To: CHRIS POMEROY, FRIEDMAN MEMORIAL AIRPORT

From: Chris Sandfoss

Cc: Rob Adams

Date: 3/1/2017

Re: SUN Noise Modeling Methodology and Preliminary Results

This memo summarizes the basic input data for, and the preliminary results of, the noise modeling of existing (2017) baseline conditions at Friedman Memorial Airport (SUN). Noise contours have been be prepared using the AEDT at levels of DNL 65, 70, and 75. The following sections describe the input data and results of the noise contour modeling.

NOISE MODELING METHODOLOGY

Number of Operations and Fleet Mix: The number of annual operations that were modeled for the existing (2017) conditions at SUN is based on a variety of sources, including ATCT operations counts, Airport landing fee reports, and FAA Aviation System Performance Metrics (ASPM) databases. There were 25,316 total operations at SUN from January 2016 through December 2016, which corresponds to 69.4 average-annual day operations. **Table 1** provides a summary of the average daily operations and fleet mix at SUN, organized by aircraft type, operation type, and time of day. Several aircraft types use the same FAA-approved substitute in the noise database of the AEDT as indicated by the noise model ID in Table 1.

Daytime/Nighttime Operations: Data on the ratio of daytime to nighttime operations is based on data from the Draft Environmental Impact Statement (DEIS) and data from FMAA staff. Approximately 98 percent of all operations occur during the daytime (7:00 am to 9:59 pm) and 2 percent of all operations occur during the nighttime (10:00 pm to 6:59 am). Therefore, this overall ratio was modeled for the existing (2017) baseline conditions at SUN.

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Table 1
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT
Friedman Memorial Airport

Aircraft Type(s)	Noise Model ID	Average-Annual Day Operations
Regional Jets		
Canadair CRJ-700	CRJ701	7.9
Subtotal		*7.9*
General Aviation Jets		
Cessna Citation CIT 3	CIT3	2.1
Falcon 2000 / Gulfstream G200	CL600	2.8
BD-100 Challenger 300/350	CL601	5.3
Cessna Citation CJ1/CJ2	CNA500	2.4
Cessna Mustang Model 510	CNA510	0.4
Cessna Citation CJ4 525C	CNA525C	0.7
Cessna 550 Citation Bravo	CNA55B	1.6
Cessna Citation Encore 560	CNA560E	1.9
Cessna Citation Ultra 560	CNA560U	1.3
Cessna Citation Excel 560	CNA560XL	4.6
Cessna Citation Sovereign 680	CNA680	1.8
Cessna Citation X	CNA750	2.3
Embraer Legacy	EMB145	3.1
Falcon 50 / 7X / 900	F10062	0.8
Gulfstream GIV-SP	GIV	1.0
Gulfstream GV / Bombardier Global Express	GV	3.5
IAI Westwind 1125	IA1125	0.8
Lear 35 / Falcon 10 / Hawker -700, -800, -900	LEAR35	6.1
Beechcraft Beechjet 400	MU3001	1.9
Subtotal		*44.4*
Props		
Beechcraft Baron 58 / Cessna 414	BEC58P	0.6
Cessna 172 Skyhawk	CNA172	1.2
Cessna 208 Caravan / Pilatus PC-12	CNA208	5.2
Cessna 441 Conquest / Beech King Air 300/350	CNA441	3.6
Fairchild Swearingen Metroliner II	DHC6	0.2
Bombardier DASH 8	DHC830	2.1
Dornier 228-100 / Beech Super King Air	DO228	1.6
Piper PA-46 Malibu / Rockwell Commander	GASEPV	1.2
Piper PA-31 Navajo	PA31	0.2
Piaggio P-180	SD330	0.6
Subtotal		*16.5*

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Table 1, *(continued)*
DISTRIBUTION OF AVERAGE DAILY OPERATIONS BY AIRCRAFT
Friedman Memorial Airport

Aircraft Type(s)	Noise Model ID	Average-Annual Day Operations
Helicopters		
Agusta A-109	A109	0.1
Bell 222	B222	0.1
Eurocopter EC-130	EC130	0.3
Subtotal		*0.5*
Grand Total		69.4

Runway End Utilization: Average-annual day runway end utilization is based on data provided by FMAA staff. Data shows that approximately 95 percent of all aircraft arrive from the south, landing on Runway 31; and depart to the south, taking off from Runway 13. Approximately 5 percent of aircraft arrive from the north, landing on Runway 13 and depart to the north on Runway 31. Of this 5 percent, approximately 3 percent are single-engine prop aircraft and the other 2 percent are turboprops or general aviation jets. Arrivals to Runway 13 land with a 1,701 foot displaced threshold.

Flight Tracks: Flight tracks used for modeling the existing (2017 baseline conditions are shown in Exhibit 1, Exhibit 2, and Exhibit 3. Flight track locations and percent of use is based on a data from the DEIS, FAA published flight routes, and visual observation of flight track locations. Aircraft on approach to Runway 31 fly either a visual approach or an instrument approach. Exhibit 1 shows arrival flight tracks for both the visual and the instrument approaches. For noise modeling, it is assumed that 99 percent of commercial regional jet arrivals, 50 percent of general aviation jet arrivals, and 25 percent of prop aircraft arrivals follow one of the instrument approach routes.

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NOISE MODELING RESULTS

The noise modeling results are reported using the Day-Night Average Sound Level (DNL) metric. DNL is the metric approved by the FAA for environmental noise studies. The DNL metric describes the total noise exposure during a given 24-hour period, typically an average-annual day. In computing DNL, an extra weight of 10 dB is assigned to any sound levels occurring between the hours of 10:00 p.m. and 7:00 a.m. This is intended to account for the greater annoyance that nighttime noise is presumed to cause for most people. Due to the logarithmic nature of the decibel scale, this extra weight treats one nighttime noise event as equivalent to 10 daytime events of the same magnitude.

Existing (2017) Baseline Noise Contour: The Existing (2017) Baseline noise contour represents current conditions at SUN. The 65 DNL of the Existing (2017) Baseline noise contour is shown on **Exhibit 4**. The shape of the noise contour reflects the predominant runway use patterns at SUN in which aircraft primarily arrive from the south and depart to the south. Therefore, the noise contour shape comes to a point on the south end due to the influence of noise levels from aircraft arrivals on a straight-in approach. The noise contour on the north end expands outward due to the engine noise from aircraft starting their departure roll.

The 65 DNL noise contour primarily remains over Airport property. On the north side, the noise contour extends outward beyond airport property; however, it remains over commercial and undeveloped property.

Existing (2017) Baseline Grid Point Noise Analysis: In addition to noise contours, noise levels were calculated in the vicinity of SUN at specific grid point locations. Regularly-spaced grid points were created in the noise model and noise levels were calculated at each of the grid points using the DNL metric. **Exhibit 5** shows the grid point locations and the DNL range of each grid point at five-decibel intervals.

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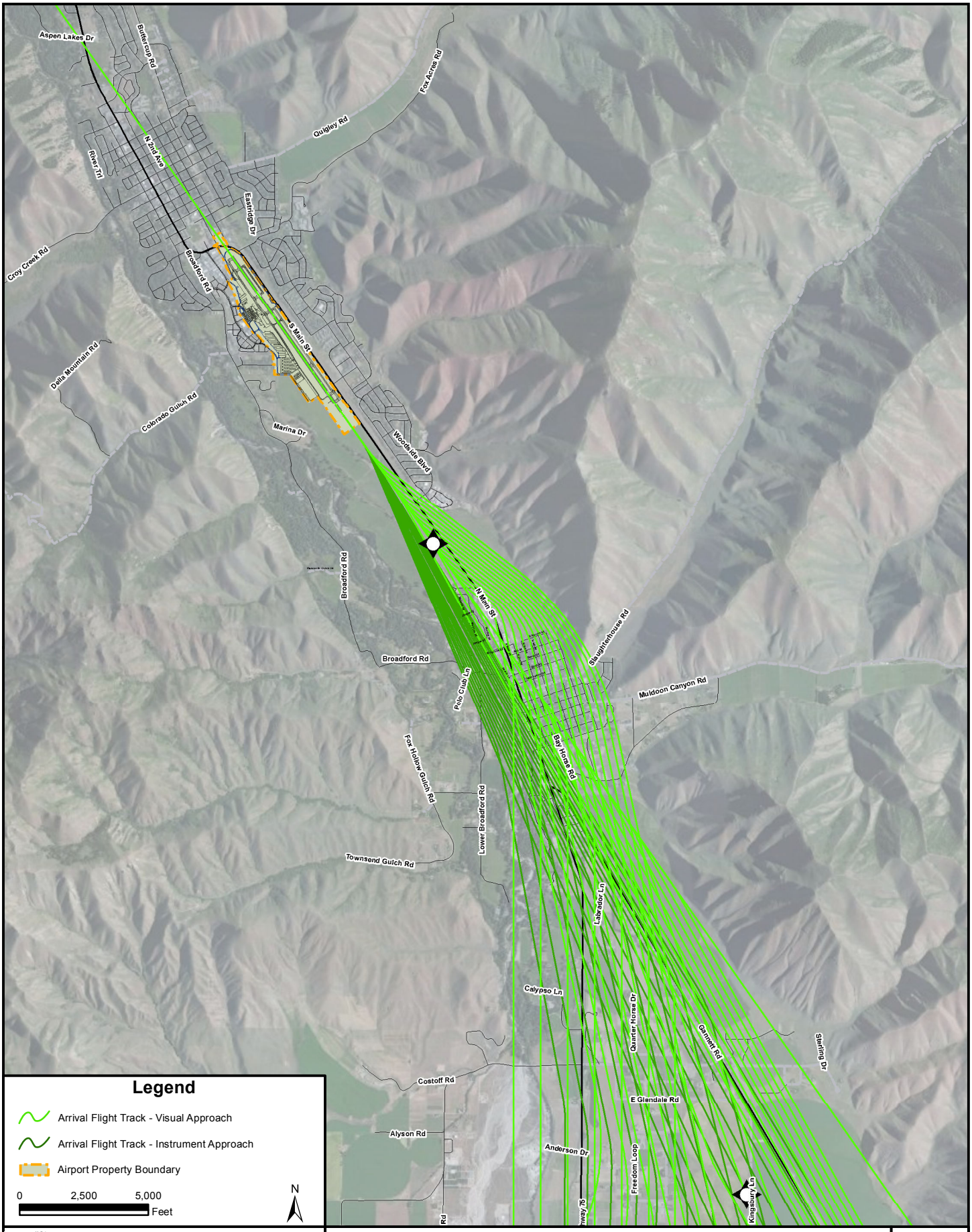

Noise Analysis
Friedman Memorial Airport

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Modeled Arrival Flight Tracks

EXHIBIT: 1

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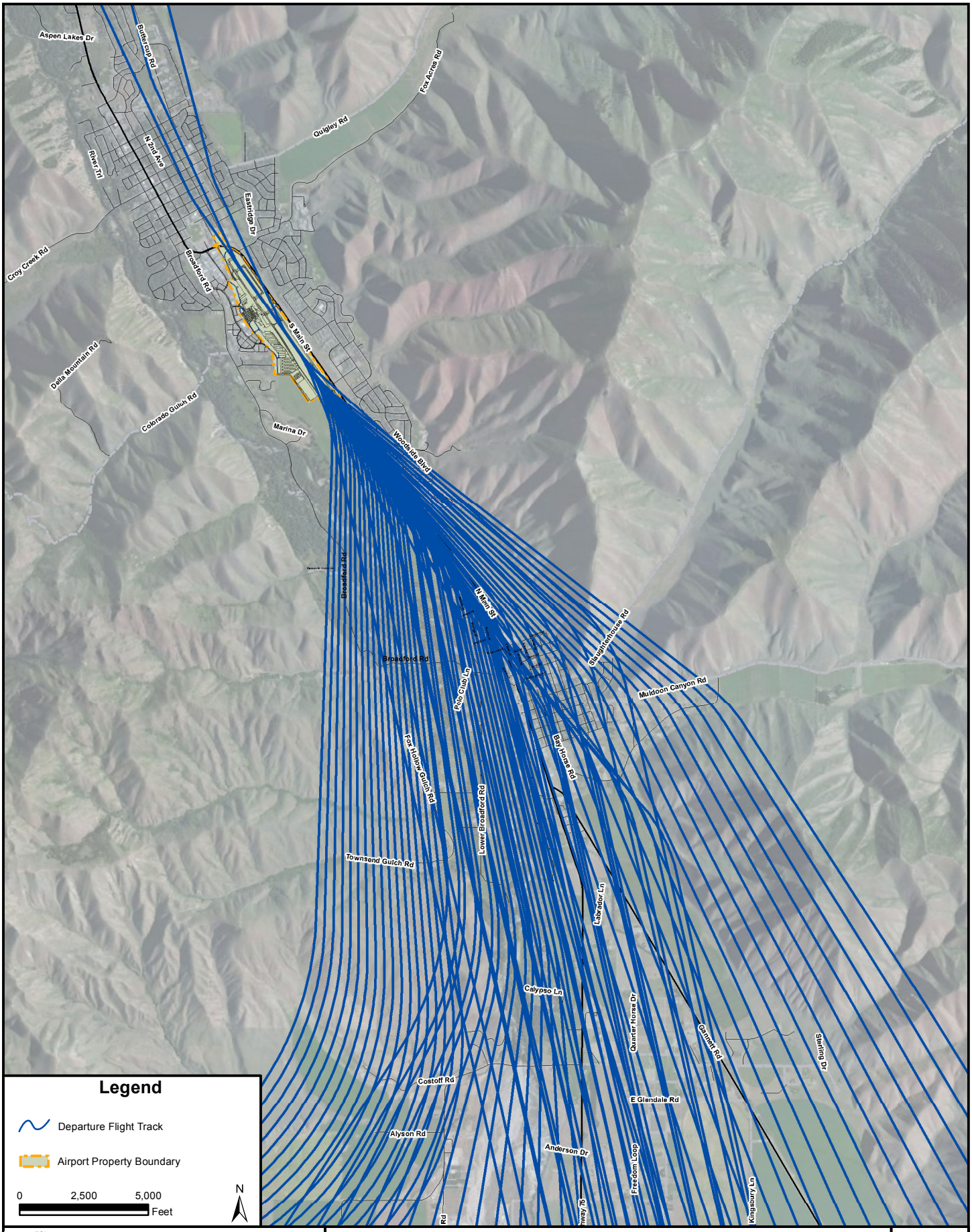

Noise Analysis
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Modeled Departure Flight Tracks

EXHIBIT: 2

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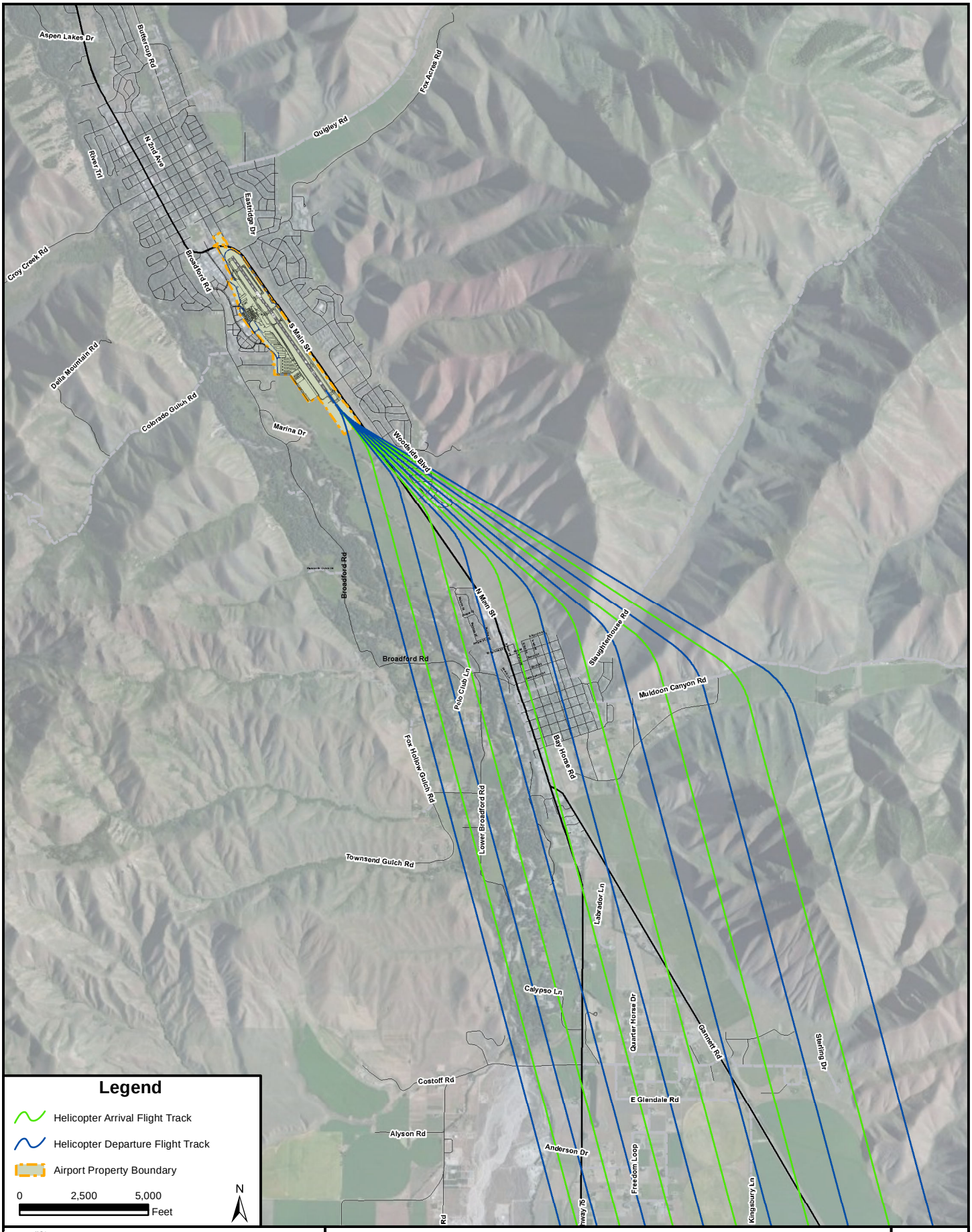

Noise Analysis
Friedman Memorial Airport

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Modeled Helicopter Flight Tracks

EXHIBIT: 3

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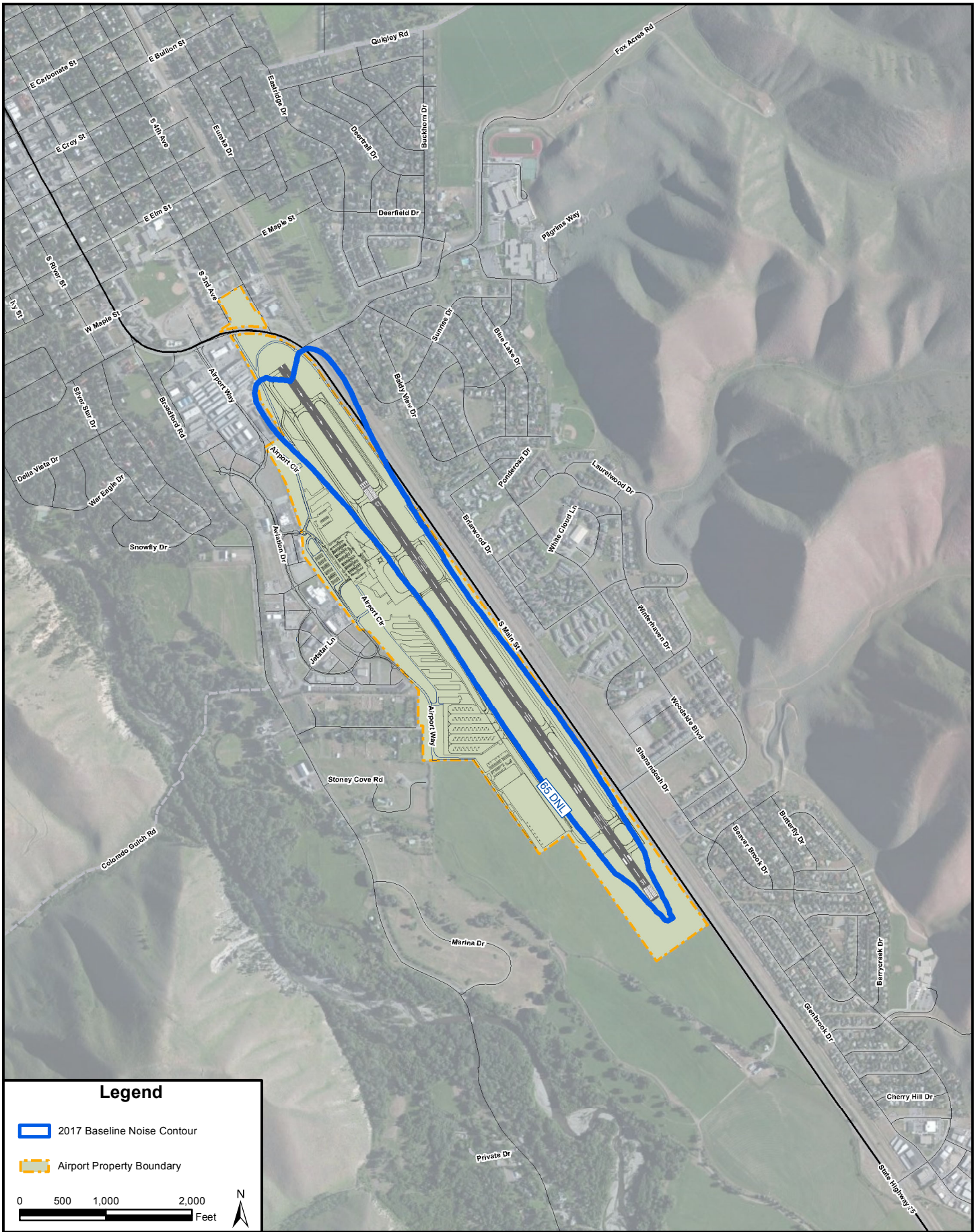

Noise Analysis
Friedman Memorial Airport

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Existing (2017) Baseline Noise Contour

EXHIBIT: 4

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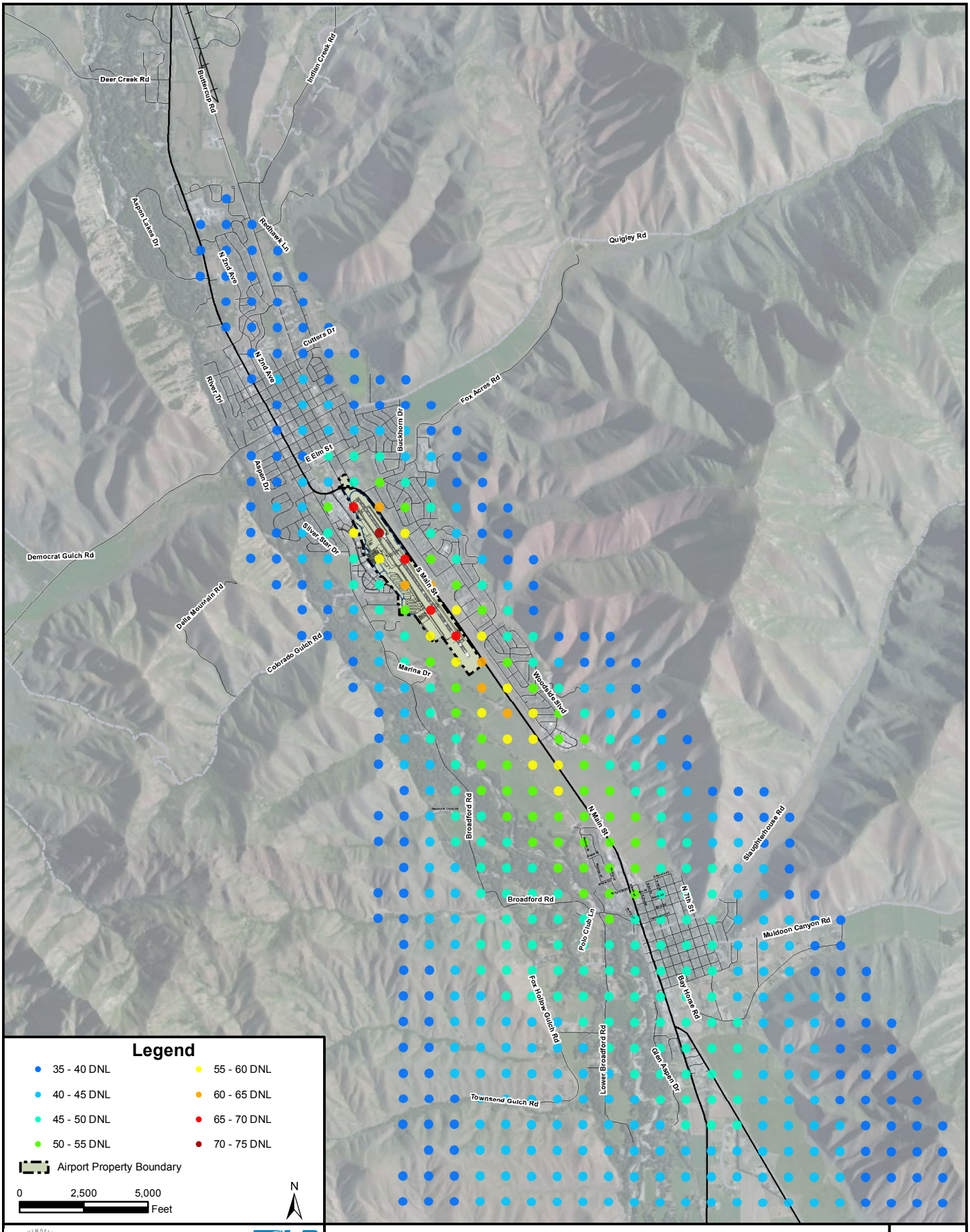

Noise Analysis
Friedman Memorial Airport

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Existing (2017) Baseline Grid Point Noise (DNL) Analysis

EXHIBIT: **5**

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