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## **Appendix L-2**

### Noise Technical Report (Sleep Disturbance)





# March Air Reserve Base Noise Technical Report for Proposed Project

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## 1.0 Introduction

This Noise Technical Report summarizes the aircraft noise analysis for a potential warehouse project at March Air Reserve Base (March ARB). The objective of this study is to analyze sleep disturbance and residential acclimation using guidance from the American National Standards Institute (ANSI) *Technical Report ASA TR S12.9-2018/Part 6 Rationale for Withdrawing S.12.9-2008/Part 6 Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard In Homes* for multiple scenarios described below.

For the purposes of this analysis, the aircraft-related noise exposure is described using noise contours prepared with the Federal Aviation Administration's (FAA) Aviation Environmental Design Tool (AEDT) Version 3e.

## 2.0 Noise and Effects on People

The following section provides basic information on noise and its characteristics, and the effects of noise on people.

### 2.1 Characteristics of Sound

Sound can be described in terms of amplitude (loudness), frequency (pitch), and duration (time). The standard unit of measurement of the loudness of sound is the decibel (dB). Decibels are based on the logarithmic scale. The logarithmic scale compresses the wide range in sound pressure levels to a more usable range of numbers in a manner similar to the Richter scale used to measure earthquakes.

The human hearing system is not equally sensitive to sound at all frequencies. Sound waves below 16 Hz are not heard at all but are "felt" as a vibration. Similarly, while people with extremely sensitive hearing can hear sounds as high as 20,000 Hz, most people cannot hear above 15,000 Hz. In all cases, hearing acuity falls off rapidly above about 10,000 Hz and below about 200 Hz. Since the human ear is not equally sensitive to sound at all frequencies, a frequency-dependent rating scale has been devised to relate noise to human sensitivity. The A-weighted decibel scale (dBA) performs this compensation by discriminating against frequencies in a manner approximating the sensitivity of the human ear. Community noise levels are measured in terms of the A-weighted decibel abbreviated dBA or dB.

### 2.2 Propagation of Noise

Outdoor sound levels decrease as a result of several factors, including distance from the sound source, atmospheric absorption (characteristics in the atmosphere that absorb sound), and ground attenuation (characteristics on the ground that absorb sound). If sound is radiated from a source in a homogeneous and undisturbed manner, the sound travels in spherical waves. As the sound wave travels away from the source, the sound energy is spread over a greater area dispersing the sound power of the wave.

Temperature and humidity of the atmosphere also influence the sound levels received by the observer. The influence of the atmosphere and the resultant fluctuations increase with distance and become particularly important at distances greater than 1,000 feet. The degree of absorption depends on frequency of the sound as well as the humidity and air temperature. For example, when the air is cold and humid, and therefore denser, atmospheric absorption is lowest. Higher frequencies are more readily absorbed than the lower frequencies. Over large distances, lower frequency sounds become dominant as the higher frequencies are attenuated.

### 2.3 Noise Metrics

The analysis and reporting of community noise levels around communities has to account for the complexity of human response to noise and the variety of noise metrics that have been developed for describing noise impacts. Each of these metrics attempts to quantify noise levels with respect to community response.

Noise metrics can be divided into two categories: single event and cumulative. Single event metrics describe the noise levels from an individual event such as an aircraft flyover. Cumulative metrics average the total noise over a specific time period, which is typically from one to 24-hours for community noise levels. This study presents both single event and cumulative noise modeling results.

**Maximum Noise Level (L<sub>max</sub>)** is the peak sound level during an aircraft noise event. The metric only accounts for the instantaneous peak intensity of the sound, and not for the duration of the event. As an aircraft passes by an observer, the sound level increases to a maximum level and then decreases. Typical single event noise levels range from over 90 dBA close to the airport to 50-60 dBA at more distant locations.

**Sound Exposure Level (SEL)** is calculated by summing the decibel levels during a noise event and compressing that noise into one second. The SEL value is the integration of all the acoustic energy contained within the noise event (for example, an aircraft overflight or automobile pass-by). This metric considers both the maximum noise level of the event and the duration of the event. For aircraft flyovers, the SEL value is approximately 10 dB higher than the maximum noise level.

**Community Noise Equivalent Level (CNEL)** is a measure of twenty-four hours and applies a weighting factor which places greater significance on noise events occurring during the evening and night hours. CNEL is a 24-hour, time-weighted average noise level based on the A-weighted decibel. Time-weighted refers to the fact that noise which occurs during certain sensitive time periods is penalized for occurring at these times. The evening time period (7 p.m. to 10 p.m.) is penalized by 4.7 dB and night time period (10 p.m. to 7 a.m.) is penalized by 10 dB. These penalties were selected to attempt to account for increased human sensitivity to noise during quieter periods of a day, where rest and sleep is the most common activity. CNEL levels near airports range from DNL 75 dB on airport property to below DNL 45 dB at more distant locations.

### 3.0 Noise Methodology Guidance

This analysis used specific methodology to generate an analysis of sleep disturbance and residential acclimation using guidance from American National Standards Institute (ANSI) *Technical Report ASA TR S12.9-2018/Part 6 Rationale for Withdrawing S.12.9-2008/Part 6 Methods for Estimation of Awakenings Associated with Outdoor Noise Events Heard In Homes* for the following scenarios. The ANSI technical report ASA TR S12.9-2018 replaces the previously published guidance in 2008 that was used in prior studies at March ARB. It should be noted that ANSI guidance is voluntary and is based on industry best practices.

This updated guidance contains two formulas for calculating aircraft disturbances for residents that have become accustomed to both military and civilian operations at March ARB, and for those new to the area and are not acclimated to aircraft noise events.

ANSI formula for probability of sleep disturbance for acclimated residents (habituated):

$$P_{A,\text{single}} = \frac{1}{1 + e^{-Z}}$$

According to the ANSI guidance, “This equation was derived from behavioral awakenings associated with noise events in “steady-state” situations where the noise has been present in both level and in frequency of occurrence for at least a year.” (ANSI, 15)

ANSI formula for probability of residential acclimation (new):

$$P_{A,\text{single}} = 0.0087 \times (L_{AE} - 30)^{1.79}$$

According to the ANSI guidance, until the issuance of the most recent voluntary guidelines in ANSI *Technical Report ASA TR S12.9-2018/Part 6*, virtually all sleep research has been focused on residents that were exposed to a noise source for a “long period of time” which is defined as longer than one year. The residential acclimation formula relies on the Federal Interagency Committee on Aviation Noise (FICAN) recommendation of using a functional relation of “an upper bound to the behavioral awakening data...” (ANSI, 17), that would better correlate nighttime sounds for residents that are new to an area.

#### 4.0 Project Scenarios

This analysis focused on the following four scenarios:

- Project Scenario for a total of 10,608 flights distributed across day, evening and night as provided by Mead & Hunt.
- Nighttime flight noise reduction alternative – removes nighttime operations (10 pm – 7 am) and redistributes them in daytime hours (7 am – 7 pm). Redistribution to be provided by Mead & Hunt.
- Reduced flight operations alternative – reduction in total operations. Night, evening and daytime distribution stays the same as proposed project. Reduction of operations to be provided by Mead & Hunt.
- Private aircraft services alternative – reflects a project change to GA aircraft rather than air cargo. Fleet mix to be provided by Mead & Hunt.

#### 4.1 Sound Exposure Level (SEL) Receptor Point Analysis

For each of the habituated and new scenarios, SEL noise contours were generated using FAA’s AEDT Version 3d, which was released in March 2021. Subsequent to the start of this analysis, AEDT Version 3e was released that included U.S. Census data from 2020. For this analysis, AEDT Version 3e was used to generate population data. As with prior habituation studies, this team created a grid of noise receptors that represent residential land uses off each runway end; to the northwest off Runway 14, there are 32 receptors and to the south off Runway 32, there are 12 receptors.

The aircraft modeled for this analysis is the Boeing 767-300; this is representative of the aircraft type anticipated to be used for this Project. The analysis includes the 85 dBA SEL noise contours for the B767-300 landing and arriving on each runway end. Each of these sound exposure level noise contours

represents one operation, which would be one arrival or one departure. Each of the arrival and departure operations was assumed to operate straight in, not executing a turn within five nautical miles of March ARB. **Appendix A** contains figures and tables showing both habituated and new percentage awakened for arrival and departure operations on each runway end. **Table 1** below shows the 85 SEL size in square miles and the population within the contours.

As an example, as shown in Appendix A, for the B737-300 arriving on Runway 32, the average percent awakened for habituated residents is 1.2% and for new residents, it is 2.5%. For departures on Runway 32, the average percent awakened for habituated residents is 2.3% and for new residents, it is 6.4%.

**Table 1 – SEL Contour Area and Population Exposure**

Operation Runway		SEL Contour Area and Population Exposure	
		Sq Miles*	85dBA
Arrival	Runway 14	3	4,390
Arrival	Runway 32	3	8,913
Departure	Runway 14	9	4,559
Departure	Runway 32	9	3,074

Source: AEDT Version 3d and Version 3e, 2020 U.S. Census

\*Square miles are rounded to the nearest tenth

#### 4.2 Annual Average CNEL Population Analysis

Alternative	CNEL Contour Population Exposure Count			
	55dBA	60dBA	65dBA	70dBA
Preferred Flight Operations (proposed project)	485	19	10	2
No night operations alternative	144	16	7	1
Reduced flight operations alternative	241	16	8	1
GA operations alternative	7	1	1	

Source: AEDT Version 3e, 2020 US Census

## 5.0 Summary

This analysis considered the noise exposure levels from a Boeing 767-300 aircraft arriving and departing at March ARB on Runway 14/32. The analysis shows that for habituated residents, the percent awakened ranged from 1.1% to 2.9% for departures and 3.7% to 0.5% for landing. For new residents, the percent awakened ranged from 8.2% to 3.2% for departures and 10.2% to 0.1% for landing.

For the average annual CNEL analysis, the data show that for habituated and new residents, the percentage awakened was 1% or less. The guidance used to determine the percent awakened for habituated and new residents is voluntary guidance independent of state or Federal guidance for noise annoyance.

## 6.0 Appendix

*May 13, 2022*

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**Appendix Table 1**

Sorted in descending Latitude values

Latitude	Longitude	Elevation MSL (ft)
33.9221095	-117.2830439	1548
33.9218128	-117.283632	1548
33.9217412	-117.2830915	1548
33.9215511	-117.2829939	1548
33.9214641	-117.2836721	1548
33.9213601	-117.2830638	1548
33.9211503	-117.2827092	1548
33.9211324	-117.2830792	1548
33.921023	-117.283648	1548
33.920971	-117.283822	1548
33.920918	-117.283996	1548
33.920882	-117.28364	1548
33.920873	-117.284194	1548
33.920795	-117.282705	1548
33.92079	-117.284409	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920697	-117.284088	1548
33.920661	-117.284303	1548
33.920633	-117.283641	1548
33.920562	-117.28381	1548
33.920531	-117.284229	1548
33.920466	-117.284003	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920211	-117.283633	1548
33.920082	-117.283951	1548
33.920025	-117.282829	1548
33.919953	-117.283314	1548
33.919442	-117.285363	1548
33.918914	-117.285346	1548
33.91837	-117.285171	1548
33.851642	-117.23959	1548
33.851597	-117.242402	1548
33.851584	-117.24067	1548
33.851576	-117.241835	1548
33.851544	-117.241229	1548
33.851538	-117.240112	1548
33.850818	-117.239437	1548
33.850383	-117.239495	1548
33.850056	-117.239535	1548
33.849568	-117.239519	1548
33.848923	-117.239532	1548
33.848883	-117.240077	1548

<b>Arrival Runway 14</b>		
<b>Probabilities</b>		
	<i>Eq. B.1</i>	<i>Eq. C.1</i>
SEL	P(Habituated)	P(New)
84.2	2.2%	6.2%
85.5	2.3%	6.6%
84.7	2.2%	6.3%
84.7	2.2%	6.3%
86.1	2.3%	6.7%
85.1	2.2%	6.4%
84.7	2.2%	6.3%
85.4	2.3%	6.5%
86.6	2.4%	6.9%
87.1	2.4%	7.0%
87.5	2.5%	7.1%
86.8	2.4%	6.9%
88.0	2.5%	7.3%
85.2	2.3%	6.5%
88.5	2.6%	7.5%
86.0	2.3%	6.7%
85.7	2.3%	6.6%
88.0	2.5%	7.3%
88.5	2.6%	7.5%
87.2	2.5%	7.1%
87.6	2.5%	7.2%
88.6	2.6%	7.5%
88.2	2.6%	7.4%
86.8	2.4%	6.9%
86.5	2.4%	6.8%
87.8	2.5%	7.2%
88.7	2.6%	7.5%
86.4	2.4%	6.8%
87.5	2.5%	7.1%
92.4	3.1%	8.7%
92.9	3.1%	8.9%
93.3	3.2%	9.0%
52.7	0.5%	0.3%
53.1	0.6%	0.4%
52.9	0.5%	0.3%
53.0	0.5%	0.4%
52.9	0.5%	0.4%
52.8	0.5%	0.3%
52.5	0.5%	0.3%
52.4	0.5%	0.3%
52.3	0.5%	0.3%
52.1	0.5%	0.3%
52.0	0.5%	0.3%
52.0	0.5%	0.3%



Figure 1A: SEL Contour and Graduated Color Grid values





Figure 1B: SEL Contour and Percent of Habituated Population Potentially Awakened





Figure 1C: SEL Contour and Percent of New Population Potentially Awakened





Figure 1D: SEL Contour and % of New Population Potentially Awakened (Zoomed In)



**Appendix Table 2**

Sorted in descending Latitude values

Latitude	Longitude	Elevation MSL (ft)
33.9221095	-117.2830439	1548
33.9218128	-117.283632	1548
33.9217412	-117.2830915	1548
33.9215511	-117.2829939	1548
33.9214641	-117.2836721	1548
33.9213601	-117.2830638	1548
33.9211503	-117.2827092	1548
33.9211324	-117.2830792	1548
33.921023	-117.283648	1548
33.920971	-117.283822	1548
33.920918	-117.283996	1548
33.920882	-117.28364	1548
33.920873	-117.284194	1548
33.920795	-117.282705	1548
33.92079	-117.284409	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920697	-117.284088	1548
33.920661	-117.284303	1548
33.920633	-117.283641	1548
33.920562	-117.28381	1548
33.920531	-117.284229	1548
33.920466	-117.284003	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920211	-117.283633	1548
33.920082	-117.283951	1548
33.920025	-117.282829	1548
33.919953	-117.283314	1548
33.919442	-117.285363	1548
33.918914	-117.285346	1548
33.91837	-117.285171	1548
33.851642	-117.23959	1548
33.851597	-117.242402	1548
33.851584	-117.24067	1548
33.851576	-117.241835	1548
33.851544	-117.241229	1548
33.851538	-117.240112	1548
33.850818	-117.239437	1548
33.850383	-117.239495	1548
33.850056	-117.239535	1548
33.849568	-117.239519	1548
33.848923	-117.239532	1548
33.848883	-117.240077	1548

**Arrival Runway 32**

Probabilities		
	<i>Eq. B.1</i>	<i>Eq. C.1</i>
SEL	P(Habituated)	P(New)
49.2	0.5%	0.1%
49.2	0.5%	0.1%
49.3	0.5%	0.1%
49.3	0.5%	0.1%
49.3	0.5%	0.1%
49.4	0.5%	0.1%
49.5	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.4	0.5%	0.1%
49.5	0.5%	0.1%
49.4	0.5%	0.1%
49.5	0.5%	0.1%
49.5	0.5%	0.1%
49.4	0.5%	0.1%
49.5	0.5%	0.1%
49.6	0.5%	0.1%
49.6	0.5%	0.1%
49.6	0.5%	0.1%
49.6	0.5%	0.1%
49.6	0.5%	0.1%
49.6	0.5%	0.1%
49.7	0.5%	0.1%
49.7	0.5%	0.1%
49.6	0.5%	0.1%
49.7	0.5%	0.1%
49.8	0.5%	0.1%
96.7	3.7%	10.2%
88.0	2.5%	7.3%
93.1	3.2%	8.9%
89.5	2.7%	7.8%
91.2	2.9%	8.3%
94.9	3.4%	9.5%
95.3	3.5%	9.7%
94.1	3.3%	9.2%
93.2	3.2%	9.0%
92.1	3.0%	8.6%
90.8	2.9%	8.2%
89.2	2.7%	7.7%



Figure 2A: SEL Contour and Graduated Color Grid values

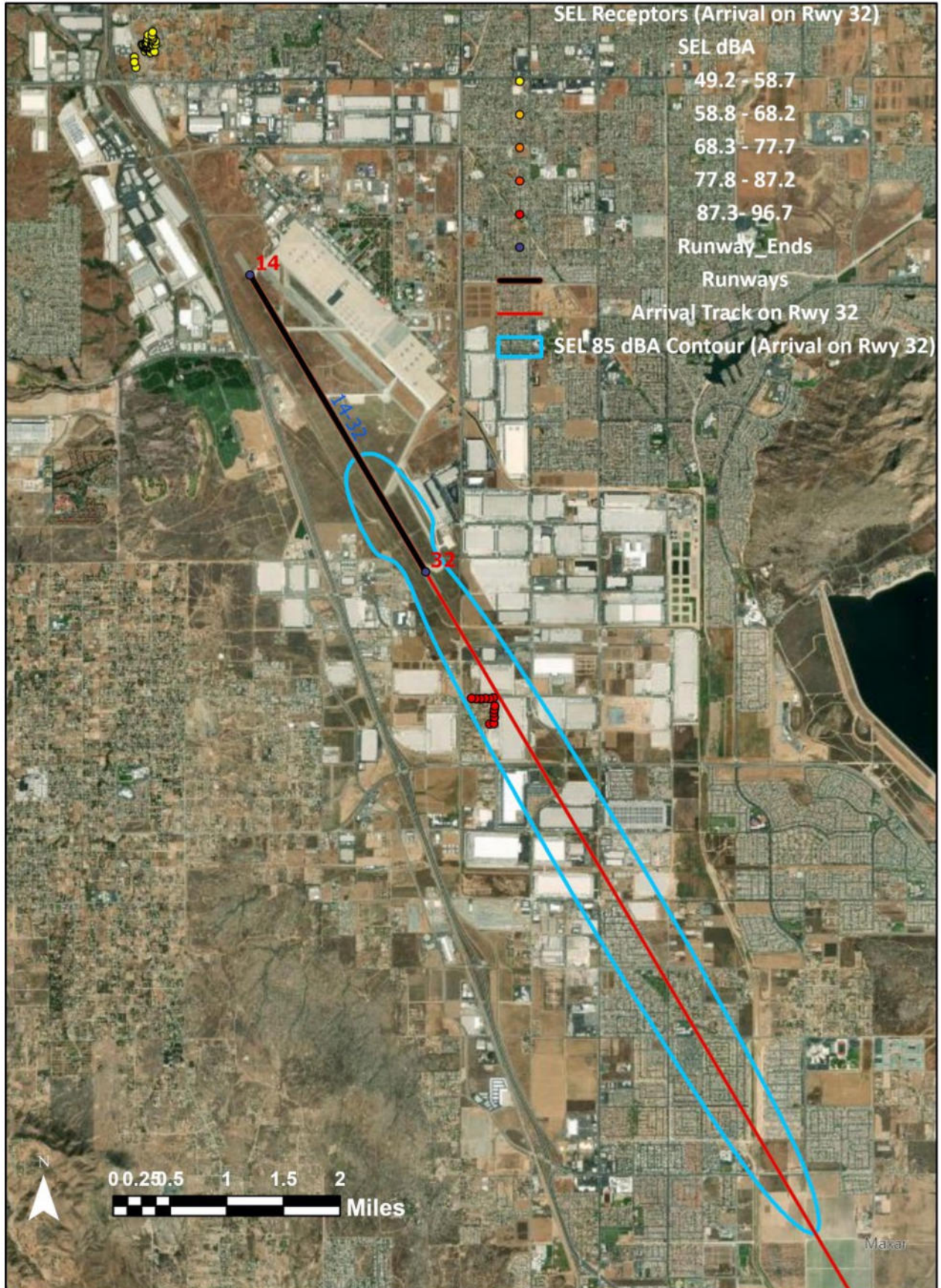




Figure 2B: SEL Contour and Percent of Habituated Population Potentially Awakened

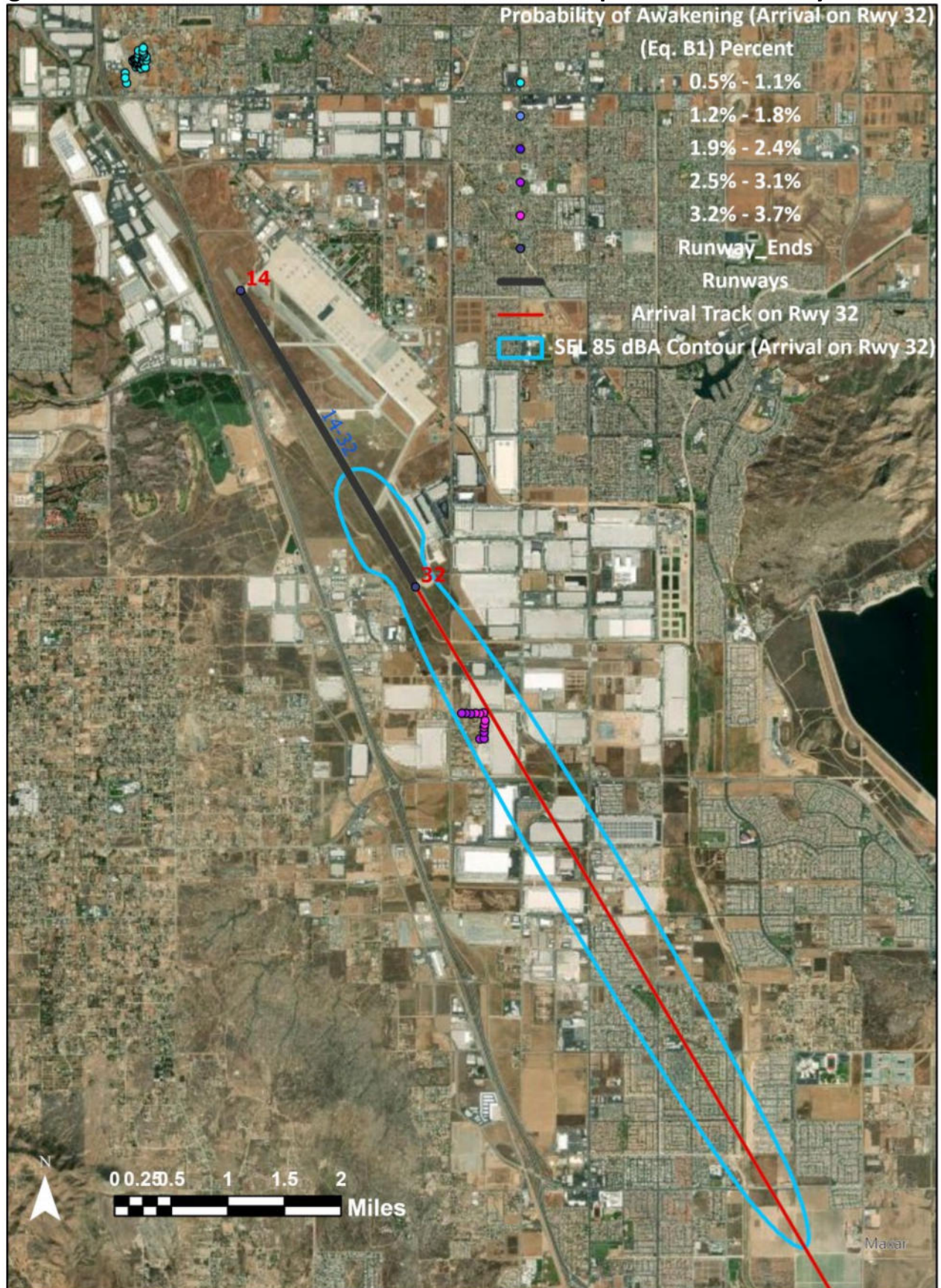




Figure 2C: SEL Contour and Percent of New Population Potentially Awakened

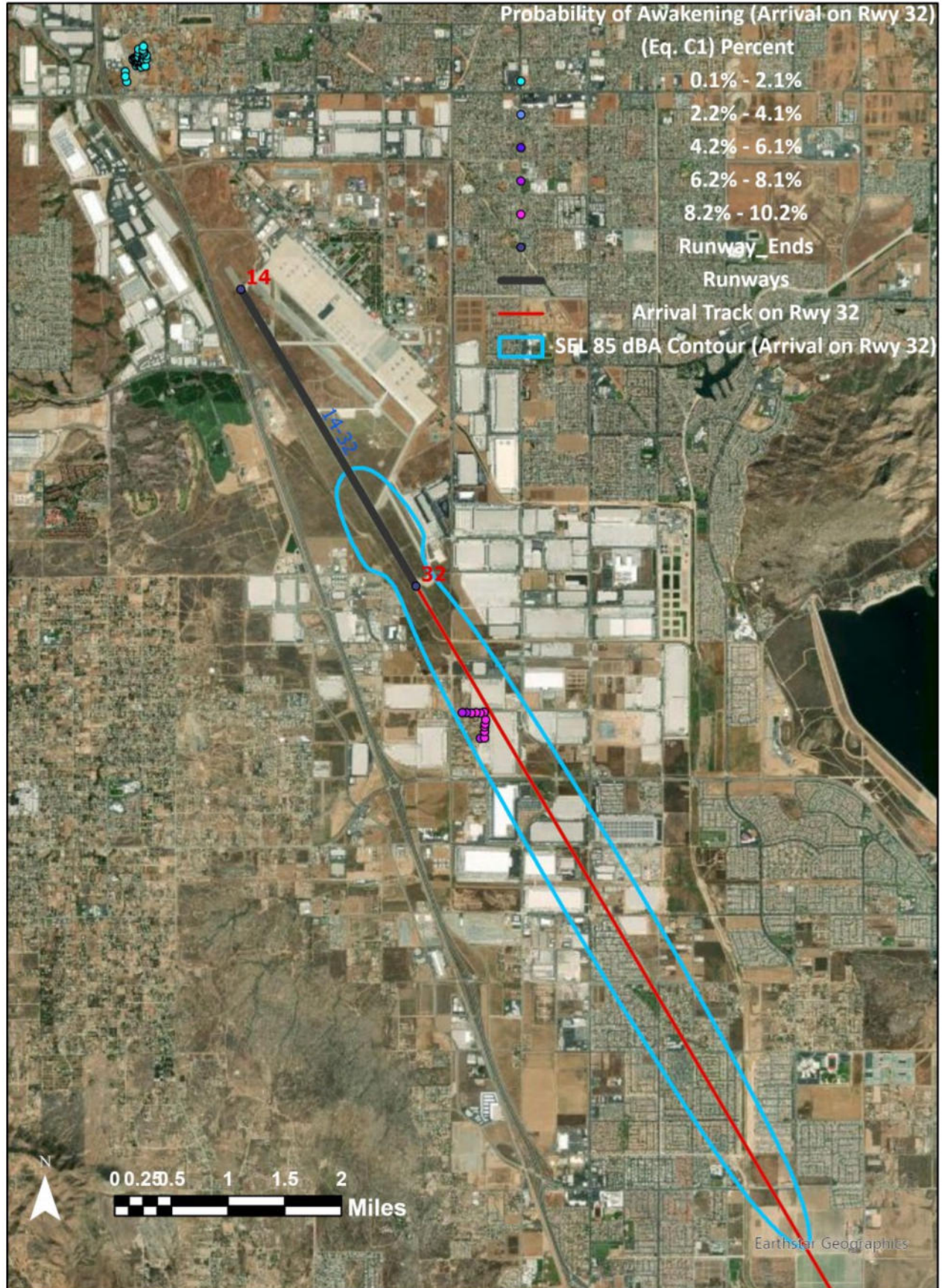




Figure 2D: SEL Contour and % of New Population Potentially Awakened (Zoomed In)



**Appendix Table 3**

Sorted in descending Latitude values

Latitude	Longitude	Elevation MSL (ft)
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33.9218128	-117.283632	1548
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33.9215511	-117.2829939	1548
33.9214641	-117.2836721	1548
33.9213601	-117.2830638	1548
33.9211503	-117.2827092	1548
33.9211324	-117.2830792	1548
33.921023	-117.283648	1548
33.920971	-117.283822	1548
33.920918	-117.283996	1548
33.920882	-117.28364	1548
33.920873	-117.284194	1548
33.920795	-117.282705	1548
33.92079	-117.284409	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920697	-117.284088	1548
33.920661	-117.284303	1548
33.920633	-117.283641	1548
33.920562	-117.28381	1548
33.920531	-117.284229	1548
33.920466	-117.284003	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920211	-117.283633	1548
33.920082	-117.283951	1548
33.920025	-117.282829	1548
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33.851576	-117.241835	1548
33.851544	-117.241229	1548
33.851538	-117.240112	1548
33.850818	-117.239437	1548
33.850383	-117.239495	1548
33.850056	-117.239535	1548
33.849568	-117.239519	1548
33.848923	-117.239532	1548
33.848883	-117.240077	1548

Departure Runway 14		
Probabilities		
	<i>Eq. B.1</i>	<i>Eq. C.1</i>
Indoor SEL	P(Habituated)	P(New)
67.9	1.1%	2.4%
67.8	1.1%	2.4%
68.0	1.1%	2.4%
68.1	1.1%	2.4%
67.9	1.1%	2.4%
68.1	1.1%	2.4%
68.3	1.1%	2.4%
68.2	1.1%	2.4%
68.1	1.1%	2.4%
68.1	1.1%	2.4%
68.1	1.1%	2.4%
68.0	1.1%	2.4%
68.4	1.1%	2.5%
68.0	1.1%	2.4%
68.3	1.1%	2.4%
68.3	1.1%	2.4%
68.1	1.1%	2.4%
68.1	1.1%	2.4%
68.2	1.1%	2.4%
68.2	1.1%	2.4%
68.1	1.1%	2.4%
68.2	1.1%	2.4%
68.4	1.1%	2.5%
68.5	1.1%	2.5%
68.4	1.1%	2.4%
68.3	1.1%	2.4%
68.6	1.1%	2.5%
68.5	1.1%	2.5%
68.3	1.1%	2.4%
68.5	1.1%	2.5%
68.7	1.1%	2.5%
91.0	2.9%	8.2%
90.7	2.9%	8.1%
90.9	2.9%	8.2%
90.8	2.9%	8.2%
90.8	2.9%	8.2%
90.9	2.9%	8.2%
90.8	2.9%	8.2%
90.8	2.9%	8.2%
90.7	2.9%	8.1%
90.6	2.9%	8.1%
90.4	2.8%	8.1%
90.3	2.8%	8.0%

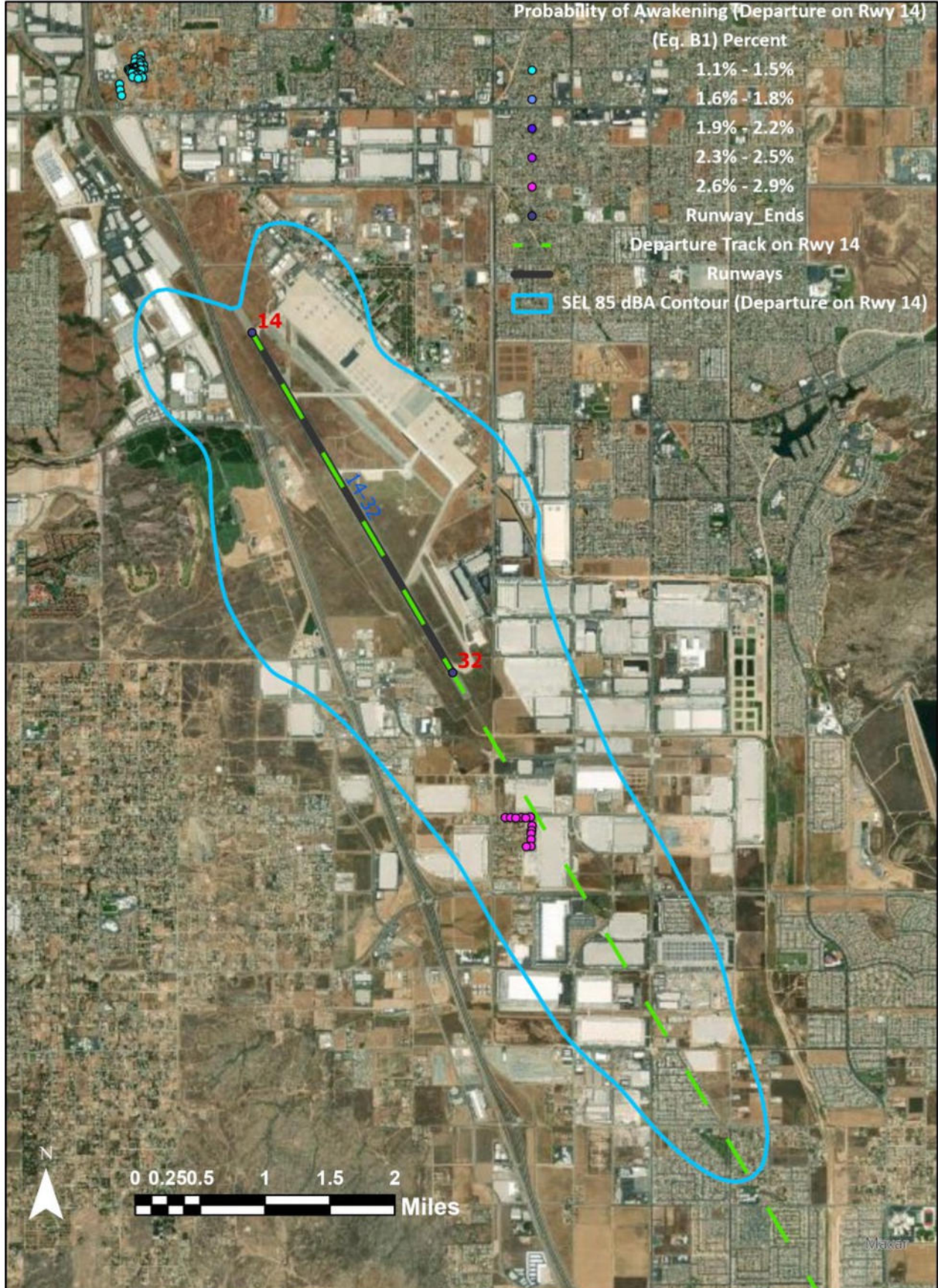


Figure 3A: SEL Contour and Graduated Color Grid values





**Figure 3B: SEL Contour and Percent of Habituated Population Potentially Awakened**





**Figure 3C: SEL Contour and Percent of New Population Potentially Awakened**

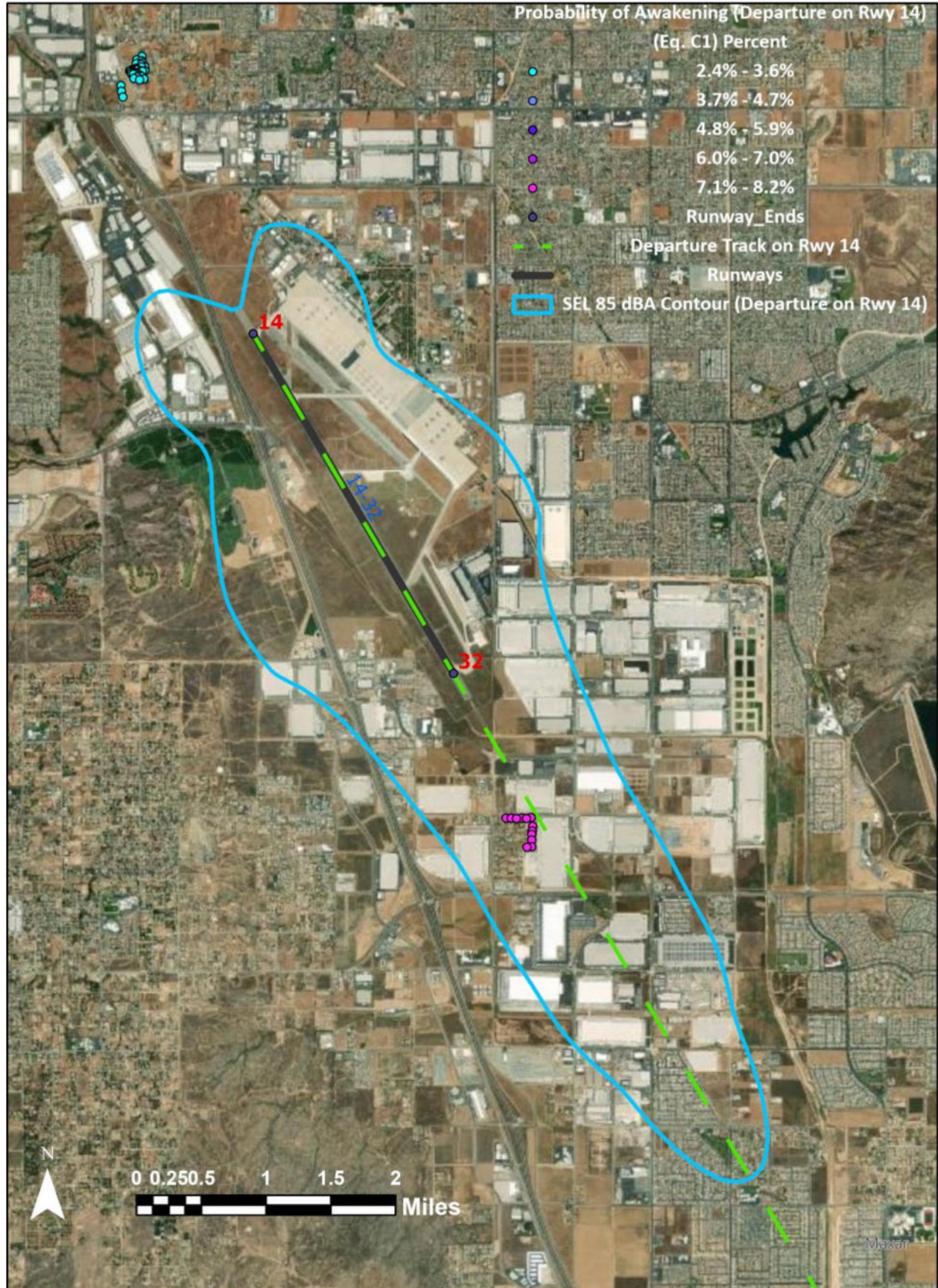




Figure 3D: SEL Contour and % of New Population Potentially Awakened- (Zoomed In)



**Appendix Table 4**

Sorted in descending Latitude values

Latitude	Longitude	Elevation MSL (ft)
33.9221095	-117.2830439	1548
33.9218128	-117.283632	1548
33.9217412	-117.2830915	1548
33.9215511	-117.2829939	1548
33.9214641	-117.2836721	1548
33.9213601	-117.2830638	1548
33.9211503	-117.2827092	1548
33.9211324	-117.2830792	1548
33.921023	-117.283648	1548
33.920971	-117.283822	1548
33.920918	-117.283996	1548
33.920882	-117.28364	1548
33.920873	-117.284194	1548
33.920795	-117.282705	1548
33.92079	-117.284409	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920697	-117.284088	1548
33.920661	-117.284303	1548
33.920633	-117.283641	1548
33.920562	-117.28381	1548
33.920531	-117.284229	1548
33.920466	-117.284003	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920211	-117.283633	1548
33.920082	-117.283951	1548
33.920025	-117.282829	1548
33.919953	-117.283314	1548
33.919442	-117.285363	1548
33.918914	-117.285346	1548
33.91837	-117.285171	1548
33.851642	-117.23959	1548
33.851597	-117.242402	1548
33.851584	-117.24067	1548
33.851576	-117.241835	1548
33.851544	-117.241229	1548
33.851538	-117.240112	1548
33.850818	-117.239437	1548
33.850383	-117.239495	1548
33.850056	-117.239535	1548
33.849568	-117.239519	1548
33.848923	-117.239532	1548
33.848883	-117.240077	1548

Departure Runway 32		
Probabilities		
	<i>Eq. B.1</i>	<i>Eq. C.1</i>
SEL	P(Habituated)	P(New)
88.0	2.5%	7.4%
88.3	2.6%	7.4%
88.2	2.6%	7.4%
88.2	2.6%	7.4%
88.4	2.6%	7.4%
88.3	2.6%	7.4%
88.3	2.6%	7.4%
88.4	2.6%	7.4%
88.6	2.6%	7.5%
88.6	2.6%	7.5%
88.7	2.6%	7.5%
88.6	2.6%	7.5%
88.7	2.6%	7.5%
88.4	2.6%	7.4%
88.8	2.6%	7.5%
88.5	2.6%	7.5%
88.5	2.6%	7.5%
88.8	2.6%	7.5%
88.8	2.6%	7.5%
88.7	2.6%	7.5%
88.8	2.6%	7.5%
88.8	2.6%	7.5%
88.8	2.6%	7.6%
88.8	2.6%	7.5%
88.7	2.6%	7.5%
88.7	2.6%	7.5%
88.8	2.6%	7.6%
88.9	2.6%	7.6%
88.7	2.6%	7.5%
88.8	2.6%	7.6%
89.2	2.7%	7.7%
89.3	2.7%	7.7%
89.4	2.7%	7.7%
73.2	1.3%	3.4%
74.2	1.4%	3.6%
73.5	1.4%	3.5%
73.9	1.4%	3.6%
73.6	1.4%	3.5%
73.3	1.3%	3.5%
72.9	1.3%	3.4%
72.8	1.3%	3.3%
72.7	1.3%	3.3%
72.5	1.3%	3.3%
72.3	1.3%	3.2%
72.4	1.3%	3.3%

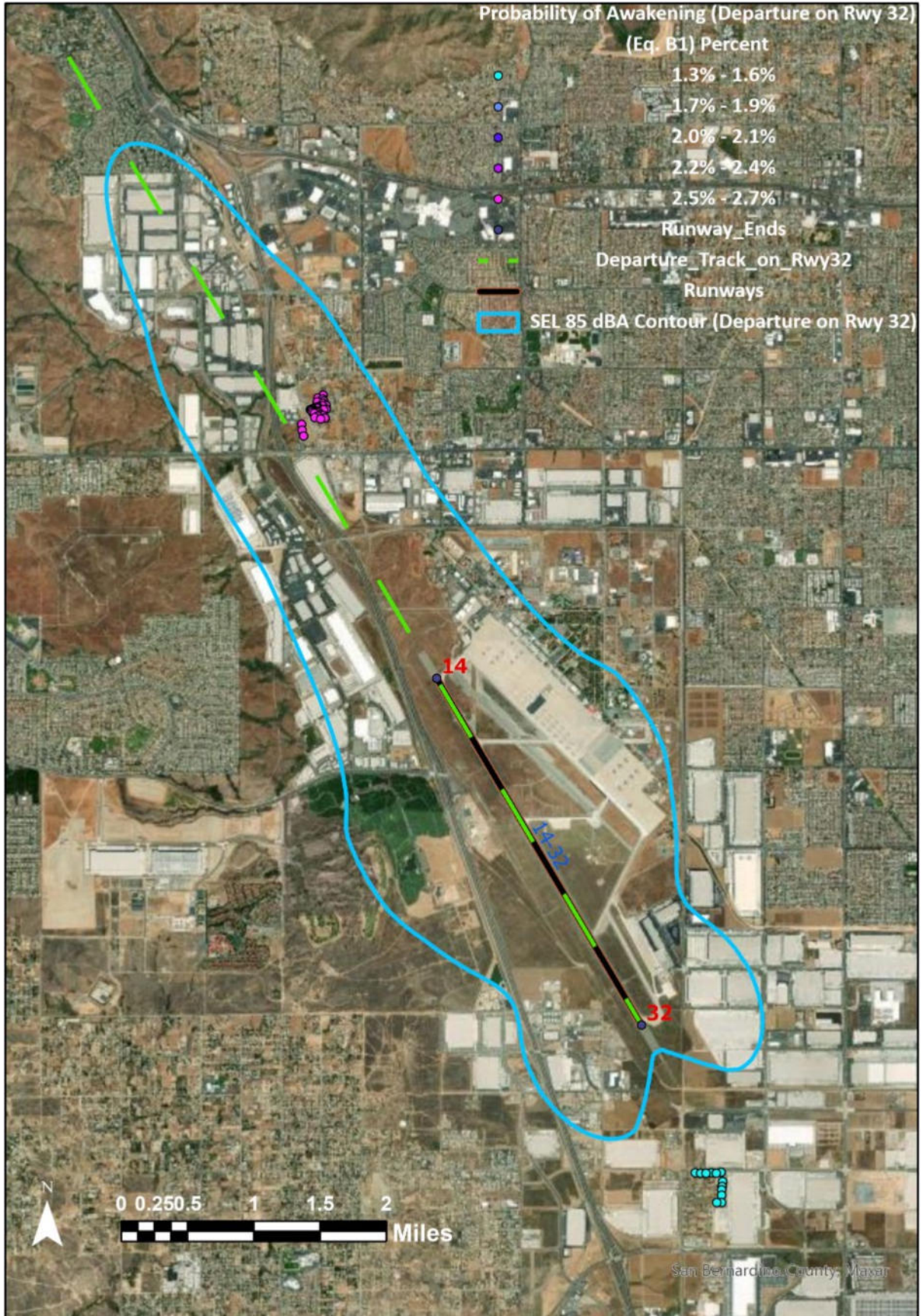


**Figure 4A: SEL Contour and Graduated Color Grid values**





**Figure 4B: SEL Contour and Percent of Habituated Population Potentially Awakened**





**Figure 4C: SEL Contour and Percent of New Population Potentially Awakened**

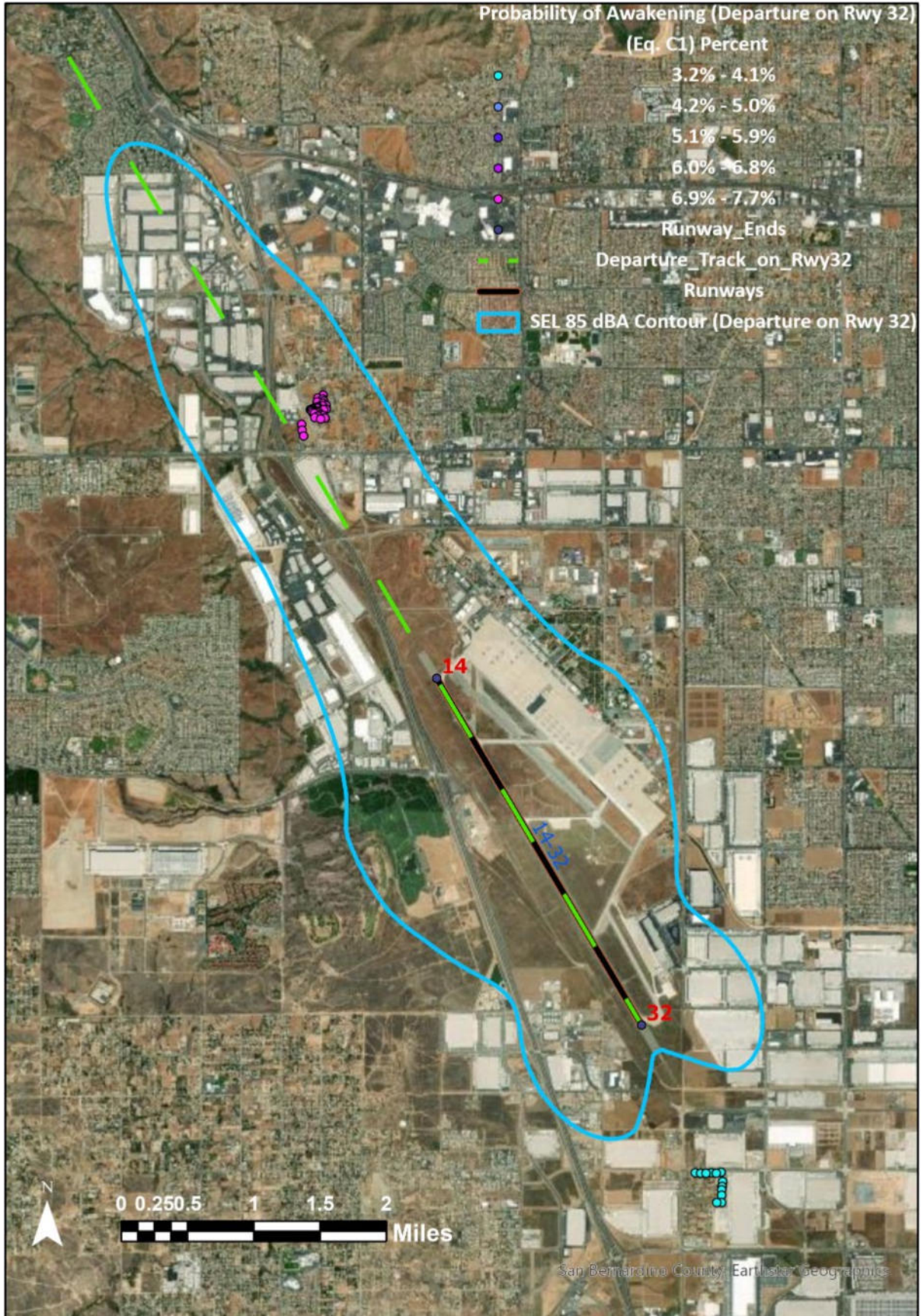


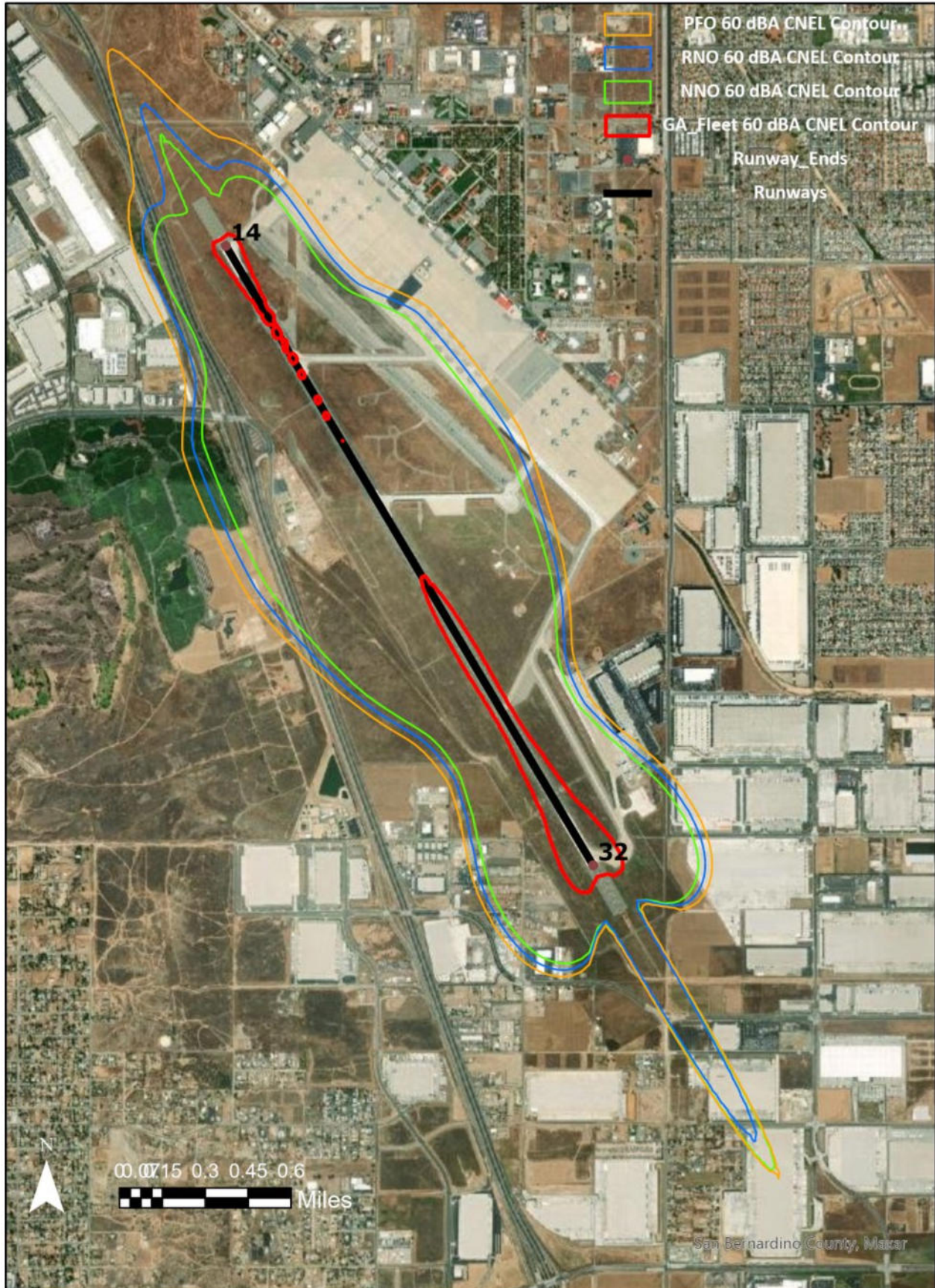


Figure 4D: SEL Contour and of New Population Potentially Awakened- (Zoomed In)





Figure 5: Comparison of Four CNEL Scenarios





Appendix Table 6

**Preferred Flight Operations**

Latitude	Longitude	Elevation MSL (ft)	Probabilities		
			<i>Eq. B.1</i>		<i>Eq. C.1</i>
			SEL	P(Habituated)	P(New)
33.91837	-117.285171	1548	57.0	0.006557369	0.74678352
33.920531	-117.284229	1548	56.2	0.006310251	0.65288721
33.919442	-117.285363	1548	56.7	0.006473946	0.71486683
33.920082	-117.283951	1548	56.2	0.006332583	0.661288469
33.920211	-117.283633	1548	56.1	0.006299114	0.648704367
33.919953	-117.283314	1548	56.1	0.006301897	0.649748966
33.920331	-117.283254	1548	56.0	0.00626029	0.63415795
33.920252	-117.283015	1548	55.9	0.006249241	0.630028592
33.920025	-117.282829	1548	56.0	0.006257526	0.633124495
33.920466	-117.284003	1548	56.1	0.006299114	0.648704367
33.920562	-117.28381	1548	56.0	0.0062769	0.6403743
33.920633	-117.283641	1548	56.0	0.00626029	0.63415795
33.920661	-117.284303	1548	56.1	0.006301897	0.649748966
33.920697	-117.284088	1548	56.1	0.006285221	0.643492507
33.920882	-117.28364	1548	55.9	0.006235457	0.624883644
33.92079	-117.284409	1548	56.1	0.006299114	0.648704367
33.920873	-117.284194	1548	56.0	0.0062769	0.6403743
33.920918	-117.283996	1548	56.0	0.006257526	0.633124495
33.920971	-117.283822	1548	55.9	0.006240967	0.626939389
33.921023	-117.283648	1548	55.8	0.006221703	0.619757324
33.920783	-117.283164	1548	55.8	0.00620798	0.61464965
33.920767	-117.283	1548	55.8	0.006197023	0.610576948
33.920795	-117.282705	1548	55.7	0.006169714	0.600447513
33.848883	-117.240077	1548	53.9	0.00570567	0.433689054
33.848923	-117.239532	1548	55.0	0.0060057	0.540284612
33.849568	-117.239519	1548	56.2	0.006318616	0.656032126
33.850056	-117.239535	1548	57.1	0.00657186	0.75234851
33.850383	-117.239495	1548	57.9	0.006802079	0.841512529
33.850818	-117.239437	1548	59.0	0.007143572	0.975934834
33.851642	-117.23959	1548	60.3	0.00755854	1.141753293
33.851538	-117.240112	1548	58.6	0.007030992	0.931376545
33.851584	-117.24067	1548	57.1	0.006563162	0.749007328
33.851544	-117.241229	1548	55.5	0.006131682	0.586392105
33.851576	-117.241835	1548	54.2	0.005797153	0.465663375
33.851597	-117.242402	1548	53.2	0.005544115	0.378516624
33.918914	-117.285346	1548	56.9	0.006508338	0.727999106



Figure 6C: Preferred Flight Operations CNEL Contour and Percent of New Population Potentially Awakened





**Appendix Table 7**

Latitude	Longitude	Elevation MSL (ft)
33.91837	-117.285171	1548
33.920531	-117.284229	1548
33.919442	-117.285363	1548
33.920082	-117.283951	1548
33.920211	-117.283633	1548
33.919953	-117.283314	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920025	-117.282829	1548
33.920466	-117.284003	1548
33.920562	-117.28381	1548
33.920633	-117.283641	1548
33.920661	-117.284303	1548
33.920697	-117.284088	1548
33.920882	-117.28364	1548
33.92079	-117.284409	1548
33.920873	-117.284194	1548
33.920918	-117.283996	1548
33.920971	-117.283822	1548
33.921023	-117.283648	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920795	-117.282705	1548
33.848883	-117.240077	1548
33.848923	-117.239532	1548
33.849568	-117.239519	1548
33.850056	-117.239535	1548
33.850383	-117.239495	1548
33.850818	-117.239437	1548
33.851642	-117.23959	1548
33.851538	-117.240112	1548
33.851584	-117.24067	1548
33.851544	-117.241229	1548
33.851576	-117.241835	1548
33.851597	-117.242402	1548
33.918914	-117.285346	1548

<b>No Night Operations</b>		
<b>Probabilities</b>		
	<i>Eq. B.1</i>	<i>Eq. C.1</i>
<b>SEL</b>	<b>P(Habituated)</b>	<b>P(New)</b>
55.7	0.006169714	0.600447513
54.7	0.005905726	0.504229568
55.3	0.006083126	0.568537124
54.8	0.005929254	0.51266954
54.6	0.005892696	0.49956743
54.6	0.005895299	0.500498329
54.5	0.005853775	0.485695843
54.4	0.005843439	0.482025894
54.5	0.005851189	0.484777204
54.6	0.005895299	0.500498329
54.5	0.005874501	0.49307257
54.5	0.005853775	0.485695843
54.6	0.005900511	0.502362419
54.6	0.005882292	0.495851488
54.4	0.005830545	0.477455742
54.6	0.005895299	0.500498329
54.5	0.005874501	0.49307257
54.5	0.005853775	0.485695843
54.4	0.005838278	0.480195527
54.3	0.00582025	0.473813461
54.3	0.005804842	0.468373135
54.2	0.005792032	0.463860724
54.1	0.005766498	0.454893795
53.5	0.005610663	0.401032094
54.8	0.005929254	0.51266954
56.0	0.006254763	0.632091783
56.9	0.006514087	0.730198071
57.7	0.00675123	0.821704293
58.8	0.007102713	0.959738361
60.2	0.007525276	1.128386458
58.5	0.006984606	0.91308227
56.8	0.006502593	0.725803068
55.2	0.006050968	0.556769365
53.8	0.005693078	0.429327702
52.7	0.005420547	0.33756252
55.5	0.006118156	0.581407953



Figure 7C: No Night Operations CNEL Contour and Percent of New Population Potentially Awakened





**Appendix Table 8**

**Reduced Night Operations**

**Probabilities**

*Eq. B.1*

*Eq. C.1*

SEL

P(Habituated)

P(New)

Latitude Longitude Elevation MSL (ft)

33.91837	-117.285171	1548
33.920531	-117.284229	1548
33.919442	-117.285363	1548
33.920082	-117.283951	1548
33.920211	-117.283633	1548
33.919953	-117.283314	1548
33.920331	-117.283254	1548
33.920252	-117.283015	1548
33.920025	-117.282829	1548
33.920466	-117.284003	1548
33.920562	-117.28381	1548
33.920633	-117.283641	1548
33.920661	-117.284303	1548
33.920697	-117.284088	1548
33.920882	-117.28364	1548
33.92079	-117.284409	1548
33.920873	-117.284194	1548
33.920918	-117.283996	1548
33.920971	-117.283822	1548
33.921023	-117.283648	1548
33.920783	-117.283164	1548
33.920767	-117.283	1548
33.920795	-117.282705	1548
33.848883	-117.240077	1548
33.848923	-117.239532	1548
33.849568	-117.239519	1548
33.850056	-117.239535	1548
33.850383	-117.239495	1548
33.850818	-117.239437	1548
33.851642	-117.23959	1548
33.851538	-117.240112	1548
33.851584	-117.24067	1548
33.851544	-117.241229	1548
33.851576	-117.241835	1548
33.851597	-117.242402	1548
33.918914	-117.285346	1548

56.3	0.006343778	0.665506867
55.4	0.006101964	0.57545177
56.0	0.00626029	0.63415795
55.5	0.006123563	0.58339936
55.4	0.006091192	0.571496026
55.4	0.006093883	0.572483833
55.2	0.006053642	0.557745861
55.2	0.006042955	0.553844408
55.2	0.006053642	0.557745861
55.4	0.006093883	0.572483833
55.3	0.006069707	0.563620691
55.2	0.006053642	0.557745861
55.4	0.006093883	0.572483833
55.3	0.006077755	0.566568289
55.1	0.006029624	0.548984597
55.4	0.006091192	0.571496026
55.3	0.006069707	0.563620691
55.2	0.006050968	0.556769365
55.2	0.006034953	0.550926253
55.1	0.006016321	0.5441437
55.0	0.006003048	0.539321735
55.0	0.00599245	0.535477808
54.9	0.005966038	0.525921124
53.2	0.005524548	0.371955832
54.3	0.005817679	0.472904815
55.5	0.006120859	0.582403281
56.4	0.006363417	0.672917534
57.1	0.006586383	0.757931726
58.3	0.006920175	0.887739767
59.5	0.007319032	1.045777987
57.9	0.006808087	0.843856592
56.3	0.006354993	0.669737099
54.8	0.00593974	0.516440474
53.5	0.005613143	0.401877013
52.5	0.005370466	0.32130297
56.1	0.006296333	0.647660511



**Figure 8C: Reduced Night Operations CNEL Contour and Percent of New Population Potentially Awakened**





Appendix Table 9

			General Aviation Fleet		
			Probabilities		
			<i>Eq. B.1</i>		<i>Eq. C.1</i>
Latitude	Longitude	Elevation MSL (ft)	SEL	P(Habituated)	P(New)
33.91837	-117.285171	1548	42.6	0.003464018	#NUM!
33.920531	-117.284229	1548	41.0	0.003232756	#NUM!
33.919442	-117.285363	1548	42.1	0.003394162	#NUM!
33.920082	-117.283951	1548	41.1	0.003244232	#NUM!
33.920211	-117.283633	1548	40.9	0.003212769	#NUM!
33.919953	-117.283314	1548	40.9	0.003208503	#NUM!
33.920331	-117.283254	1548	40.7	0.003177386	#NUM!
33.920252	-117.283015	1548	40.6	0.003166145	#NUM!
33.920025	-117.282829	1548	40.6	0.003168952	#NUM!
33.920466	-117.284003	1548	41.0	0.00322132	#NUM!
33.920562	-117.28381	1548	40.8	0.003201404	#NUM!
33.920633	-117.283641	1548	40.7	0.003184431	#NUM!
33.920661	-117.284303	1548	41.0	0.003228462	#NUM!
33.920697	-117.284088	1548	40.9	0.003211347	#NUM!
33.920882	-117.28364	1548	40.6	0.003166145	#NUM!
33.92079	-117.284409	1548	41.0	0.003227033	#NUM!
33.920873	-117.284194	1548	40.9	0.003205662	#NUM!
33.920918	-117.283996	1548	40.7	0.003188666	#NUM!
33.920971	-117.283822	1548	40.6	0.003173166	#NUM!
33.921023	-117.283648	1548	40.5	0.003157741	#NUM!
33.920783	-117.283164	1548	40.4	0.003139608	#NUM!
33.920767	-117.283	1548	40.3	0.003128501	#NUM!
33.920795	-117.282705	1548	40.1	0.003106404	#NUM!
33.848883	-117.240077	1548	41.0	0.003225603	#NUM!
33.848923	-117.239532	1548	42.2	0.003395666	#NUM!
33.849568	-117.239519	1548	43.3	0.003571498	#NUM!
33.850056	-117.239535	1548	44.2	0.003715051	#NUM!
33.850383	-117.239495	1548	45.0	0.003847284	#NUM!
33.850818	-117.239437	1548	46.1	0.004051782	0.010999652
33.851642	-117.23959	1548	47.7	0.004331787	0.049788537
33.851538	-117.240112	1548	45.7	0.003980678	0.005075093
33.851584	-117.24067	1548	44.2	0.003716697	#NUM!
33.851544	-117.241229	1548	42.7	0.003476313	#NUM!
33.851576	-117.241835	1548	41.4	0.003284719	#NUM!
33.851597	-117.242402	1548	40.3	0.003134049	#NUM!
33.918914	-117.285346	1548	42.3	0.003422844	#NUM!

The SEL values have to be above 45.0 dBA SEL for the Contour and Percent of New Population Potentially Awakened equation to work.