Appendix D

Noise Study

Noise Technical Study for Projected 2008 Operations at Talkeetna Airport

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This report describes the methods and data used to analyze the noise-related implications of proposed airport improvements at Talkeetna Airport (TKA) in Alaska for the year 2008. The findings of this analysis are intended for incorporation into an Environmental Assessment (EA) being prepared for the proposed project. This report addresses noise evaluation of the proposed action in year 2008. Existing noise conditions at TKA have previously been evaluated (CH2M HILL, 2002) and are therefore not included in this report.

Methodology

The accepted method for evaluation of aircraft noise exposure in the vicinity of civilian airports is the use of the Federal Aviation Administration (FAA) Integrated Noise Model (INM) computer program. This noise model accounts for noise effects of aircraft landings, takeoffs, and ground run-up operations based on an extensive database that has been developed from actual measurements.

The FAA's Office of Environment and Energy (AEE-100) has developed the INM for evaluating aircraft noise impacts in the vicinity of airports. INM has many analytical uses, such as assessing changes in noise impact resulting from new or extended runways or runway configurations, assessing new traffic demand and fleet mix, evaluating revised routing and airspace structures and assessing alternative flight profiles or modifications to other operational procedures.

The INM has been the FAA's standard tool since 1978 for determining the predicted noise impact in the vicinity of airports. Statutory requirements for INM use are defined in FAA Order 1050.1E, *Policies and Procedures for Considering Environmental Impacts*; Order 5050.4A, *Airport Environmental Handbook;* and FAR Part 150, *Airport Noise Compatibility Planning*.

The model utilizes flight track information, aircraft fleet mix, standard and user defined aircraft profiles and terrain as inputs. The INM model produces noise exposure contours that are used for land use compatibility maps. The INM program includes built in tools for comparing contours and utilities that facilitate easy export to commercial Geographic Information Systems.

For the purpose of evaluating potential aircraft flight noise effects at residential areas in Talkeetna, the INM Version 6.1 was used to evaluate noise impacts of forecast 2008 flight operations in terms of the Day-Night Level (DNL). In addition, to account for potential noise effects of aircraft taxiing operations at the proposed North Apron area, sample noise level measurement data from aircraft taxiing events at TKA, obtained in June 2002, were used to estimate the contribution of aircraft ground movements to overall noise exposure due to airport operations.

Noise Impact Criteria and Guidelines

The principal criterion used to determine the level of significance of noise exposure due to the proposed action at noise-sensitive areas, is defined by the FAA. The FAA has established a land-use compatibility criterion of a DNL of 65 dB. The FAA documents establishing this noise criterion include Order 1050.1E, *Policies and Procedures for Considering Environmental Impacts*; Order 5050.4A, *Airport Environmental Handbook*; and Federal Aviation Regulations (FAR) Part 150, *Airport Noise Compatibility Planning*.

DNL 65 dB is the threshold of incompatibility for residential and other noise-sensitive land uses, such as schools, hospitals, and religious facilities, located in the vicinity of civilian airports. According to FICON, if conditions pre-project are already 65 dB, then an impact is declared if there is an increase of over DNL 1.5dB. However, a number of other guidelines are included in this report to provide discussions of noise-related issues which are typically of potential concern to the public. Specifically, potential aircraft noise effects on outdoor speech communication are addressed through this evaluation.

DNL is the community noise metric recommended by the U.S. Environmental Protection Agency (EPA) and has been adopted by most federal agencies (Federal Interagency Committee on Noise [FICON], 1992). It has been well established that DNL correlates well with community response to noise (Schultz, 1978; Finegold, 1994). DNL is a noise index that accounts for the greater annoyance caused by noise during the nighttime hours (10 p.m. to 7 a.m.). DNL values are calculated by averaging the hourly L_{eq} for a 24-hour period after applying a 10-dB penalty to nighttime L_{eq} values. The 10-dB penalty reflects the increased sensitivity to noise during nighttime hours.

Aircraft Taxiing Noise Level Measurements

For the purpose of the TKA airport noise study, a noise measurement survey was conducted between June 25 and 27, 2002. The noise measurement program included continuous (24-hour) noise level measurements and aircraft single-event noise measurements conducted at various residential locations in Talkeetna.

In addition, single-event measurements of aircraft taxiing operations were performed at an on-airport location near the main taxiway and supplementary single-event measurements of aircraft flights were conducted at the Talkeetna town center. The community noise monitoring data, which include the aircraft flight noise data, were reported in the 2002 noise study (CH2M HILL, 2002).

The taxiing noise level measurements included the collection of passby noise level data at a distance of approximately 150 feet from the taxiway, in terms of the maximum noise level (L_{max}) and the sound exposure level (SEL). Table 1 summarizes the results of the aircraft

taxiing noise measurement data. The data are utilized to estimate aircraft ground noise exposure due to activities at the proposed North Apron for forecast 2008, in terms of both the DNL and single event noise levels.

TABLE 1
Summary of Aircraft Taxiing Noise Level Measurement Data at a distance of 150 feet from the source

Source Type	Number Sampled	L_{max}, dB Mean (Range)	SEL, dB Mean (Range)
Single-engine Propeller	8	65.1 (61-70)	77.5 (72-81)
Twin-engine Propeller	3	70.0 (67-75)	78.6 (76-80)

Source: CH2M HILL

L_{max} = Maximum noise level during the single aircraft noise event.

SEL = Sound exposure level, which is equivalent to the total acoustic energy produced by the single aircraft noise event.

Noise Impact Analysis

Generation of INM noise contours requires several pieces of information, including aircraft flight tracks and the number of operations by aircraft type assigned to the flight tracks on a daily basis. The goal of this study is to evaluate future (2008) community noise exposure at noise-sensitive areas in the vicinity of TKA.

For existing conditions, airport noise contours were generated for the annual average day and the peak-season day and documented in a previous noise study report (CH2M HILL, 2002). For future (2008) conditions, noise contours for peak-season day are developed under the Proposed Action, which includes the proposed North Apron and the Northeast Heliport Site.

Airport Flight Operations

Historical data related to specific flight tracks and the associated number of aircraft operations are not available because no such records are kept at the airport. To develop the flight tracks and operations numbers, CH2M HILL made a number of conservative yet realistic assumptions based on the existing available data, coupled with anecdotal information from a variety of sources. The worst case scenario was assumed. Peak season, the summer period, operations are assumed to form 80 percent of the total annual airport operations based upon tendency of high tourism volumes in Alaska and on data gathered in current airport air quality research being conducted by ADOT &PF (CH2MHILL, 2004). In addition, it was assumed that the fleet mix remains proportionately similar to existing operations. The existing flight tracks around TKA at the time of the field noise measurements (June 2002) are depicted in the 2002 noise study and shown again in this report (see Figure 1). These flight tracks are the basis for developing the airport noise contours.

2008 peak season flight operations data at TKA that are used for INM input, for both fixed-wing and helicopter activity, are summarized in Table 2.

TABLE 2
Peak Season Average Day Flight Operations Data Summary

	2000 (Part 135/GA)	2008 (Part 135/GA)
Fixed-wing departures per day		
South wind (Runway 18)	63.6 / 28.8	92.6 / 33.8
North wind (Runway 36)	7.1 / 3.2	10.3 / 3.8
Helicopter departures per day		
Military helicopter	2.8	2.8
Civil helicopter	12	17

Source: CH2M HILL , 2005

Assumption: Peak season operations are assumed to form 80% of the total annual airport operations based upon tendency of high tourism volumes in Alaska and current air quality research being conducted by ADOT &PF (CH2MHILL, 2004).

Table 3 summarizes fleet mix information for both fixed-wing aircraft and helicopters that are used in the noise model. The future fleet mix is assumed to be identical to existing fleet mix based on the aviation forecast prepared for TKA..

TABLE 3
Fleet Mix Information Summary

Fixed-Wing	Fixed-Pitch	Variable-Pitch	Twin-Engine
Part 135	22 Percent	67 Percent	11 Percent
General aviation	86 Percent	14 Percent	0 Percent
Helicopter	**Eurocopter 315 Lama**	**Bell 206 Jet Ranger/Eurocopter 350 Astar**	**CH-47 Chinook**
Military	0 Percent	0 Percent	100 Percent
Civil	50 Percent	50 Percent	0 Percent

Future (2008) Noise Exposure

Future (2008) noise exposure in the vicinity of TKA was evaluated for the Proposed Action and the No Action Alternatives.

No Action

Under the future (2008) No Action scenario, future daily airport flight operations during the peak season would be reflective to those listed in Table 2 and the airfield landing

configuration would remain as it currently is. DNL contours were developed for 2008 peak-season average day using the INM. Figure 1 shows the peak-season average day DNL contours for the 2008 No Action conditions.

The contours for the No Action Alterntive depicted in Figure 1 show that the only noise-sensitive areas where the DNL 65-dB noise level would be exceeded are limited areas of two developed residential lots within the Denali Subdivision. The noise contours depict southbound directional take-offs and landing.

Proposed Action

The future (2008) Proposed Action conditions, daily airport flight operations are assumed to be the same forecast as the No Ac tion listed in Table 2. The only change in the operational patterns is the the proposed new heliport positioned on the north east end of the main runway and the proposed North Apron constructed (see Figure 2).

DNL contours were developed for 2008 peak-season average day under the Proposed Action, using the INM and combining the aircraft ground noise levels with the flight noise exposure contours. Figure 2 shows the 2008 peak-season average day noise contours for the Proposed Action. In comparing the two figures, there is a slightly larger contour reflecting added taxi ways into the new aircraft apron and a new set of contours surrounding the heliport.

As with the No Action Alternative, the only noise-sensitive areas where the DNL 65-dB noise level would be exceeded within limited portions of the same two residential parcels adjacent to the airport. The forecast noise contour does not reveal a change in noise level at these two residential lots. Noise due to aircraft ground movements to and from the proposed north apron would not affect noise exposure within residential parcels in close proximity to the north apron. Furthermore, based on the data presented in Table 1, single noise events due to aircraft taxiing operations would not be expected to interfere with speech communication at exterior areas of nearby residences. The nearest residential parcels are approximately 400 to 500 feet away from the closest aircraft parking locations. At such distances, maximum noise levels from individual aircraft taxiing in and near the North Apron would be below 60 dBA. There is a slight increase of noise over the No Action Alternative because the taxiing routes are closer to the residences, however the noise levels do not exceed thresholds.

References

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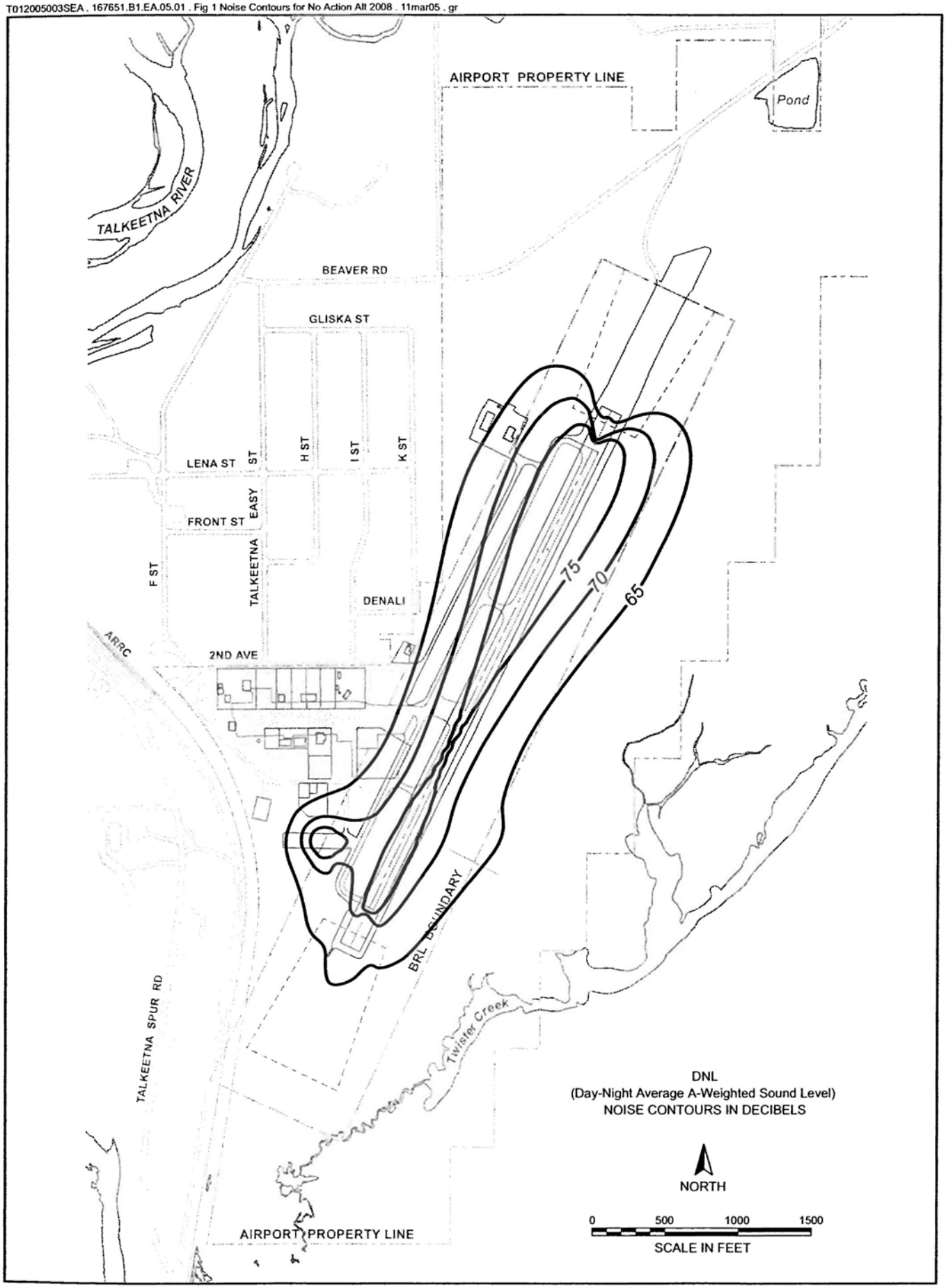
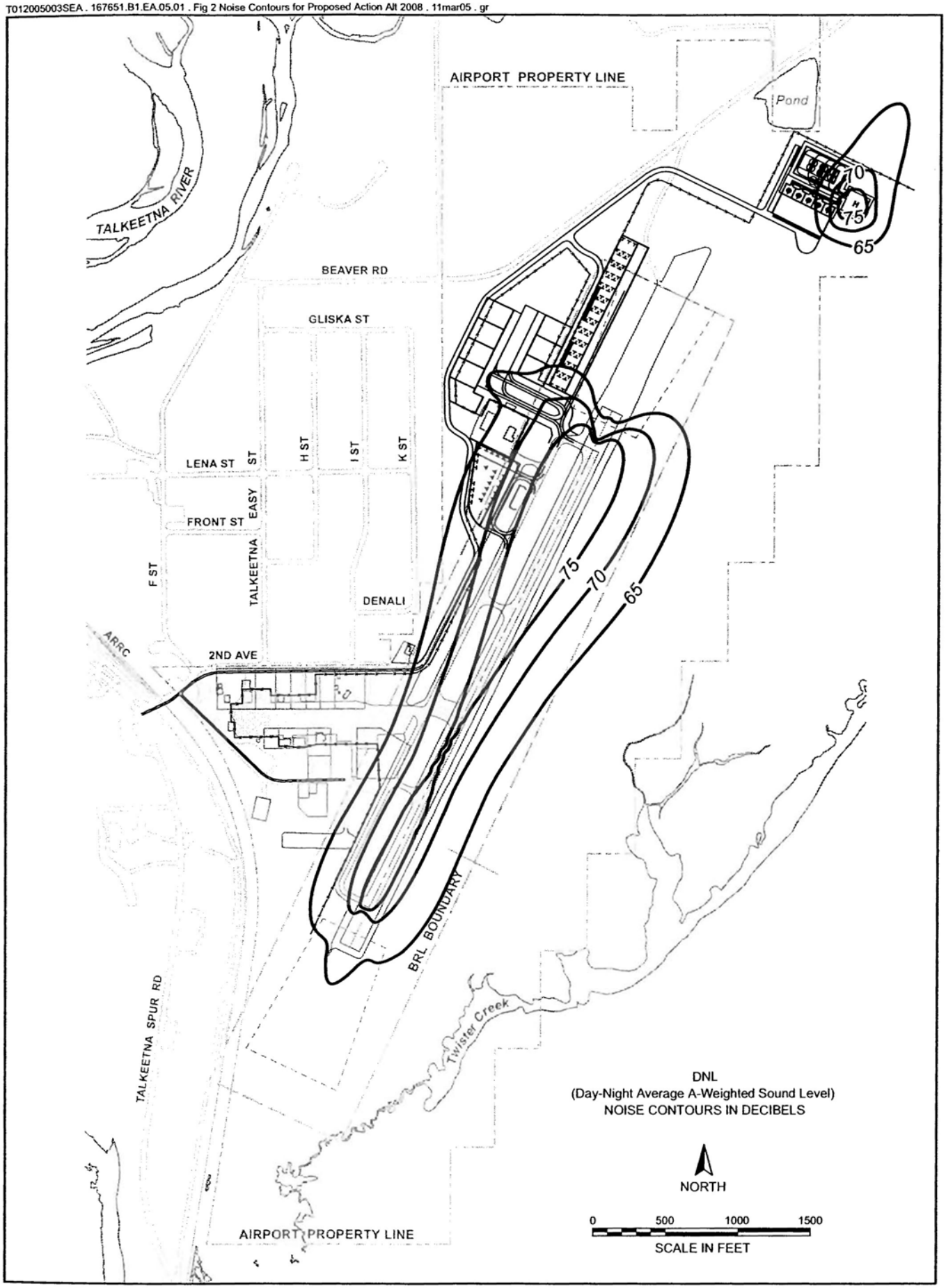
T012005003SEA . 167651.B1.EA.05.01 . Fig 1 Noise Contours for No Action Alt 2008 . 11mar05 . gr



Talkeetna Airport Improvements, Phase II
Environmental Assessment

Figure 1
Noise Contours for the No Action Alternative in 2008

T012005003SEA . 167651.B1.EA.05.01 . Fig 2 Noise Contours for Proposed Action Alt 2008 . 11mar05 . gr



Talkeetna Airport Improvements, Phase II
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Figure 2
Noise Contours for the Proposed Action Alternative in 2008