurements at these sites were conducted using a “01dB Solo” sound level meter. The analyzers within the 01dB Solo automatically calculate the various single event data. The 01dB Solo systems include software that provides data storage for later retrieval and analysis.

During the survey, the noise measurement instrumentation was calibrated at the start and end of each measurement cycle. This calibration was based on standards set by the National Institute of Standards and Technology, formerly the National Bureau of Standards.

6.3 Noise Measurement Data and Analysis Procedures

The following section outlines the methods used to measure and quantify existing noise levels from aircraft operations and from ambient noise level conditions. Measurement methodology and analysis techniques used in the study are also described.

6.3.1 CONTINUOUS MEASUREMENT OF THE NOISE

The methodology employed in this study used a data collection program that was designed to continuously measure and record the noise at each measurement location. An example of the time history of the continuous noise measured by each portable noise monitor is presented in Figure 2. This graph shows the continuous noise at one site for a 15-minute period. The red line on the graph denotes the LEQ for this 15-minute period, which is approximately 49 LEQ. Figure 2 shows five distinct events that rose above the ambient noise level. None of the events were generated by aircraft.

It is possible to see the duration of noise events and the time period of ambient noise in between the events. Since all of the noise data is collected during the measurements, it is possible to process the data and calculate different metrics of interest that may arise, including the aircraft single event noise event level, cumulative daily noise levels, time above levels, and the ambient levels. The parameters are adjustable and can be modified so that it is possible to recalculate noise events from raw data any time in the future.

6.3.2 CORRELATED FIELD OBSERVATIONS

During the noise measurements, consultant staff maintained logs of aircraft events at the seaplane dock in Favorite Bay. Over the seven-day measurement period during times when not in the field maintaining the monitors, the acoustic engineers observed approximately 20 seaplane operations on Favorite Bay. This was not a complete list of all seaplane operations, rather those that were observed arriving at and departing the floatplane dock by the acoustic engineers between field activities during the measurement period. Additional seaplane operations occurred that were not logged. Of the logged operations, post-measurement analysis was able to correlate specific seaplane events with measured noise data from the monitors. When correlating aircraft events with the associated noise at the noise measurement site, it is important to be able to precisely note the time of the aircraft event so as to avoid any erroneous correlation of non-aircraft events with aircraft noise.

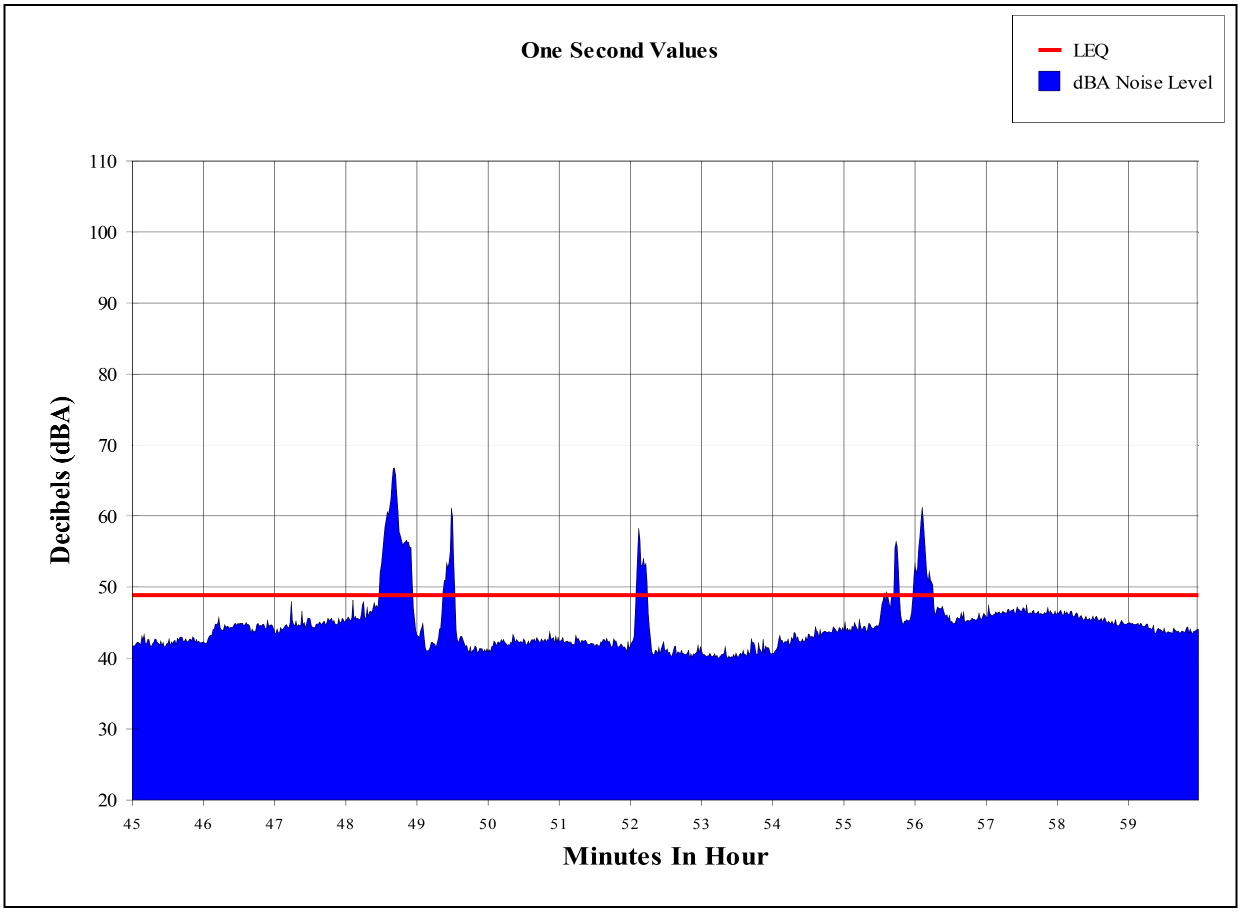

Figure 2. Sample time history noise plot of aircraft and ambient noise, City site.

Correlated noise events are shown on the next two pages in Figures 3 and 4 through the use of graphs depicting dBA noise levels over a period of time. Figures 3 and 4 show an example of one seaplane aircraft event that was correlated at two of the noise measurement sites (at Airport Alternative Sites 3a and 12a). The aircraft first passed by Airport Alternative 3a at 8:20 am, then passed over Airport Alternative 12a at 8:21 am. The SEL for Airport Alternative Site 3a is 74.1 dBA, while the Lmax is 63.1 dBA. The SEL for site Airport Alternative Site 12a is 77.9 dBA, while the Lmax is 77.9 dBA. Because flight tracking radar is unavailable for the Angoon area, the path of the flight in relation to the noise measurement locations cannot be determined. Although, based on the recorded noise levels, it appears that this specific aircraft flew closer to Airport Alternative site 12a than Airport Alternative site 3a, because higher noise levels were recorded at Airport Alternative site 12a.

6.3.3 Ambient or Background Sound Levels

The ambient sound level at each site was identified based on information from the noise survey. The information helps identify the ambient noise environment and aids in assessing how intrusive additional aircraft noise would be at a particular location. For Angoon Airport EIS, the ambient sound levels determine the existing noise environment prior to building an airport in the project area. In Angoon, ambient sound levels include existing aircraft over-flight and seaplane operations, which are a common (i.e., multiple times each day) occurrence in Favorite Bay and the Monument–Wilderness Area.

The results of the ambient noise measurement data at each measurement site are described in the following table. Table 3 presents a summary of the ambient measurements for all of the sites, which includes over-flight and seaplane operations. This table presents the Ln noise level for the Lmin, L90, L50, L10, and Lmax. The Lmax is presented for the peak dBA value that was measured while the Lmin is the lowest (quietest) dBA value that was measured. This table illustrates the range in noise levels at each site during the measurement period. Typically, L50 represents the median or ambient noise level. The ambient levels range between 29 dBA and 36 dBA, and are shown using Ln.

Table 3. Ambient Measurement Results (dBA)

Site	Statistical Noise Levels (dBA)				
	Max	L10	L50	L90	Min
Airport Alternative 4	75	34	29	27	19
Airport Alternative 3a	71	30	25	23	19
Airport Alternative 12a	82	38	35	33	19
City site	82	43	36	33	27

6.3.4 HOURLY AND DAILY NOISE LEVELS

Hourly and daily noise level data were recorded for each of the measurement locations. Hourly values include the 24-hour LEQ, nighttime LEQ, daytime LEQ, and school hours LEQ. Table 4 presents data for background and aircraft noise together. As expected and shown in Table 4, the City site showed the highest noise levels because of roadway traffic and other human activity, with a daily DNL of 48.5, which included existing aircraft events. During the day, the average noise level was higher, because of the location of the noise monitor next to a roadway and near a city building.

Table 4. Hourly and Daily Total Values, LEQ and DNL (dBA)

Site	24 Hr LEQ	Nighttime LEQ	Daytime LEQ	School Hours LEQ	Daily DNL
		10 pm–7 am	7 am–10 pm	8 am–4 pm	
Airport Alternative 4	37.3	34.2	38.4	40.4	41.5
Airport Alternative 3a	33.9	29.6	35.3	36.8	37.8
Airport Alternative 12a	42.5	40.0	43.5	45.3	47.7
City site	47.0	39.0	48.7	50.3	48.5

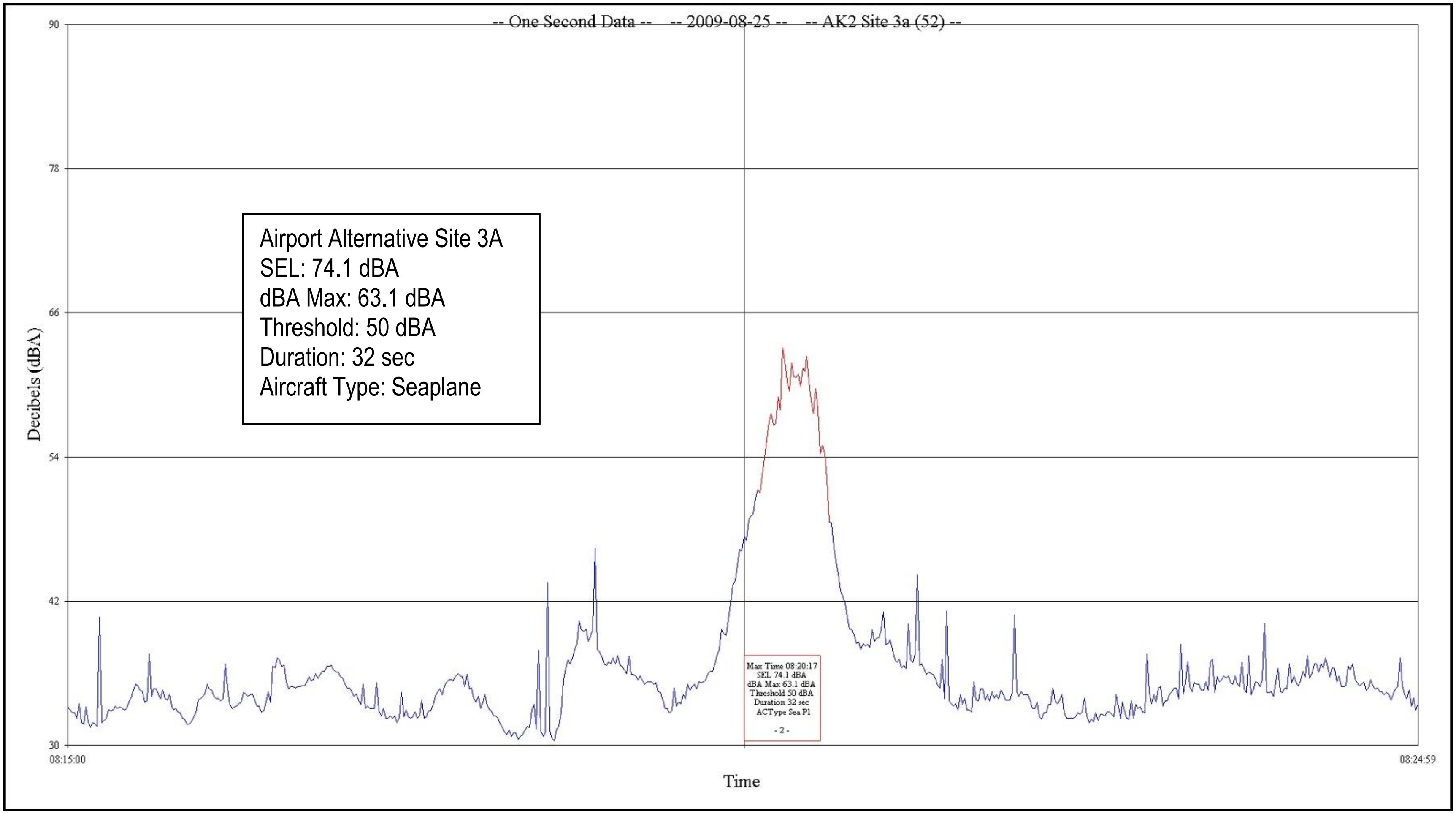

Figure 3. Aircraft noise event correlation at Airport Alternative 3a and Airport Alternative 12a. (Airport Alternative 3a – 8:20 a.m.)

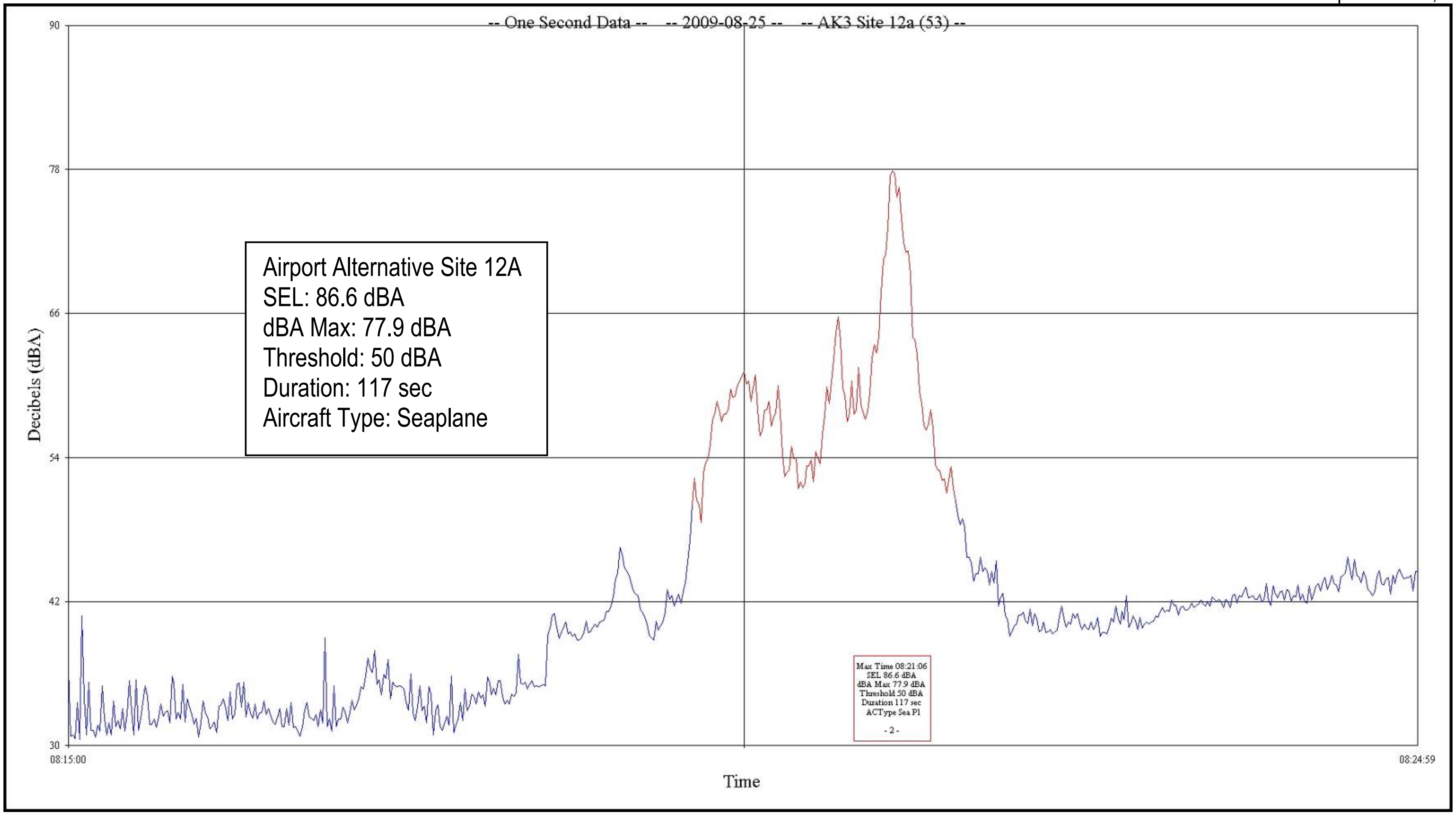

Figure 4. Aircraft noise event correlation at Airport Alternative 3a and Airport Alternative 12a. (Airport Alternative 12a – 8:21 a.m.)

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Acronyms

dB	Decibels
dBA	A-weighted Frequency Level
DNL	Day-Night Average Level
DOT&PF	Alaska Department of Transportation and Public Facilities
EIS	Environmental impact statement
FAA	Federal Aviation Administration
FICON	Federal Interagency Committee on Noise
L	Level
LEQ	Equivalent Noise Level
Lmax	Maximum Noise Level
Lmin	Minimum Noise Level
Ln	Percent Noise Levels
NEPA	National Environmental Policy Act
OSHA	Occupational Safety and Health Administration
SEL	Sound Exposure Level
TA65	Time Above 65